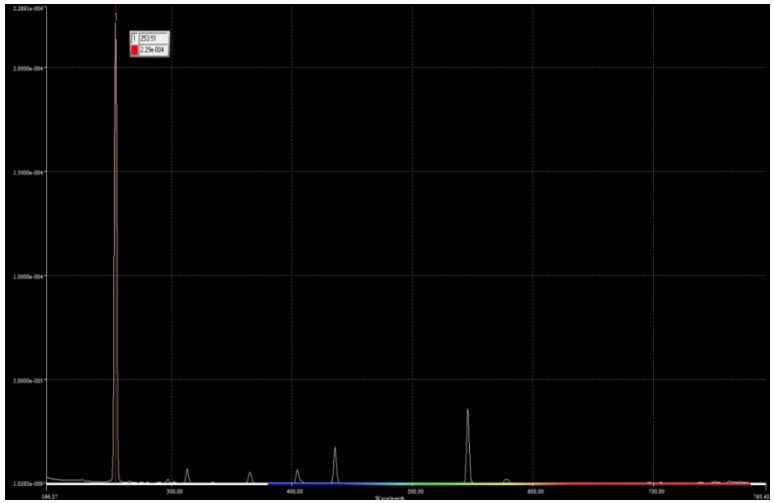
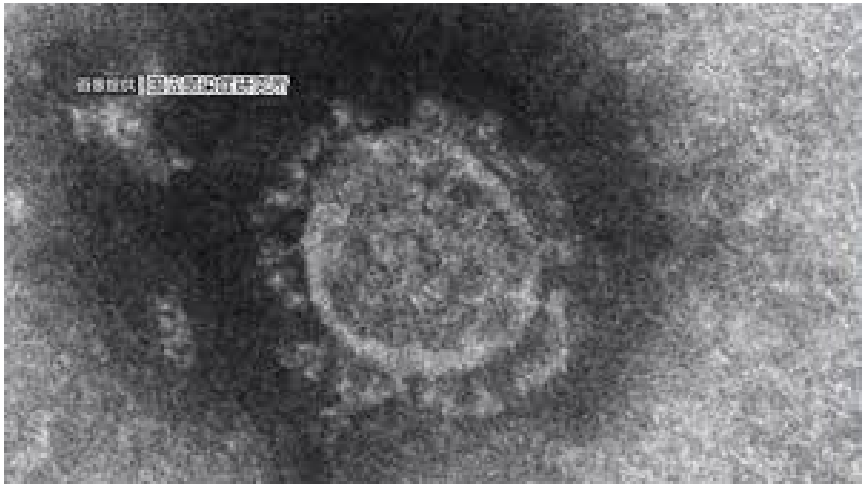
UV-C254&222Lamp
(Virus / bacteria inactivation system)





September 2020

Provided by Nanatsubaki Inc　　7tsubaki.com

What is the UVC254 virus / bacteria inactivation system ?

- Currently, various viruses and bacteria such as new coronavirus and influenza are threatening our lives and lives all over the world.

- For the new coronavirus, preventive and therapeutic methods have not yet been clarified. Vaccines have been extensively tested and researched, but viruses are also evolving over time.

- Now, the minimum we can do is preventive measures to prevent infection.

- It is carried out as a basic preventive measure such as hand washing, alcohol disinfection, and wearing a mask.

- UVC254 is a system that inactivates viruses and bacteria as part of prevention.

What is the principle of the UVC254 inactivated system?

- **The UVC254 inactivation system inactivates viruses and bacteria with a lamp that emits UV-C ultraviolet rays with a wavelength of 254 nm.**

- **UV-C ultraviolet rays are contained in the sun's rays, but do not reach the earth due to the ozone layer. The wavelength and properties of light are completely different from those of ordinary ultraviolet rays, and the effect of decomposing and inactivating virus nuclei has been confirmed. (UV-C ultraviolet rays demonstrated inactivation of the new coronavirus at Miyazaki University.)**

- **However, the wavelength range of UV-C ultraviolet rays is defined as 100 nm to 280 nm, and by deeply penetrating into the skin of the human body and deeply into the corneum, IEC62471 [photobiological safety of lamps and lamp systems] Standards] and Japanese JIS safety standards stipulate handling precautions.**

- **Until now, UV-C ultraviolet rays have been used mainly for sterilizing products as part of industrial machinery, but due to the spread of virus infection, they have been attracting attention and being used as infection prevention measures.**

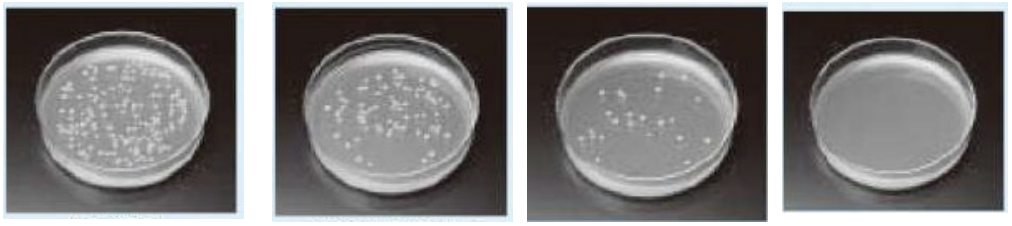
- **The UVC254 inactivation system is a virus / bacteria inactivation system that gives top priority to safety by completely sealing the light source based on IEC62471 [Standards for photobiological safety of lamps and lamp systems] and Japanese JIS safety standards.**

What is the effect of UV-C ?

- **The action of UV-C sterilization line is effective against bacteria, bacteria and viruses, and the effect varies depending on the illuminance and irradiation time of the sterilization line.**

UV sterilization effect on nosocomial infection MRSA

Irradiation amount	0%	23%	30%	90%
Sterilization rate	0%	58%	87%	99%



※According to the experimental results, it is possible to inactivate 99% of the virus by irradiating the object with 90% or more. Therefore, it is important to irradiate the whole area.

- **In a certain university test of UV-C, 99.9% of coronavirus was inactivated in just 30 seconds after irradiation.**
  UV-C: LED was used in the test.
  Our UVC254 is about 300 times stronger than UV-C: LED lamps and can instantly inactivate coronavirus.

	感染価（PFU/mL）※			対数減少値		減少率（%）	
DUV-LED照射時間	0秒	30秒	60秒	30秒	60秒	30秒	60秒
対照（照射なしウイルス液）	3.4×10^4	–	–	–	–	–	–
DUV-LED（照射ありウイルス液）	–	<20	<20	>3.2	>3.2	>99.9	>99.9

※ 検出下限値：20 PFU / mL

UVC254 verification data

- Wavelength at peak value: 253.51 nm (nm: nanometer)

  Emission intensity at peak value: 0.229mw / cm2 Distance 50cm

  (Approximately 300 times that of a normal UVC-LED light: proportional to sterilization ability.)

- Peak wavelength width: Approximately 1.7 nm

(The wavelength of 254 nm is very strong, and there is little fluctuation in the center wavelength, and it emits light stably.)

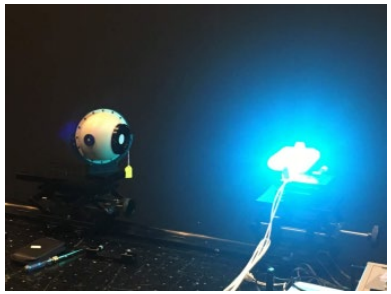
Measurement date: July 17, 2020

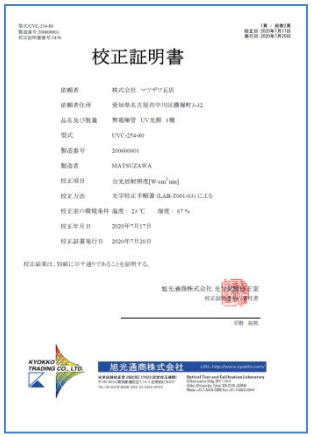
Measuring company: Kyokko Tsusho Co., Ltd. Optical test calibration room (the only measurable institution in Japan)

Measurement content: Spectral data

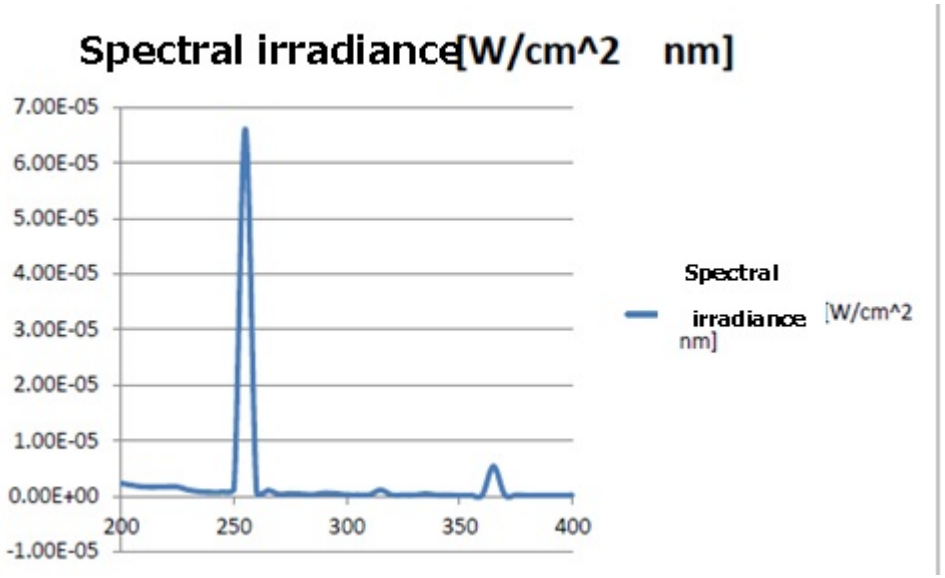
(Emission intensity, emission wavelength)

Test method: Measuring distance 50 cm





校正証明書



UVC254 air conditioning duct type specifications

Product name: SVI-UVC254 or OZONE-250Wor120W

Power supply: ① 250W: AC100V-AC220V 50/60Hz

② 120W: AC100V-AC220V 50/60Hz

Lamp size: ① 250w: W200mm, D340mm, H90mm

② 120w: W170mm D111mm H90mm

Fixture size: ① 250w: 483*415*234mm Approx. 4kg

② 120w: 380*260*210 mm Approx. 3 kg

Lifespan: 50,000 hours, 3-year warranty

Others: Installation work and power supply work are required separately

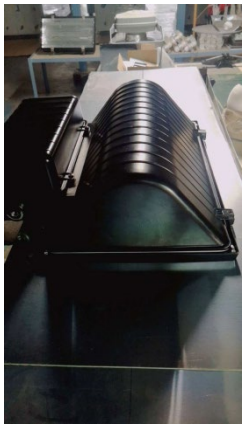
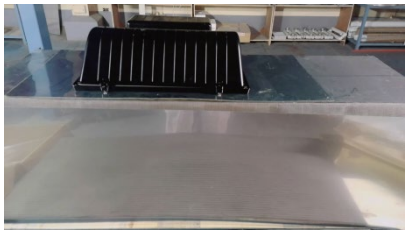
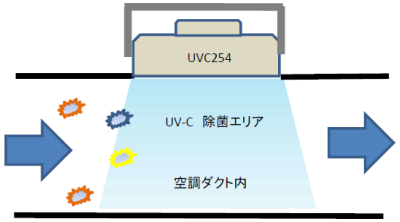
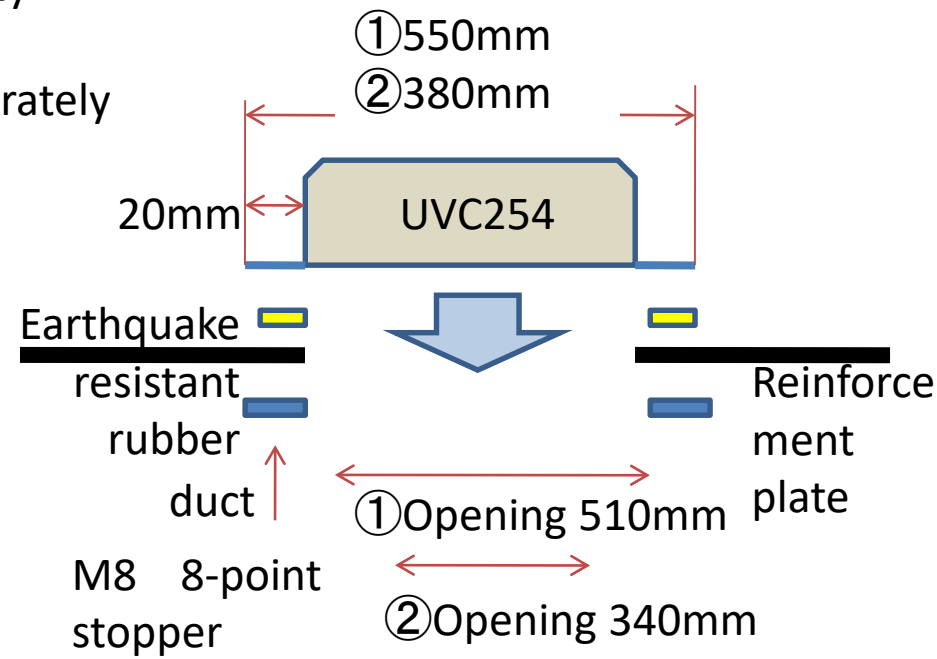


Image of air-conditioning duct type







UVC254 Jet fan (wall/ceiling mount type) specifications

Product name UVC254 jet fan

Power supply : 120W: AC100V-AC220V 50/60Hz

Lamp size: W200mm, D340mm, H90mm

Body size: 200*500*200mm, approx. 4kg

Life: 50,000 hours, 3-year warranty

Others: Installation work and power supply work are required separately

UVC254 Jet fan

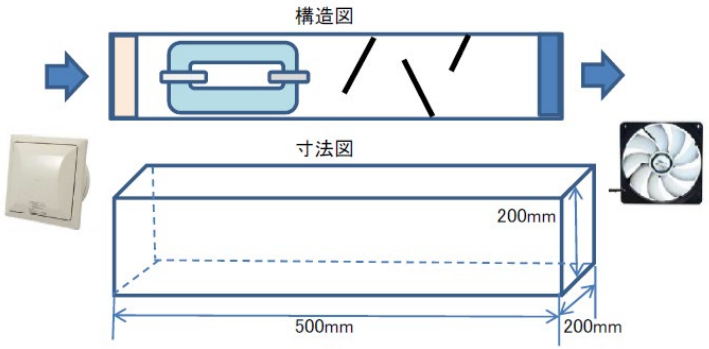
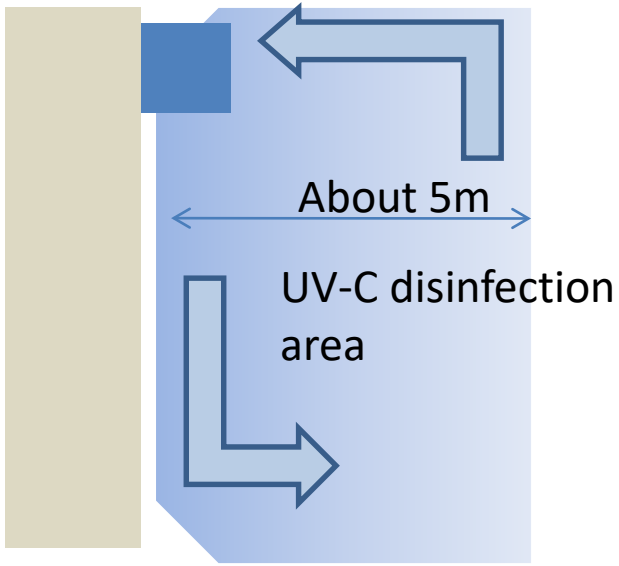
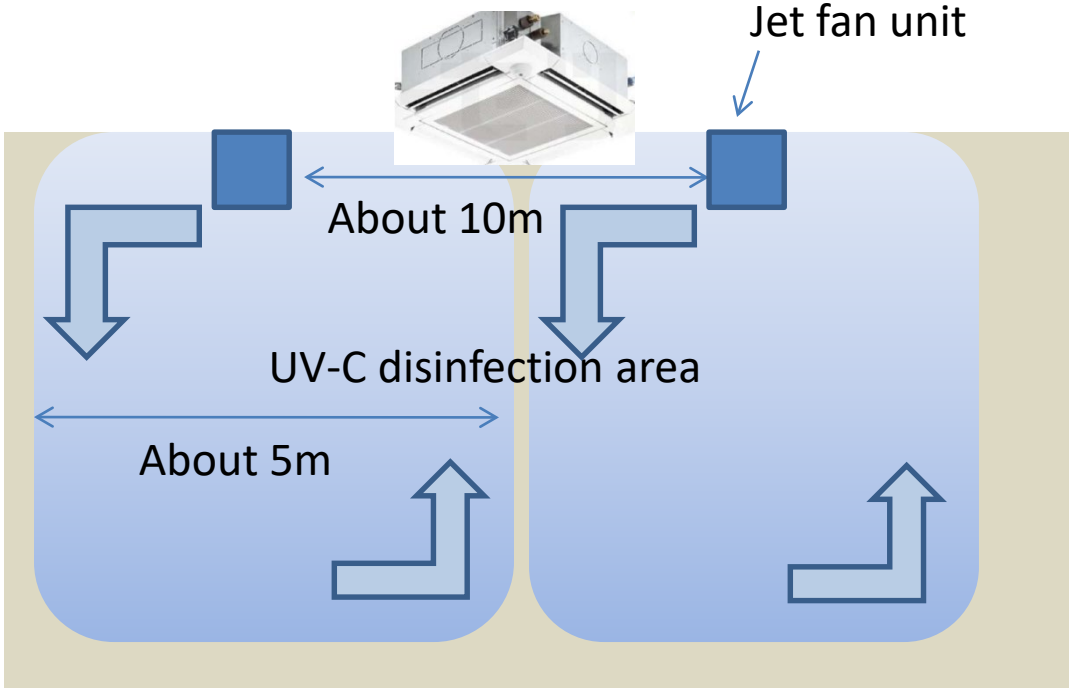


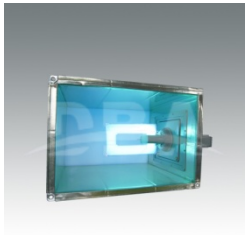
Image of wall ceiling



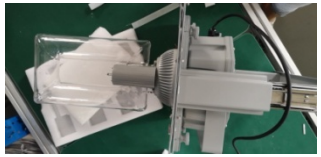


UVC254 duct type performance

UVC254 lamp inactivation system and air volume



Wind speed of normal duct 6-8m/S

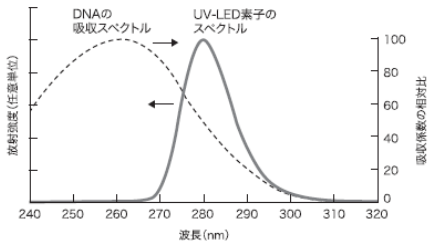
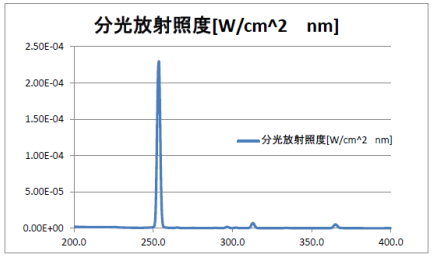


Wind Speed m/s	UV influence width m	Ramp width pssing time msec	Bacterial inactivation time conversion value (sec)
15	0.6	0.040	0.67
12	0.6	0.050	0.84
10	0.6	0.060	1.00
8	0.6	0.075	1.25
6	0.6	0.100	1.67
4	0.6	0.150	2.51
2	0.6	0.300	5.01
1	0.6	0.600	10.02

- The width of the air conditioning and air purifier duct does not affect the inactivation rate.

- When the lamp width is 300 mm and the UV-C influence range is 300+300 mm, the influence width is 600 mm. For example, when the wind speed is 8 m/sec. The time to pass the UV influence range is 1.25 seconds and UV will continue to be exposed during this time. Inactivates bacteria.

UV-C comparison table

Comparison	UV-C LED Lamp	UV-C Electrodeless Lamp
Power	15W	120W
Operating environment temperature	0℃～30℃	-10℃～50℃
lifespan	10,000 hours	50,000 hours
Peak wavelength	Around 280 nm	254nm
Luminous intensity (Distance 50cm)	0.0015mw/㎠ (10 cm from the measuring instrument) (Cannot measure 50 cm from the measuring instrument)	0.229mw/㎠ (50 cm from the measuring instrument)
Sterilization ability	Takes time (Demonstrated with E. coli Staphylococcus)	High/Fast (Demonstrated with E. coli Staphylococcus)
Feature	Small size and short distance use. Suitable for sterilizing small items.	Air conditioning, water purification, etc. Suitable for large projects.
Wavelength stability	The problem is the heat generated by the LED element itself. Lack of wavelength stability.	Good wavelength stability. There is no blur of 254 nm.
Wavelength		

UV-C electrodeless lamp safety and security

- It has been confirmed that UV-C (ultraviolet rays) is effective in inactivating bacteria and viruses in the air and attached.
- However, if the human body is directly exposed to UV-C germicidal rays, or if direct light enters the eyes, it has strong penetrability to the skin and cornea and lacks safety.
- UV-C germicidal rays do not meet JIS standards such as safety in a device that irradiates in a manned area (directly exposes human body to UV-C light).

○Our company considers safety and security for the human body to be the first priority, and establishes safety handling programs that are consistent from construction to use as safety programs, and provides them with safety and security by educating and thoroughly implementing them. Doing.

○ In particular, our UVC series does not allow the customer to directly touch the equipment.

We provide 100% safety and security based on IEC62471 [Standard for photobiological safety of lamps and lamp systems] and JIS safety standards of Japan.

What is the 222nm Virus/Bacteria Inactivation System?

- Currently, various viruses and bacteria's such as new coronavirus and influenza are threatening our lives and lives all over the world.

- Preventive and therapeutic methods for the new coronavirus have not been clarified yet. Although various tests and studies have been conducted on the development of vaccines, viruses have evolved over time.

- Now what we can do is preventive measures to prevent infection.

- Basic precautionary measures such as hand washing, alcohol disinfection, and wearing masks are implemented.

- UVC222Lamp is a system that inactivates viruses and bacteria as part of prevention.

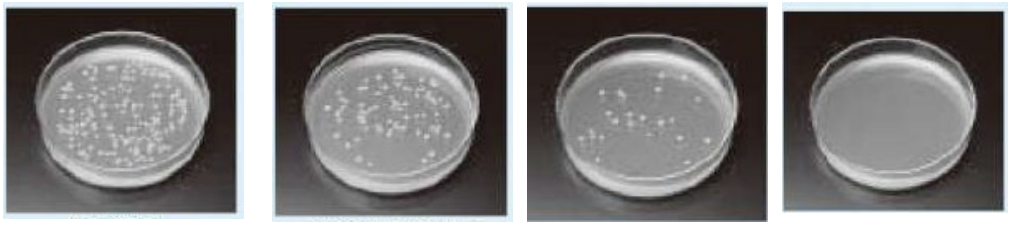


What is the effect of UV-C ?

・The action of UV-C germicidal rays is effective against bacteria, bacteria and viruses, and the effect varies depending on the illuminance of the germicidal rays and irradiation time.

UV germicidal ray effect on nosocomial bacterium MRSA

Radiation dose	0%	23%	30%	90%
Sterilization rate	0%	58%	87%	99%



*According to the experimental results, it is possible to inactivate 99% of the virus by irradiating the object with 90% or more. For that reason, it is important to illuminate the whole area.

・In a university test of UV-C, it took only 30 seconds after irradiation.99.9% of coronaviruses are inactivated. UV-C:LED was used in the test. Our UVC254 is 150 times stronger than UV-C:LED lamps and can instantly inactivate coronavirus.

	感染価（PFU/mL）※			対数減少値		減少率（%）	
DUV-LED照射時間	0秒	30秒	60秒	30秒	60秒	30秒	60秒
対照（照射なしウイルス液）	3.4×10^4	–	–	–	–	–	–
DUV-LED（照射ありウイルス液）	–	<20	<20	>3.2	>3.2	>99.9	>99.9

※ 検出下限値：20 PFU / mL

What is the principle of UVC222 Inactivation System ?

・The UVC222 inactivation system inactivates viruses and bacteria with a lamp that emits UV-C ultraviolet rays of 222 nm.

・UV-C UV rays are contained in the sun light but do not reach the ground surface due to the ozone layer. The wavelength and properties of light are completely different from ordinary ultraviolet rays, and it has been confirmed that it has the effect of decomposing and inactivating the nucleus of viruses. (UV-C ultraviolet rays demonstrated inactivation of the new coronavirus at the University of Miyazaki.)

・However, the wavelength range of UV-C ultraviolet rays is defined as 100 nm to 280 nm, and it penetrates deeply into the skin of the human body and deeply into the cornea, thus improving the IEC62471 lamps and lamp systems. The handling precautions are stipulated in the relevant standards and Japanese JIS safety standards.

・ Until now, UV-C ultraviolet rays have been mainly used as a part of industrial machinery for purposes such as sterilization of products, but due to the spread of virus infection, it has been noticed and used as an infection prevention measure.

・ Among UV-C, it was discovered that the UV-C 222 nm UV wavelength is a special wavelength that does not penetrate human skin or cornea, does not affect the human body, and inactivates only viruses and bacteria.

・UV-C UV rays could not be used in manned spaces, but the UV-C 222nm wavelength makes it possible to inactivate viruses and bacteria even in manned spaces, and can be widely used as a preventive measure against infections without affecting the human body.

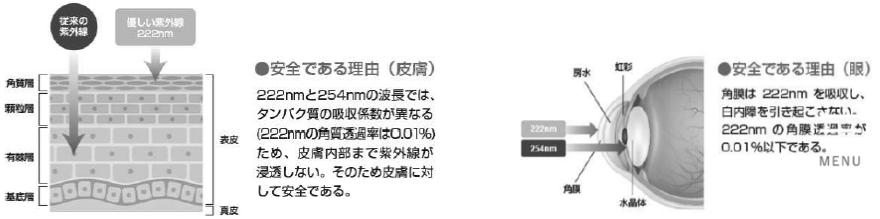
Related articles about 222nm

It has been proved that 222nm UV rays are safe for human skin and have a bactericidal effect.

Preventing pandemics by realizing ultraviolet sterilization and virus inactivation in a manned environment-Joint research between Kobe University and Ushio Electric-Kobe University Graduate School of Medicine, Department of Surgery, Orthopedic Surgery Ryosuke Kuroda Professor Group (Kobe University) Ushio Electric Co., Ltd., a paper on the verification of safety and bactericidal effect on human skin by direct irradiation of 222 nm ultraviolet rays, which was being jointly researched, will be published in the US scientific journal "PLOS ONE".

■222nm UV sterilization ・Using a virus inactivation unit, 500mJ/cm2 of 222nm UV is directly irradiated to 20 normal skins to kill resident bacteria without erythema which is an acute disorder. As a result, it was proved that 222 nm UV light has both safety and bactericidal effect on human skin.

(In the previous verification targeting mice, safety was confirmed by skin cell damage test and carcinogenicity test by repeated irradiation of 222 nm ultraviolet light, and it was confirmed that there is no effect on eyes such as keratitis and cataract. Ushio will continue to carry out further research on the utilization of ultraviolet rays in the medical field with Kobe University, and aim to develop medical equipment for the purpose of disinfecting and sterilizing the surgical field during surgery in the future. In addition, since the safety of human skin has been proved this time, further UV sterilization and inactivation using 222nm ultraviolet light under the manned environment in hospitals, schools, commercial facilities, transportation facilities, etc., which Ushio is promoting It will be realistic.



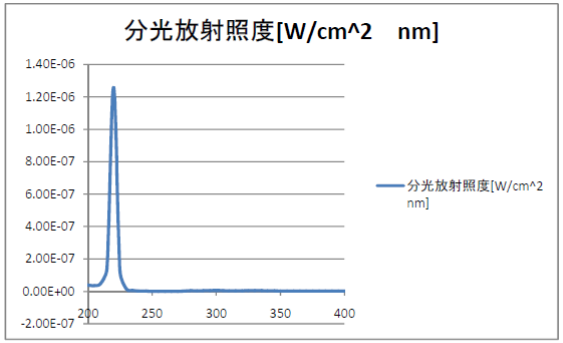
UVC222 Specifications Overview

- Product name: SVI-UVC222+OZONE-20W、 SVI-UVC222+OZONE-40W
  - Power Supply: DC24V AC100V AC200V
- UV light intensity UVC222-20W Distance 50 cm 0.17777 mw / ㎠
  （ In the case of LED UV, 0.0015 mw / ㎠ at a distance of 10 cm ）
- Lifetime 3 years (lights up 8 hours a day)
- Lamp size

UV222type	W	Lamp size
222nm	20W	Φ28×115mm
	40W	Φ28×200mm

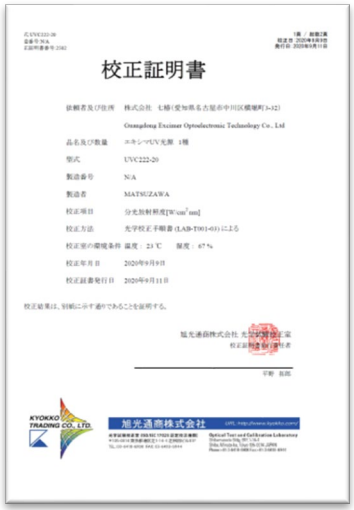
- Bacterial inactivation effect Escherichia coli staphylococcus 99.9% inactivation
- Others Mercury-less (environmentally friendly)

  Used lamps can be collected and recycled

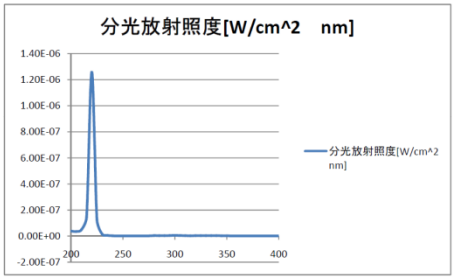
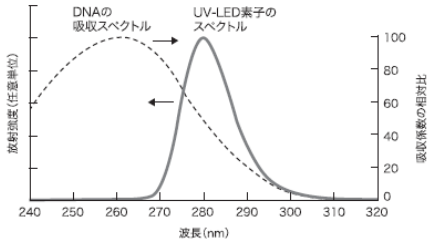


ピーク波長＝221．4nm

【 Wavelength measurement result 】



UV-C comparison table

Comparison	SVI-UVC222+OZONE-20w lamp	UV-C LED lamp
Output power	20W	15W
Operating environment temperature	-10℃～50℃	0℃～30℃
lifespan	3 years (lights up 8 hours a day)	10,000 hours
Peak wavelength	222nm	Around 280 nm
Emission intensity （distance 50㎝）	0.1777mw/㎠ (50 cm from the measuring instrument)	0.0015mw/㎠ (10 cm from the measuring instrument) (It is impossible to measure 50 cm from the measuring instrument)
Sterilization ability	High / Fast(Demonstration with Escherichia coli staphylococcus)	Take time(Demonstration with Escherichia coli staphylococcus)
Feature	There is no effect even if it irradiates the human skin directly. Can be used in manned spaces.	Small size and short distance use. Suitable for sterilizing small items.
Wavelength stability	Good wavelength stability. There is no blur of 222 nm.	The problem is the heat generated by the element itself. Lack of wavelength stability.
Wave length		

About sale

・Sales schedule

Sales start at the end of August (SVI-UVC-222+OZONE-20w)

Started selling in early September (SVI-UVC-222+OZONE−40W)

However, the schedule may change due to slight corrections.

・Places where installation is possible

Trains, planes, ships, buses, ambulances, monorails, schools, hospitals, offices

Sports facilities, restaurants, theaters, movie theaters, factories, airports, hotel department stores

Supermarket convenience store, plant house, poultry farm, pig farm, clean room

Entertainment facilities, banks, service areas, public toilets, etc.