Light is protecting

AirZing™ – powered by OSRAM HNS® UV lamps

April 1st, 2020

Light is OSRAM

OSRAM

What is UV-C

What is AirZing™

Area of Applications

How to use AirZing™

Any other impacts

OSRAM

What is UV-C

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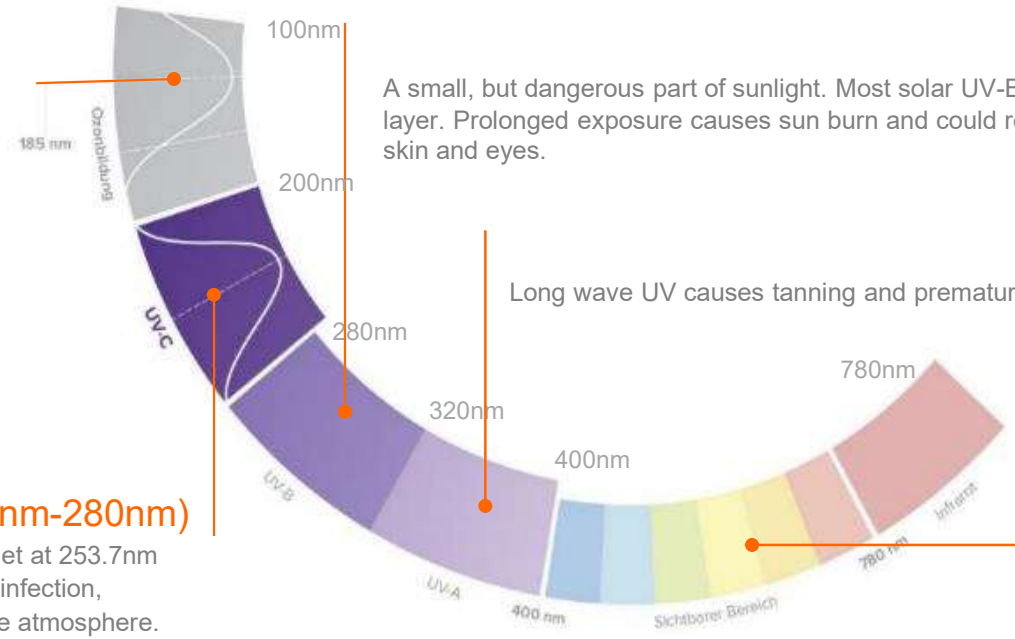
UV-C is a proven technology of obliterating micro-organisms efficiently

- As we all know, UV is part of sun light, which is an easy way of surface cleaning in our daily life.
- UV is a sort of invisible electromagnetic radiation, with wave length between 100-380nm.
- The very first artificial UV light source was introduced to the world in Germany 200 years ago.

V-UV(100nm-200nm)

V-UV (185nm) causes Ozone, which can kill bacteria and virus in air as well, Meanwhile, Ozone is a threat to human beings.



UV-B(280-320nm)

A small, but dangerous part of sunlight. Most solar UV-B is absorbed by the ozone layer. Prolonged exposure causes sun burn and could result in unhealthy effects on the skin and eyes.

UV-A(320-400nm)

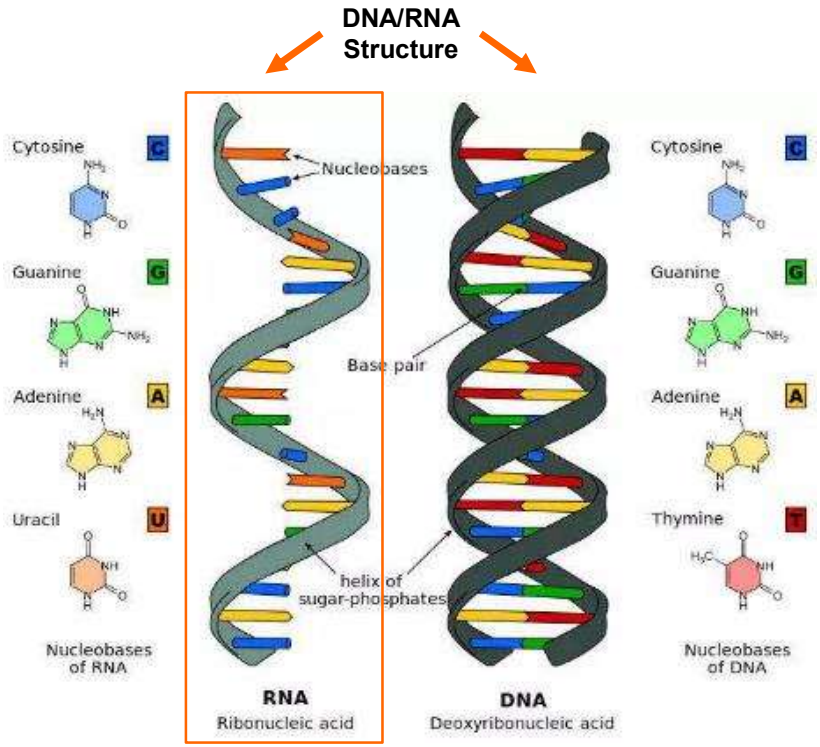
Long wave UV causes tanning and premature skin aging.

UV-C(200nm-280nm)

Shortwave UV, which includes germicidal ultraviolet at 253.7nm wavelength - is used for air, surface and water disinfection, Completely absorbed by Oxygen and Ozone in the atmosphere.

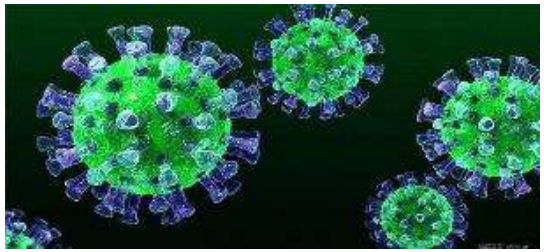
Visible light

How does UV-C obliterate microorganisms (bacteria and virus)



The cell nucleus of micro-organisms(bacteria and virus) contains thymine, a chemical element of the DNA / RNA. This element absorbs UV-C at a specific wavelength of 253.7 nm and changes to such an extent (formation of thymine dimers) that the cell is no longer capable of multiplying and surviving.

- UV-C (253.7nm) penetrates the cell wall of the micro-organism
- The high energy photons of the UV-C are absorbed by the cell proteins and DNA / RNA
- UV-C damages the protein structure causing metabolic disruption
- DNA/RNA is chemically altered so organisms can no longer replicate
- Organisms are unable to metabolize and replicate, CAN'T cause disease or spoilage



Coronavirus (SARS-CoV-2) has typical RNA structure

Comparison

V-UV(185nm) also kill micro-organisms as well, but causes Ozone accordingly which is harmful for human beings. It is used for more industrial applications. UV-C is safer.

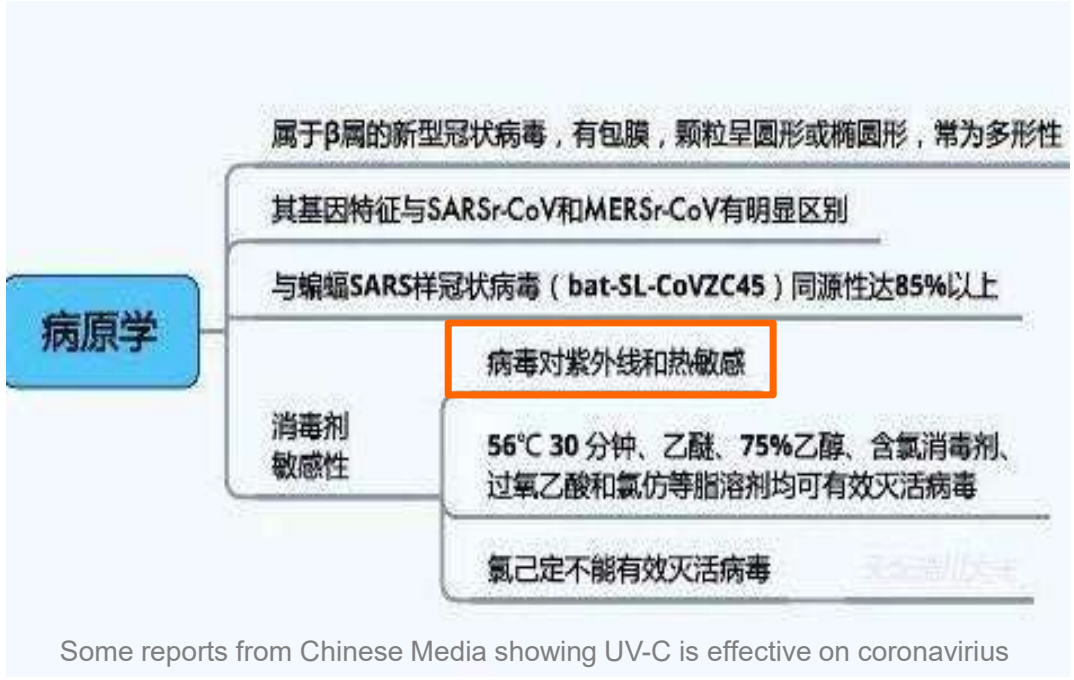
UV-C can deactive coronavirus (SARS-CoV-2)

Coronavirus is sensitive to **UV-C**.

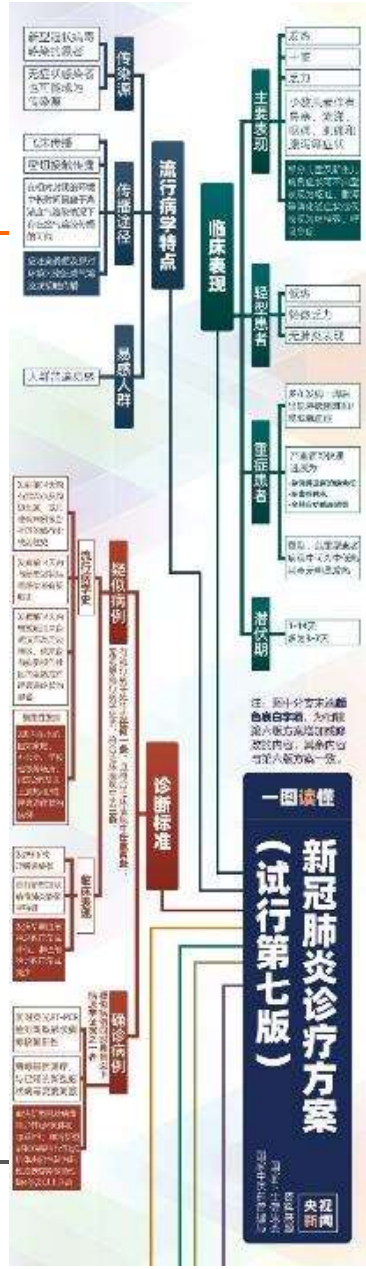
According to **Multilingual epidemic control manuals for COVID-19** (7th Edition) published by National Health Commission of China, updated on March, 04, 2020

Fact

OSRAM AirZing™ PRO (More than **1,000** pcs of UV-C product) are equipped in **38** hospitals in City of Wuhan, among **45** in Hubei province in total as of March, 2020



Some reports from Chinese Media showing UV-C is effective on coronavirius



What is UV-C

What is AirZing™

Area of Applications

How to use AirZing™

Any other impacts

OSRAM

AirZing™ – powered by OSRAM UV (HNS)

Designed in GERMANY

Efficient
99.9%
Sterilization efficiency

Precise
253.7nm
UV wave length

Premium
Ozone Free

Powerful
360°
Coverage Area

Smart
IR Sensor

Safe
30s
Delay Starting

*Available for PRO only

OSRAM HNS UV lamp

- Made in Europe
- Premium quality
- 253.7 nm UV output
- No Ozone emmission

Integrated Ballast

- Match OSRAM HNS UV lamps

Metal Screw

- Anti-UV coating

Lamp Holder

- Boost and anti-UV

IR Sensor – Safety Kit

- 30s delay starting
- Switch off lighting system once detecting people coming inside UV-working space immediately
- Coverage Area between 80-150 sqm2 depends on installation height

Special plastic housing

- Anti-UV coating

*IR Sensor is available for **AirZing™ PRO** only.

AirZing™ PRO 5030

Designed in GERMANY

AirZing™ **PRO** 5030

129 929

On going

Efficient	Precise	Premium	Powerful	Smart	Safe
99.9% Sterilization efficiency	**253.7nm** UV wave length	**Ozone Free**	**360°** Coverage Area	**IR Sensor**	**30s** Delay Starting

Product name	AirZing™ PRO 5030
Input Voltage	220V±10%
Input Current	0.16A
Output Current	360 mA
Power Consumption	34 W
lamp Wattage	30 W
Power Factor	> 0.9
THD	< 20%
UV-C Output (253.7nm)	11-12W
Initial UV-C irradiance	>1.2 W/m^2 @1M
UV-C irradiance @ 9000 hrs	>0.96 W/m^2 @1M
Lamp life time	9,000 Hrs
Warranty	3 Years
Dimension	L1058mm/W54mm/H78mm
Weight	1.3kg (net)/1.9kg(package)
Operation Temperature	-10 ℃~ 35 ℃
Storage Temperature	-20 ℃~ 60 ℃

AirZing™ PRO 5040

Designed in GERMANY

AirZing™ **PRO** 5040

129 1234 On going

Efficient	Precise	Premium	Powerful	Smart	Safe
99.9% Sterilization efficiency	**253.7nm** UV wave length	**Ozone Free**	**360°** Coverage Area	**IR Sensor**	**30s** Delay Starting

Product name	AirZing™ PRO 5040
Input Voltage	220V±10%
Input Current	0.19A
Output Current	430 mA
Power Consumption	40 W
lamp Wattage	36 W
Power Factor	> 0.9
THD	< 20%
UV-C Output (253.7nm)	14-15W
Initial UV-C irradiance	1.4 W/m^2 @1M
UV-C irradiance @ 9000 hrs	>1.24 W/m^2 @1M
Lamp life time	9,000 Hrs
Warranty	3 Years
Dimension	L1363mm/W54mm/H78mm
Weight	1.5kg (net)/2.2kg(package)
Operation Temperature	-10 ℃~ 35 ℃
Storage Temperature	-20 ℃~ 60 ℃

Standards and regulations

China standards	Relevant international standards
GB7000.1 灯具一般要求与试验	IEC60598-1 Luminaires - Part 1: General requirements and tests
GB 7000.201 特殊要求固定式通用灯具	IEC60598-2-1 Particular requirements-Fix general purpose Luminaires
GB/T 20145 灯和灯系统的光生物安全性	CIE S 009/E Photobiological safety of Lamps and Lamps Systems
GB/T 17743 电气照明和类似设备的无线电骚扰特性的限值和测试	CISPR 15 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
GB 17625 电磁兼容	IEC61000-3-2 Limits for harmonic current emission
CE	IEC/EN60335-1, Household and similar electrical appliances
CE	IEC/EN60335-2-65, Deals with the safety of electric air-cleaning appliances
China ROHS	2011/65/EU（ROHS 2.0）
Viral testing	H3N2 (on going) Escherichia coli Staphylococcus albus Staphylococcus aureus
Cooperate regulation	Q/OCN11-2018

Standards and regulations

UV Lamp Power	4W	6W	8W	13W	15W	18W	30W	36W
Initial UV-C irradiance (uw/cm^2)	11	17	22	35	50	62	100	135
UV Lamp Power	7W	9W	11W	18W	24W	36W	55W	
Initial UV-C irradiance (uw/cm^2)	18	28	40	52	100	150	186	

After the sterilization fixture operated 5mins, test UV-C irradiance under 1M distance(μW/cm2)

Initial UV-C irradiance should above 93%	《GB/T 19258-2012 紫外线杀菌灯》
EOL UV-C irradiance should above 65%	
Ozone shall lower than 0.05mg/kwh	

Measurement of UV-C Irradiance

(1) Set the UVC Fixture at 1M height, Put an UV detector meter under UVC lamp.

(2) After the UVC fixture operated 5mins, test UVC irradiance under 1M distance(μW/cm2)

(3) Stable input voltage at AC 220V

(4) Initial UV-C irradiance should be above 90μW/cm2。

(5) UVC lamp should be EOL if irradiance lower than 70μW/cm2

《医疗机构消毒技术规范》& 《消毒与灭菌效果的评价方法与标准 -GB15981》

China standards

How to measure UV-C qualitatively and quantitatively

Qualitatively

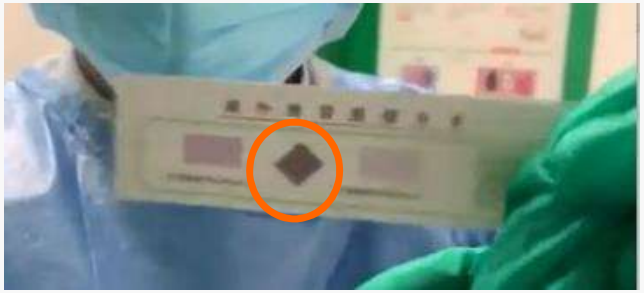
Test paper of UV-C irradiation

0.9W/m^2
New lamp

0.7W/m^2
Lamp need to be replaced

China Standard

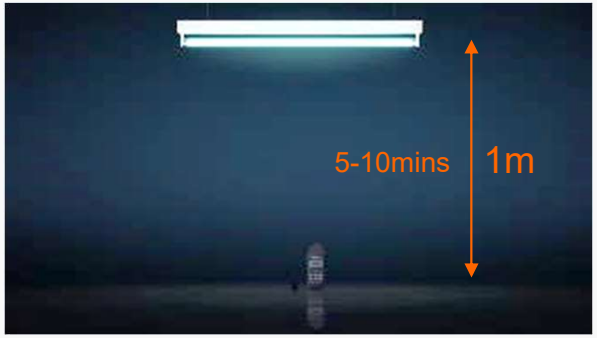
Check the color, the darker the stronger UV-C light



AirZing™ PRO 5040 testing result in Wuhan

Quantitatively

UV Radiometer



AirZing PRO 5030 (30W)

1.354W/m^2 1.331W/m^2

(Standard 1.00 W/m^2)

AirZing PRO 5040 (36W)

1.489W/m^2 1.491W/m^2

(Standard 1.35 W/m^2)

What is UV-C

What is AirZing™

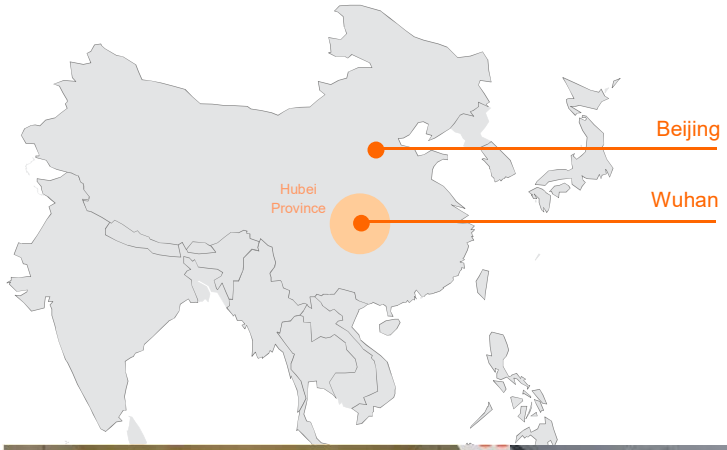
Area of Applications

How to use AirZing™

Any other impacts

OSRAM

AirZing™ application in hospitals



Beijing Xiaotangshan(XTS) Hospital is the health care base of Health Bureau of Ministry of Public Health in China. (http://www.xtshos.com.cn/english/)

- Built in 2003 for SARS initially;
- National medical service spot for epidemic disease;
- Grade 3A comprehensive hospital (top level) in Beijing.

1000

1000 pcs of AirZing™ PRO 5040 are equipped in XTS hospital

Wuhan is the capital city of Hubei province which was hit by coronavirus seriously since Jan, 2020.

- Lockdown on Jan, 23rd, 2020
- Reopen (planned) on April, 8th, 2020

1000+

1000+ pcs of AirZing™ PRO 5040 are equipped in 38 hospitals in Wuhan, among 45 in Hubei province

Beijing XTS hospital

Wuhan No.4 Hospital

AirZing™ application in hospitals

Wuhan No.1 Hospital

Wuhan No.4 Hospital

Wuhan No.5 Hospital

AirZing™ in Italy

AirZing in Wuhan

Office building in Wuhan Pulmonary Hospital

A testimonial video in Wuhan No.4 hospital

Click to watch the video

1. AirZing is working in a room. A notice of “UV-C in service” on the door.
2. The door is opened, AirZing is in service, you can see little purple light.
3. Once the nurse walks into the room, AirZing is shut down as IR sensor detectives unexpected people in the room to prevent hurt on eyes and skins by UV light.
4. A UV-C test paper shows our product is achieved medical standard (the purple color of diamond in middle is much darker than the benchmark rectangulars nearby. The darker the better)

Kindergarten application in China







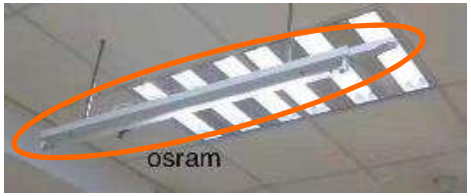


Other applications

Surface cleaning on bus, Shanghai bus company

Surface cleaning on cash, China Construction Bank, Guangzhou

Air purification in central AC, Peal Plaza, Guangzhou



Office

Area of applications

Water purification

Water must often be rid of pathogenic microorganisms to become safe for drinking. Ultraviolet radiation is
employed to change the DNA structure of the microorganisms, either killing the bacteria immediately or rendering them unable to breed. Because UV purification is a physical disinfection method, without any harmful chemicals, it doesn't cause secondary pollution. This means there is no malodorous smell in the water or byproducts.

- Private households
- Water dispensers
- Community water works
- Mobile stations (camping, outdoor activities)
- Swimming pools
- Ultra-pure water systems
- Ponds and aquariums
- Fish farms
- Food processing factories
- Sewage systems

Air purification

Ultraviolet (UV) purification is a very effective method to clean the air of biological pollutants such as bacteria, viruses and fungal spores. UV germicidal lamps can be installed in ventilation ducts to clean the air passing through them. UV air purification is more economical and efficient than other air filtration and cleaning methods.

- **Hospitals**
- **Doctors' practices**
- **Clean rooms**
- **Offices with or without AC systems**
- Cars
- **Storage rooms**
- Food processing
- **Rooms with frequent public access**
- Animal stalls

Surface cleaning

For packaging pharmaceuticals and food, in aseptic zones in hospitals and for surface cleaning of equipment and instruments objects are exposed directly to UV radiation.

- **Hospitals and other aseptic zones**
- **Health care**
- Food and pharmaceutical industry

What is UV-C

What is AirZing™

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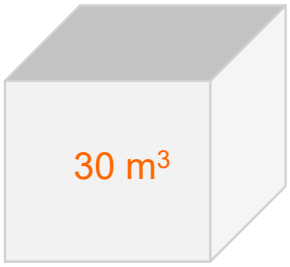
OSRAM

How much UV-C we need to obliterate microorganisms

Air purification

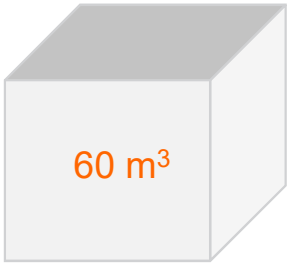
36W

30W is being tested, will share result once it's confirmed.



+

→ obliterating **>99%** of microorganisms



+

→ obliterating **>99%** of microorganisms

Application recommendation
based on air purification

AirZing™ can be ceiling mounted or wall mounted, the installation height of general space is between 2.5m-4m.

36W

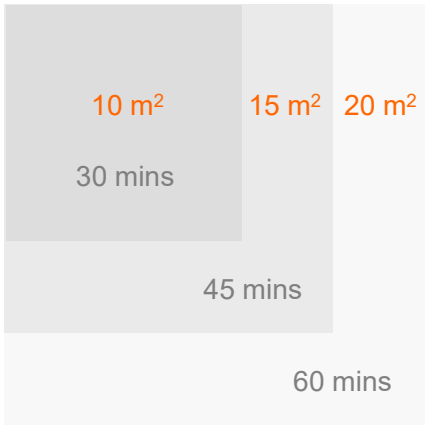
The coverage area of one set of fixture is 15-20m²

- <10m², 30 mins is recommended;
- 10 - 15m², 45 mins is recommended;
- 15 - 20m², 60 mins is recommended;
- >20m², multiple fixtures are recommended.

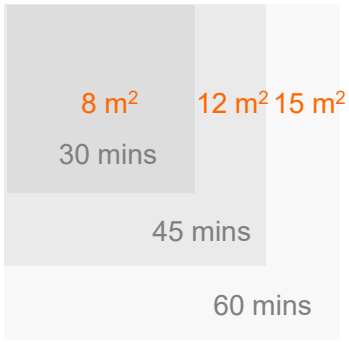
30W

The coverage area of one set of fixture is 12-15m²

- <8m², 30 mins is recommended;
- 8 - 12m², 45 mins is recommended;
- 12 - 15m², 60 mins is recommended;
- >15m², multiple fixtures are recommended.



AirZing PRO 5040 (36W)



Height = 3m

*30W is being tested, will share result once it's confirmed.

AirZing PRO 5030 (30W)

According to national standard of China -2.5W/m²

How much UV-C we need to obliterate microorganisms

Surface cleaning

It depends on

Microorganisms UV Susceptibility

Microorganisms structure and inherent ability to recover from damage induced by UV light

UV dose = Exposure time x UV Irradiance

	J/m^2
Microorganism	99%
Bacillus anthracis(vegetative)	90.4
S. enteritidis	80
B. megatherium sp. (veg.)	75
B. megatherium sp. (spores)	56
B. paratyphosus	64
B. subtilis (mixed)	142
B. subtilis spores	240
Corynebacterium diptheriae	68
Eberthella typhosa	42.8
Micrococcus candidus	121
Micrococcus piltonensis	162
Micrococcus sphaeroides	200
Neisseria catarrhalis	88
Phytomonas tumefaciens	88
Proteus vulgaris	54
Staphylococcus aureus	99

Source: CIE 155:2003 UV Air Disinfection

s

How long do we need to operate our AirZing?

w/m^2

36W	30W	
1.4	1.2	@
0.22	0.20	1m
0.088	0.07	@
	5	2.5m

For example:

- If we have a $10m^2$ space,
- We use 36W (AirZing PRO 5040)
- The installation height is 2.5m

→ 0.22 w/m^2

→ 99 J/m^2

- Our target is to kill 99% of Staphylococcus aureus
- We need to operate 450s = 99/0.22

7.5 mins

What is UV-C

What is AirZing™

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UV-C impacts on materials

(manageable) Aging effect

Upper room irradiation can cause some types of plants to wilt and die. Hanging plants should be removed from these areas of disinfection. Additionally, as with other forms of UV, UV-C can cause paints and other materials to fade and degrade over time.

Source: CIE 155:2003 ULTRAVIOLET AIR DISINFECTION 8.4

UV radiation causes changes to many materials. Any increase in UV flux to the earth's surface will degrade infrastructure more quickly and so generate additional costs for repair and replacement.
Canadian research has addressed the effects of UV on polymers, wood and paper, building materials, paints and coatings, and textiles and clothing, although the main thrust has been on the evaluation of radiation resistance of materials used in space and of clothing materials.
Non-plastic materials such as roofing membranes and outdoor sealants are currently being studied with respect to their resistance to UV but not specifically in the context of enhanced, ozone-related irradiance.

Source: Extracted from material of Environmental Canada 1997,
D.I Wardle, J.B. Kerr, C.T. McElroy and D.R. Francis.
http://kippzonen-brewer.com/uv/effect-uv-radiation/

UV-C impacts on Human

Exposure to UV can cause injury to the eyes and skin

Overexposure to UV- C can result in transient conjunctival irritation (photoconjunctivitis) and skin irritation (erythema), which disappear within a 24-48 hour period without lasting biological damage (CIE, 2002).

Source: CIE 155:2003 ULTRAVIOLET AIR DISINFECTION 8.1

Today, the Global Solar UV Index is internationally recognised as the standard for evaluation of the sunburn risk and runs from UVI of 1 to UVI of 11+, where higher UV Index represents higher risk of sunburn and skin damage. The scale is shown below. The Global Solar UV Index can be calculated by multiplying the UVE radiation value by 40 m^2/W.

Exposure category	UVI range
Low	< 2
Moderate	3 to 5
High	6 to 7
Very high	8 to 10
Extreme	11+

For example:

- 36W AirZing is installated at 2.5m
- UV-C irradiation is 0.22w/m^2
- UV Index is 8.8 = 0.22 x 40 – very high

Source: Extracted from material of Environmental Canada 1997, D.I Wardle, J.B. Kerr, C.T. McElroy and D.R. Francis. http://kippzonen-brewer.com/uv/effect-uv-radiation/

Ozone-free product

NOT exceed the maximum permissible concentration

11. Measurements results

Measurements results for meteorological factors of the air							Name of the measuring factor	Research results, mg/m³		Normative documents for research methodology
Temperature,°C		Atmosphere pressure, kPa								
++6		730…731								
Conditions of air samples taking										
Code of sample	Place of measurements	Number of sampling point	Air temperature, °C	Distance, m		Time for sample taking, min.		Revealed concentration	Maximum permissible concentration according to the normative document	
				From the floor	From the source of pollution					
1	2	3	4	5	6	7	8	9	10	11
	Line F1									
2307	Technological Equipment Setter (pasting, cap threading,	-	25	1,5	0,5	9^{20}-9^{36}	ozone	0,096 ± 0,024	0,1	МУК
2308	basing, crimping, ageing)	-	-"-	-"-	-"-	9^{470}-9^{56}	-"-	0,069 ± 0,017	- "-	No 1639-77
2309	Loading of lamps to the ageing machine	-	-"-	-"-	-"-	10^{00}-10^{16}	-"-	0,083 ± 0,021	- "-	- "-
2310	Technological Equipment Setter (pasting, cap threading	-	29	1,5	0,5	10^{20}-10^{36}	ozone	0,096 ± 0,024	- "-	- "-
2311	basing, crimping, ageing)	-	36	-"-	-"-	10^{40}-10^{56}	-"-	0,082 ± 0,020	- "-	- "-
2312	Came out of lamps from the ageing machine	-	-"-	-"-	-"-	11^{00}-11^{16}	-"-	0,096 ± 0,024	- "-	- "-

Conclusion: The content of ozone in the air in the Technological Equipment Setter's working area does not exceed the maximum permissible concentration, which is in conformity with the requirements of GOST 12.1.005-88 and GN 2.2.5.1313-03

AirZing™ can be used in …