UVCleantech

UviPortable

QUARTZ ADVANCED

User Manual

Rev 1.0

WELCOME!

The UviPortable

Congratulations on your purchase of the UviPortable! We have designed the UviPortable to provide the highest level of UVC disinfection efficacy available through a combination of unique specialised technologies, rigorous testing and design to take into account usage for the types of devices and objects that are commonly shared and can result in cross infection risks.

Using the UviPortable regularly on shared devices will give you peace of mind in knowing you are making your workplace and client interactions safer.

How to use this guide

The UviPortable is very simple to use - just put the device in, press the button, wait 90 seconds and your device is disinfected! Very straight forward!

That said, one of the big challenges with disinfection is answering the question “how do I know it is clean?”. There are no visible signs of microbes, so without taking swabs and sending them off to a lab for testing, this relies on an understanding of how UVC light works and best practive in use of the UviPortable cabinet.

A large part of this user guide is dedicated to giving you the information you need and simple “rule of thumb” guidelines to ensure you can have great confidence in the outcomes.

Of course, if you have any questions at all, the experts at UV Cleantech are there to help and offer advice specific to your needs. You can reach us any time on:

1 300 GET UVC (1 300 438 882)
help@uvcleantech.com

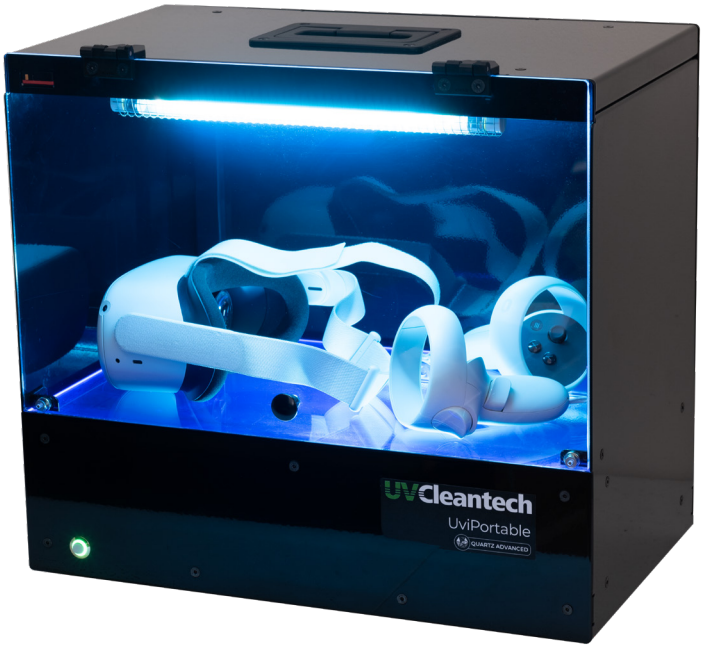
REGISTRATION

As soon as possible you should register your UviPortable for warranty. This also allows us to send you important updates and other useful information on how to get the best from your product. On the rear of cabinet is a registration sticker with your serial number. You should register at the following web site:

http://uvcleantech.com/support

Click on **Product Registration Form** and enter your details, including the product serial number.

Note that the registration sticker includes a QR code, which will take you directly to the above web-site for registration.



SAFETY GUIDE

Intended Use

Th UviPortable is designed to provide an outstanding solution to the needs of businesses to support a safe workplace and client environment across a wide range of potential disinfection use areas.

The UviPortable is not suitable for household, personal or similar use.

Working Environment

Uviportable is designed to work in ambient temperatures (15-30˚C). Do not operate the cabinets in the following environments:

- ✓ Outdoor locations where temperature could be above 30˚C.
- ✓ Strong direct sunlight.
- ✓ Wet or humid environments.
- ✓ Unstable or uneven surfaces.

Risk of Electric Shock or Fire

- ✓ Do not expose the product or accessories to water or other liquids
- ✓ Liquids should not be stored inside this unit.
- ✓ Do not place the product and accessories directly near a flame or heat source.
- ✓ Do not insert items into the product vents or other openings.
- ✓ Turn the power switch off before plugging/unplugging the cabinet.
- ✓ Never plug in the cabinet if the switch, receptacles, or power cord are broken, cracked, or torn.
- ✓ Never plug into overloaded power outlets.
- ✓ When using UviPortable with the optional PS-9 power pack, the device is still operating on 240V power and the above precautions apply.

Safety notes

- ✓ UviPortable must always be used by adults or under adult's supervision.
- ✓ The UviPortable is designed to switch off if the door is opened, however we recommend not opening the door when the lights are on.
- ✓ Ensure the magnetic door latch is engaged moving the UviPortable.
- ✓ Do not use power cord to pull the UviPortable or place the UviPortable over the power cord.
- ✓ Maintenance of items such as replacement of UVC tubes should be performed by a qualified electrician.
- ✓ Any other repairs should be performed by UviCleantech. Inadequate repair can create significant hazards to users and is not covered by the warranty.

Device Platform Precautions

The platform that devices are placed on for disinfection is made of a specialised high grade quartz due to its unique characteristics in transmitting UVC light. The following precautions should always be taken when placing items on or removing items from it:

- ✓ Do not put items greater than 3kg in weight onto the platform.
- ✓ Do not drop items onto the platform due to risk of breakage.
- ✓ Be careful not to impact sharp edges onto the quartz surface due to risk of breakage.
- ✓ Always place items onto the platform gently and with care.
- ✓ Keep surface clean with a traditional glass cleaner and soft cloth.

The platform has been engineered to be as robust as possible. It is 4mm thick to provide significant strength and has been tested under normal use case scenarios. Nonetheless it is breakable.

BREAKAGE OF QUARTZ PLATFORM FOR REASONS OTHER THAN DEFECT IN THE MATERIAL IS CONSIDERED MISUSE AND IS NOT COVERED BY WARRANTY.

SETUP

Unboxing

It is strongly recommended that you keep the packing box and foam inserts in case you ever need to return the unit to UV Cleantech for servicing. If you have purchased multiple units, then retain at least one box.

The box and foam inserts are all biodegradable.

The power cord is taped to the quartz platform on the inside of the cabinet. Remove the tape carefully and remove any tape glue residue with a soft cloth and glass cleaner.

Setup

The UviPortable should be located on a flat surface. It can be carried comfortably using the fold out carry handle on the top of the device. Please ensure that the power cord is disconnected before picking up with the carry handle.

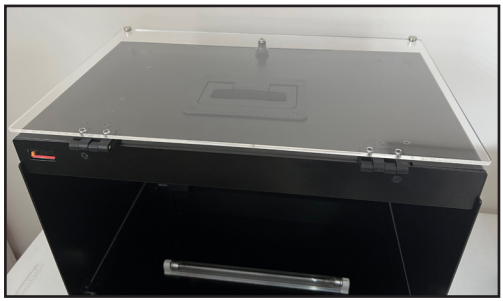
Plug the power cord into the rear of the device and use the red power switch to turn the device on.

You should turn the power off when the device is no longer being used, however the power consumption when on idle is extremely low, so it can comfortably be left on through the day.

BASIC USE

With the UviPortable plugged in and the power turned on, the surround to the main cycle start button will glow green, indicating the device is ready to use.

Insert the device or devices to be cleaned by lifting up the door at the front. The door is on a fairly strong magnetic latch so that it will not inadvertently open while being transported.

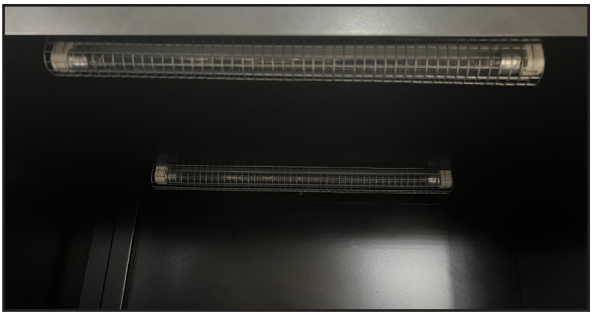


Note that the door can be rotated fully around to rest on the top of the UviPortable so that you have complete hands free access to the inside.

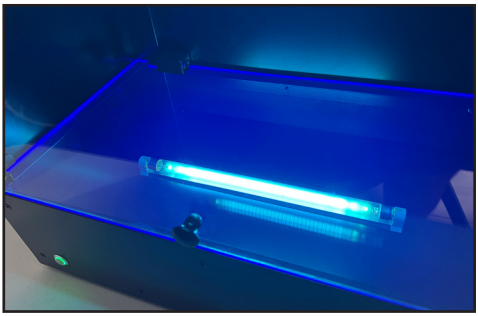
Note Carefully

One of the key features of the Uviportable is the Quartz Advanced technology used in the platform the devices to be cleaned are rested on. Please be sure to read carefully the “Device Platform Precautions” on the previous page.

When inserting devices to be disinfected, be aware that there are two UVC bulbs at the top of the cabinet on the inside. These are protected by both a lip at the front of the cabinet and wire frames over the bulbs themselves. Nonetheless, avoid hitting your devices against the bulb to prevent damage to either the bulbs, or your device.



Running a Disinfection Cycle



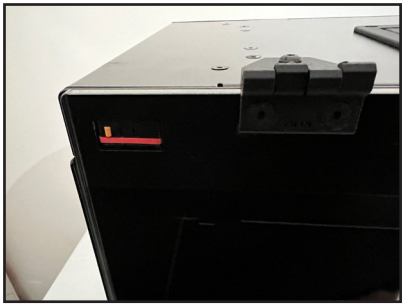
To run a disinfection cycle lightly press the Cycle Start-Stop button. You will hear a faint click as the cycle timer relay engages, and you will receive visual feedback that the cycle is running by the blue light inside the cabinet.

UVC light is invisible to the human eye, however the bulbs also produce blue light in the visible spectrum, which is what you see inside the cabinet.

The disinfection cycle will run for 90 seconds, after which the lights inside the cabinet will turn off indicating the cycle is complete.

Stopping a Cycle Prematurely

If you wish to terminate the disinfection cycle early, simply press the Cycle Start/Stop button a second time. The cycle will stop and it is safe to remove your devices. Note though that they may not be sufficiently disinfected if the cycle is terminated early.



You can also stop the disinfection cycle simply by opening the door. There is a safety interlock (located at the top left of the cabinet under the door) which automatically turns off the UVC light sources if the door is opened.

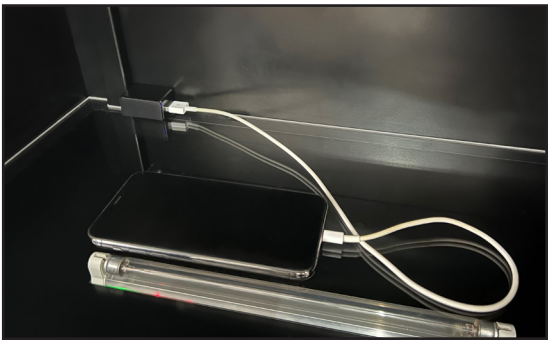
After you close the door again, the cleaning cycle will continue, however bear in mind that the timer continues while the door is open, so the disinfection time is reduced by the amount of time the door was open.

CHARGING

The UviPortable has an inbuilt USB-B charging port. This is available to use at any time the UviPortable is powered on, whether a disinfection cycle is in progress or not.

The charging port is located at the rear left of the inside of the cabinet. Insert the USB-B end of your charging cable into the socket and the other end into your device.

Before you close the door for the disinfection cycle you should ensure that the cable is not draped over your device in a way that could shadow the UVC light from reaching any part of it.



The charging circuit will fast charge at up to 2.1A and is suitable for charging a wide range of devices.

CLEANING

You should periodically clean both the inside and outside of your UviPortable. This should be done with a soft cloth and a small amount of water or a mild general purpose cleaning product. Do not spray or wipe liquids over sensive areas such as the safety switch, rear power socket or cycle start/stop button. For cleaning the quartz advanced platform and the perspex door a glass cleaner can be used. Do not use any abrasive cloths or cleaning compounds, or any solvent based cleaner which could remove the paint or damage the perspex door.

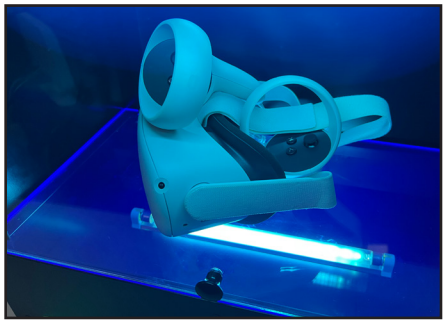
BEST PRACTICE

Please refer to Appendix A for good background information which will help you understand how your UviPortable works.

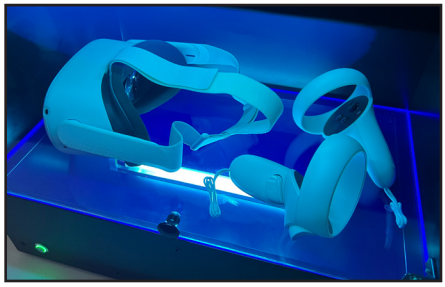
The UviPortable is designed to be extremely flexible in the way it is used and which type of devices it will clean. The unique combination of three point UVC light source, quartz advanced technology, and aluminium walls which offer a degree of internal UVC reflectivity means that your devices receive 360 degree disinfection coverage.

Nonetheless, positioning your devices correctly in the UviPortable will ensure the best possible disinfection outcomes. UVC cleaning efficacy is a combination of the intensity of the UVC light source and the distance of the object being cleaned from that source. In addition, UVC can only disinfect areas that are directly exposed to it.

As such, if you have devices stacked or overlapping this will create a “shadowing” effect where UVC light is unable to reach some surfaces. The example to the right illustrates poor practice. Due to the controllers being placed on top of the VR headset parts of both the headset and the controllers will not be disinfected.



A simple rule of thumb is the devices being cleaned should be located centrally on the platform, and separated so there is no overlap as illustrated to the right.



The UVC source under the quartz advanced platform is positioned so as to disinfect both the bottom and the inside of headsets such as shown here. The close proximity to the platform and length of the light source allows UVC to be directed into the more hidden areas of the headset. The two UVC sources at the top front and rear directs UVC light to the upper and side surfaces of the device being disinfected, thus providing optimal coverage.

Whilst multiple devices can be disinfected simultaneously, you should never overcrowd the cabinet. It is better to run multiple cleaning cycles than compromise the effectiveness of the disinfection.

Lastly, the more porous the surface is the harder it is to disinfect. If you have objects with a significant cloth or other porous type surface you may want to run it through two cycles to have greater confidence in the disinfection, and/or position it so it has maximum direct UVC.

How do I know it is disinfected?

This is a very important question, as short of swabbing your device after disinfection and sending it off to a lab to be analysed, you cannot "see" if the contagions have been removed.

The value of lab testing done by disinfection device suppliers is dubious as they only test for specific viruses (and rarely if ever Covid) and under very controlled and non real-world conditions, such as putting some virus on a glass slide in open space in the cabinet.

So where does this leave us?

UVC disinfection technology has been around for a long time, and over the years there have been many studies and lab analysis done on exactly what UVC dosage is required to kill various pathogens. This is now very well documented and accepted by the scientific community.

Log Kill

Firstly, what does "kill" actually mean? This is defined on a log scale as follows:

Log Reduction	Reduction Factor	Percent Reduced
1	10	90%
2	100	99%
3	1,000	99.9%
4	10,000	99.99%
5	100,000	99.999%

Log 4 is considered a highly effective level of disinfection and is the unofficial benchmark for disinfection products. Log 5, or even 6, is extremely difficult to achieve *over the entire area* of a disinfected

device and requires very specialised (and expensive!) equipment.

The UVC dosage to effectively kill various contagions at Log 4 is well documented. Importantly the dosage required is different for each contagion, and varies across, spores, bacteria, viruses and protozoa. Following are a number of examples of dosage required for Log 4 kill. A full list is available from UV Cleantech on request.

Bacteria	Log 4 Dosage	Reference
Escherichia coli ATCC 11229	7.5	Zimmer et al. 2002
Legionella pneumophila ATCC 43660	9.4	Wilson et al. 1992
Salmonella enteritidis	10	Tosa and Hirata 1998
Staphylococcus aureus ATCC25923	10.4	Chang et al. 1985

Virus	Log 4 Dosage	Reference
Adenovirus type 2	80	Shin et al. 2005
Calicivirus feline	30	Husman et al. 2004
Sars Cov-2	22	Boston Uni 2020
Hepatitis A	21	Wiedenmann et al. 1993
Influenza A (H1N1)	3.8	Buonanno, Welch et el.

Spore	Log 4 Dosage	Reference
Bacillus subtilis ATCC6633	78	Chang et al. 1985
Bacillus subtilis ATCC6633	79	Mamane-Gravetz and Linden 2004

For details on the references, see Appendix B. Dosage levels are quoted in mJ/cm2. As you can see there is a wide spread depending on exactly what you are looking to protect against. The majority of bacteria and viruses of concern require 30mJ/cm2 or less.

Whilst definitive peer reviewed research on Covid-19 dosage levels is still in progress, early testing on the virus along with its commonality with other similar viruses indicate this too will be at the sub 30mJ/cm2 level. Please see Appendix B for references to research and articles published to date on this.

Knowing the required UVC dosage, we can now look at test results for the UviPortable and the dosage levels measured at different parts of the cabinet for a 90 sec cycle time. These are shown below as a heat map, along with the mJ/cm2 readings at different points in the cabinet, read from both the underside and top side of the device platform.

31.3	49.4	62.3	52.5	31.4
30.6	54.7	61.1	54.3	30.9
32.9	50.8	62.5	51.3	32.3

Irradiation levels from above (directed to top and side surface of device). Measured from 6cm above the platform representing an average height above the platform for headsets and larger devices.

28.6	34.9	44.9	35.1	28.7
27.3	40.2	44.9	40.8	27.2
28.2	35.2	44.7	35.6	29.1

Irradiation levels from above (directed to top and side surface of device). Measured from platform representing dosage to low flat devices such as phones, keyboards and tablets, which should be centrally placed on the platform..

18.3	40.7	62.2	41.2	18.3
34.8	110.2	119.2	110.7	38.5
16.3	40.5	60.4	40.1	18.1

Irradiation levels from underside (bottom and inside of device). Measured from platform representing dosage to the under and inside of all devices.

Note that the irradiation levels will comfortably achieve log 4 kill for most common bacteria and viruses across the entire cabinet area.

Things such as spores are much harder to kill, and if these are of concern, running two cycles would provide the necessary dosage.

Notice too the much larger dosage delivered from the underside centre of the device. This is by design ensuring that any reduced dosage reaching the inner surfaces of headsets will still be at a level suitable for log 4 kill. We can provide documented measurements taken inside actual headsets in support of this.

If you have a particular concern around spores and harder to kill contagions, UV Cleantech can factory adjust your device timer to provide longer cycle times. This will not be necessary for the vast majority of use cases.

TECHNICAL DATA

Specification Table

UviPortable	
Dimensions - unboxed	46.2W x 27.1D x 41.8H cm
Dimensions - in shipment box	48.5W x 31.4D x 44.3 cm
Weight - unboxed	8 kg
Weight - in shipment box	9.7 kg
Door (max front clearance required)	29 cm
Shelf size	45.8 cm x 26.8 cm
Shelf max rated load	3 kg
Charger port	1 x USB-B
Max charge rate	2.1A (regulated automatically)
UVC Power	24W (array of 3 x 8W)
UVC Wavelength	254nm
Cycle time	90 seconds, factory adjustable
Auto shutoff	Yes, on door open
Manual shut off	Yes, press cycle start/stop button
Rated Power	50W max including charging
Power source	230-240VAC
Battery power	Yes, via UV Cleantech PS-9
Mobility	Top carry handle
Construction	Powder coated aluminium with perspex door.

AUSTRALIAN MADE AND OWNED

Certified Australian Made
License ID: 15292

TROUBLE SHOOTING

UviPortable will not power on

First the obvious - check that the power cord is plugged in and switched on at the mains, and the power switch on the back of the UviPortable is turned on. Next check that the removable fuse in the centre of the power plug assembly at the rear of the unit is not blown. This can be replaced by a 3A fuse. If it continues to blow, there is an internal fault and you should return the unit to UV Cleantech for repair. Also check that it is not just the front indicator light that is not working by pressing the cycle start/stop button to attempt to start a cycle.

The UVC lights do not come on

If it is just one of the three, then it is most likely a blown UVC tube. Contact UV Cleantech for a replacement. If all three do not come on, or they stay on when the door is opened, it is most likely that either the door is not fully closed or the microswitch that controls the auto shutoff is faulty. Open the door and manually press the button on the microswitch and verify a clicking sound. If faulty, you will need to return the unit to UV Cleantech for repair.

There is a slight odour in the cabinet after a cycle

This is normal, and a common by-product of UVC cleaning. It is harmless and will pass quickly. See reference article in Appendix B.

Other problems?

Please contact UV Cleantech for assistance at any time. Support is free, and we are happy to assist with trouble shooting, or any questions on how to get the most from your UviPortable:

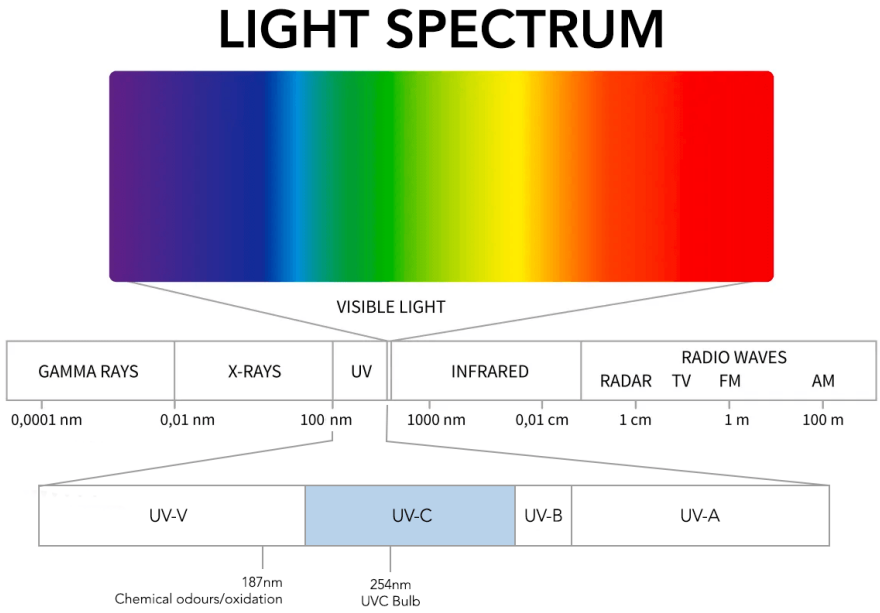
Web:	http://uvcleantech.com/support
Phone:	1 300 GET UVC (1 300 438 882)
Email:	help@uvcleantech.com

APPENDIX A

What is UVC light?

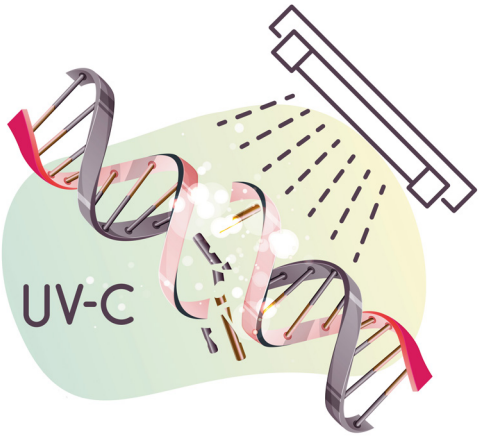
We are all familiar with UV light generally – it is what gives us sunburn if we stay out in the sun too long. However UV light is divided into UVA, UVB and UVC, each being a different band of wavelength of light in the non-visible spectrum. UVC doesn't exist naturally in the earth's atmosphere as it is absorbed well before it reaches us. Because UVC doesn't occur naturally on the earth's surface, common pathogens that prove dangerous or deadly to humans have no natural defence from it. Since UVC can be artificially created, it has been used for decades as a very effective decontamination agent against these pathogens.

The effectiveness of UVC depends on a number of factors, most importantly a) The wavelength of UVC light used b) The intensity of the light source c) The distance of the light source from the surface to be decontaminated d) The duration of exposure, and e) The substance being decontaminated (metal, cloth, wood, plastic etc).



How does UVC disinfect?

UVC radiation (typically with a wavelength of 254nm, but more broadly in the 250nm to 280nm range) disrupts the organism's DNA in a way that prevents cell replication. Without the ability to reproduce, they die. The ability of UVC to cause this depends on the total irradiation level, which is a combination of light intensity, and distance from the light source.



It is important to recognise that the primary transmission mechanism for viruses such as Covid-19 is touch, so to be effective all surface areas of a shared device (headset, laptop, keyboard etc) which may be touched, need to be fully disinfected.

A well-designed UVC cabinet, such as the UviPortable, ensures that an even coverage of the right level of UVC reaches all areas of the cabinet, so that ALL surfaces are disinfected. This is why simple solutions such as UVC wands, or other boxes that only irradiate one part of the device (eg. the inside of a headset) are not fit for purpose as the user cannot ensure consistent irradiation of all surface areas at the required intensity.

Not all light behaves the same way

We are very used to the properties of visible light. It will pass straight through glass, be reflected off some surfaces and absorbed by others. This is easy for us to comprehend because we can see it.

UVC is different. Most materials absorb UVC (glass, perspex, many metals) and some reflect a percentage of it (aluminium and to a lesser extent steel). This is why we can have a clear perspex door on the UviPortable as no UVC light passes through it. This is a highly desirable characteristic as UVC is not people-friendly and we should avoid exposure to it.

This characteristic also creates problems with making a truly effective UVC disinfection solution as it is no use having a glass device plaform with a UVC light underneath it as none of that UVC will reach the device. This is where the Quartz Advanced technology comes in.

QUARTZ ADVANCED

UV Cleantech undertook significant research and development around creating a device platform that was truly UVC transparent, allowing the UVC to pass through it for maximum disinfection effect, thus allowing true 360 degree device disinfection.

Wire racks are inefective for this purpose as any contact points with the wire rack are shielded from UVC and are thus not disinfected.

The platform in the UviPortable has been custom engineered for the purpose from a specialised form of quartz plate, 4mm thick for strength. It is what makes the UviPortable a unique product.

APPENDIX B

Research references

COVID-19

Boston University 2020, see https://www.signify.com/global/our-company/news/press-releases/2020/20200616-signify-boston-university-validate-effectiveness-signify-uvc-light-sources-on-inactivating-virus-that-causes-covid19

Ultraviolet irradiation doses for coronavirus inactivation – review and analysis of coronavirus photoinactivation studies: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7273323/

A Critical Review on Ultraviolet Disinfection Systems against COVID-19 Outbreak: Applicability, Validation, and Safety Considerations: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7571309/

OTHER BACTERIA, VIRUSES & SPORES

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Mamane-Gravetz, H. and Linden, K.G. 2004, UV Disinfection of indiginous aerobic spores: Implications for UV reactor validation in unfiltered waters, Wat. Res., 38(12): 2898-2906

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ODOURS FROM UV DISINFECTION

https://www.techstreet.com/standards/or-16-c033-root-cause-of-the-odor-generated-by-germicidal-uv-disinfection-with-mobile-units?product_id=1910130