

February 2020

Coronavirus, SARS, Measles, Influenza & other Viruses

Steril-Aire UVC systems are very effective against Viruses including strains of the Coronavirus and will provide excellent pandemic protection.

Steril-Aire very high output UVC works by destroying the DNA and RNA of microorganisms and is therefore effective against *all* types of Viruses including **Flu's, Colds, Coronavirus/SARS, Measles and German Measles.**

The droplet nuclei for these viruses can remain airborne for hours or **days** depending on airflow and humidity (Virus micro-organism size is typically 10 – 500 millimicrons – millimicron = That's 1000th of a micron). They can also enter the biofilms growing on cooling coils and potentially mutate unless the coil is treated with UVC.

In order to understand how Steril-Aire UVC works, it is important to understand the science behind UVC:

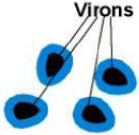


The C wavelength of the UV spectrum we use is (UVC – 253.7nm), this targets the DNA of microorganisms, destroying their cells and making replication impossible. Directed at a cooling coil or drain pan, UVC energy destroys surface biofilm, a gluey matrix of microorganisms that grows in the presence of moisture. Biofilm is prevalent in HVAC systems and leads to a host of indoor air quality (IAQ) and HVAC operational and efficiency problems. UVC also **destroys airborne viruses** and bacteria that circulate through an HVAC system.

For the most effective microbial control, Steril-Aire UV germicidal Emitters are installed on the supply side of the system, downstream from the cooling coil and above the drain pan. This location provides more effective biofilm and microbial control than in-duct UVC installations. By irradiating the contaminants at the source – the cooling coils and drains pans – Steril-Aire UVC delivers simultaneous cleaning of surface microorganisms and destruction of airborne microorganisms. Steril-Aire patented this installation configuration in 1995.

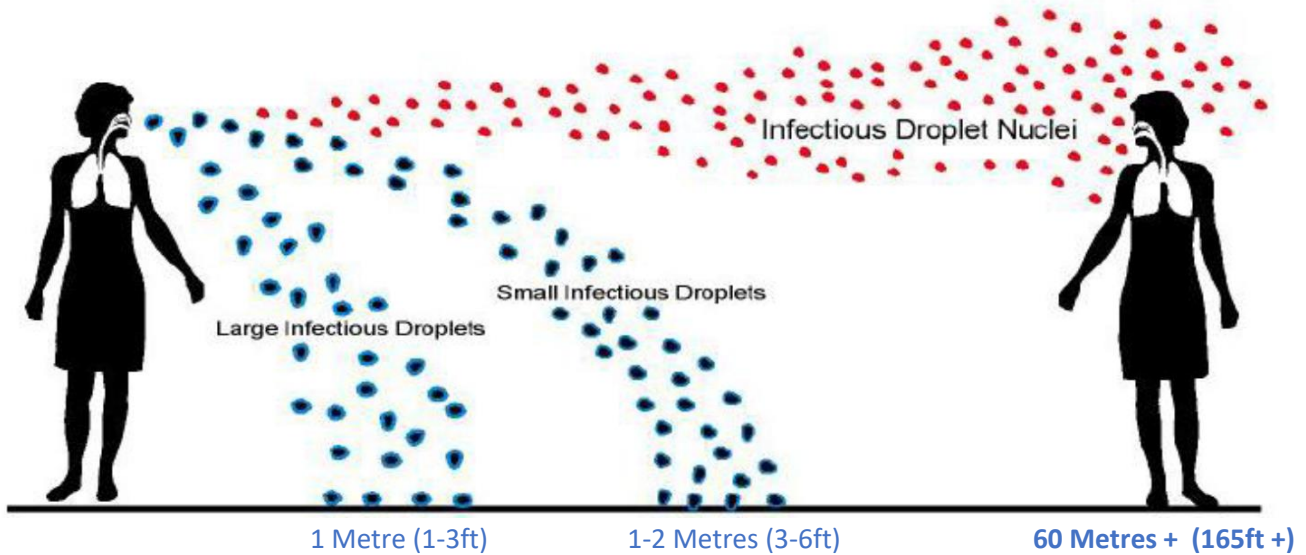
The recirculating air in HVAC systems creates redundancy in exposing microorganisms to UVC, ensuring multiple passes so the light energy is effective against large quantities of airborne microorganisms. Steril-Aire UVC delivers the highest UVC output, removing biofilms from Cooling Coils driving HVAC system efficiency while improving indoor air quality.

Transmission of Corona and Other Viruses in Buildings

Stages of Infectious Droplets & Droplet Nuclei:

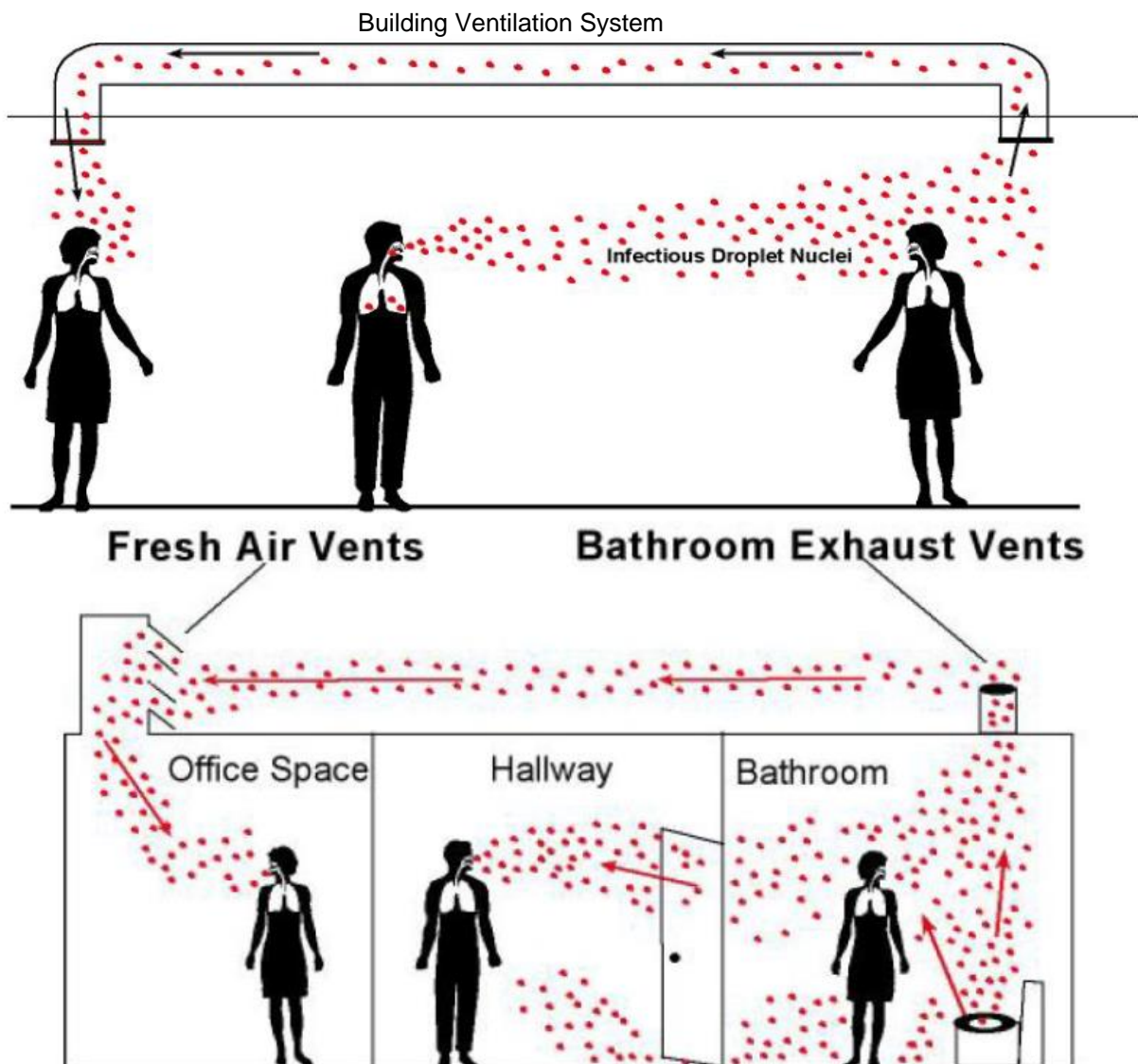
	<p>Large Infectious Droplets: Mucus/water encased Viruses are aerosolised by the infector or by toilet water. These quickly fall to the ground after traveling up to 1 Metre (1-3ft)</p>
	<p>Small Infectious Droplets: Mucus/water coating starts to evaporate. These will travel 1 to 2 Metres (3-6 ft) before falling to the ground. These droplets can become Droplet Nuclei</p>
	<p>Infectious Droplet Nuclei: Mucus/water coating has totally evaporated leaving only the VIRION. This is a Droplet Nuclei Droplet Nuclei are so microscopic they can float in the air indefinitely</p>

Infectious Droplet & Droplet Nuclei travel lengths:

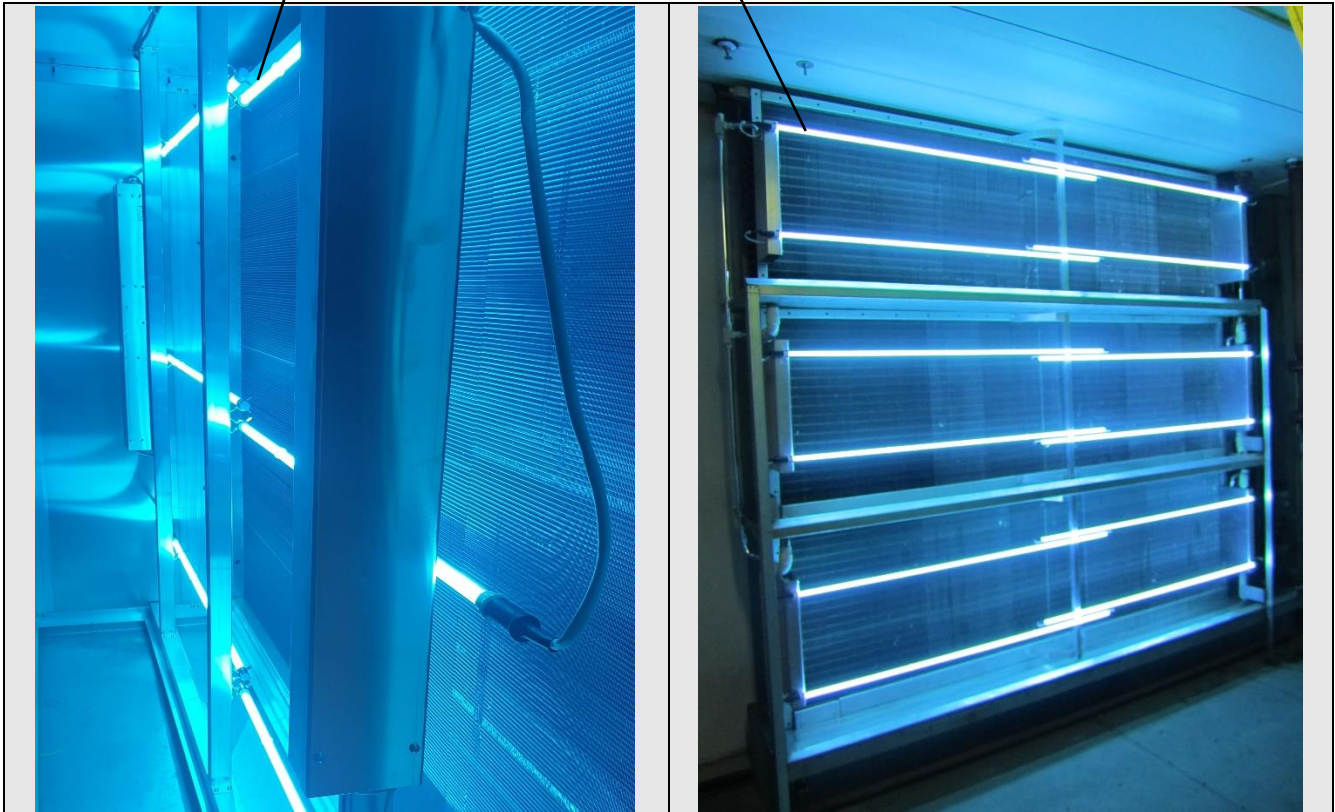
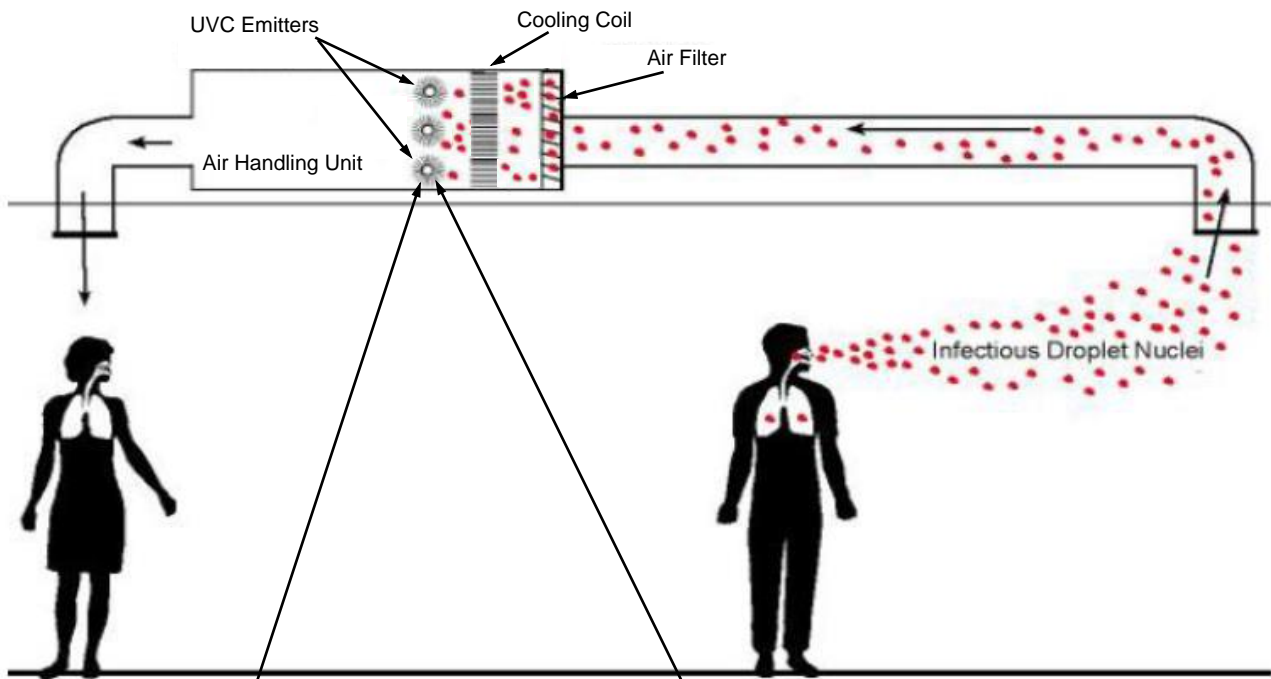


Note: Droplet Nuclei Viruses are below 0.3μ (microns) and typically in the millimicrons, they can Penetrate Deeply into the Human Lungs.

Examples of how Occupant Aerosolised Droplet Nuclei travel both within indoor spaces and then throughout a Building:



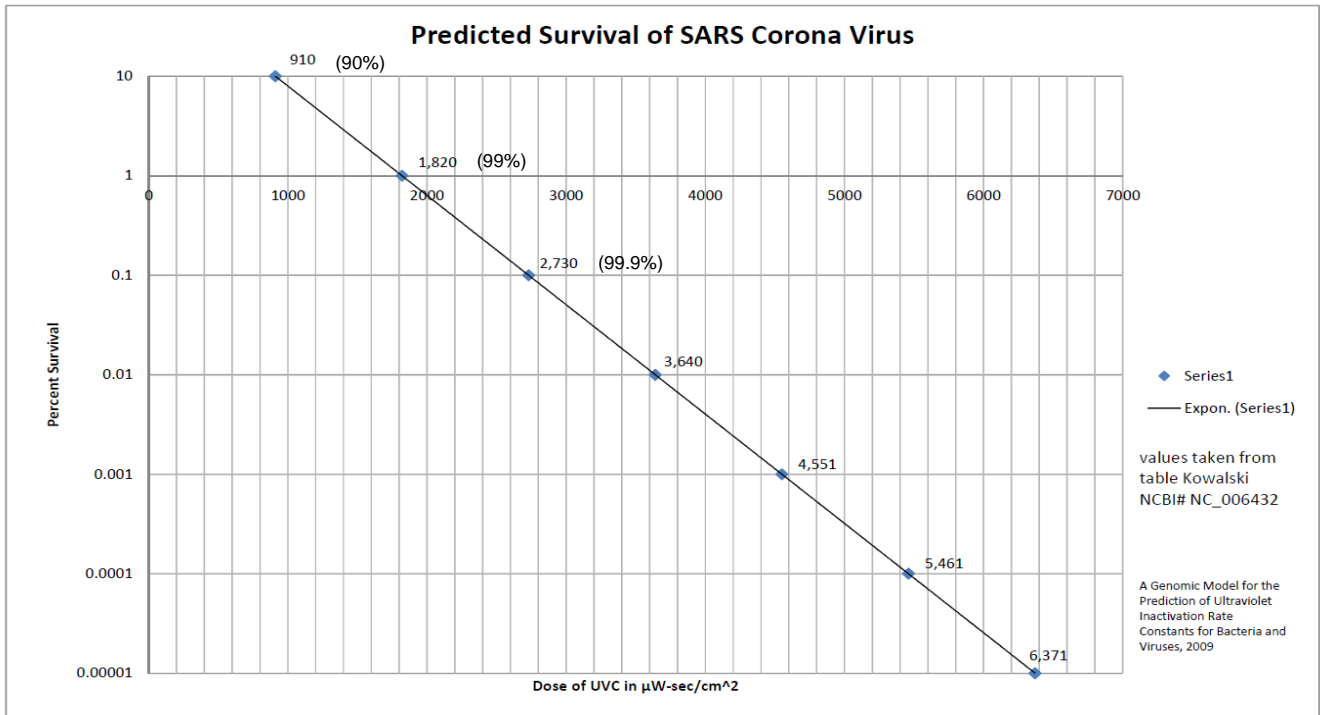
How Steril-Aire Emitters inactivate airborne Infectious Droplet Nuclei:



UVC Energy Fields generated in Air Conditioning systems by Steril-Aire create a barrier that destroys the Droplet Nuclei from Coronavirus, SARS, Measles and Influenza etc

- Humidity Levels within air-conditioned buildings typically have lower humidity than outside which allows Viruses to Evaporate faster thus creating **More Droplet Nuclei**.
- Lower humidity in buildings allows *Droplet Nuclei* to stay airborne longer as the droplets do not absorb water weight which cause them to fall to the ground.
- Indoor Air currents created by both HVAC systems and People movement assure that *Droplet Nuclei* can remain airborne **Indefinitely**.
- This allows HVAC systems to redistribute *Droplet Nuclei* throughout the building to infect more occupants.

Typical Steril-Aire UVC selection performance:



Example Inactivation Rates on a typical AHU selection:

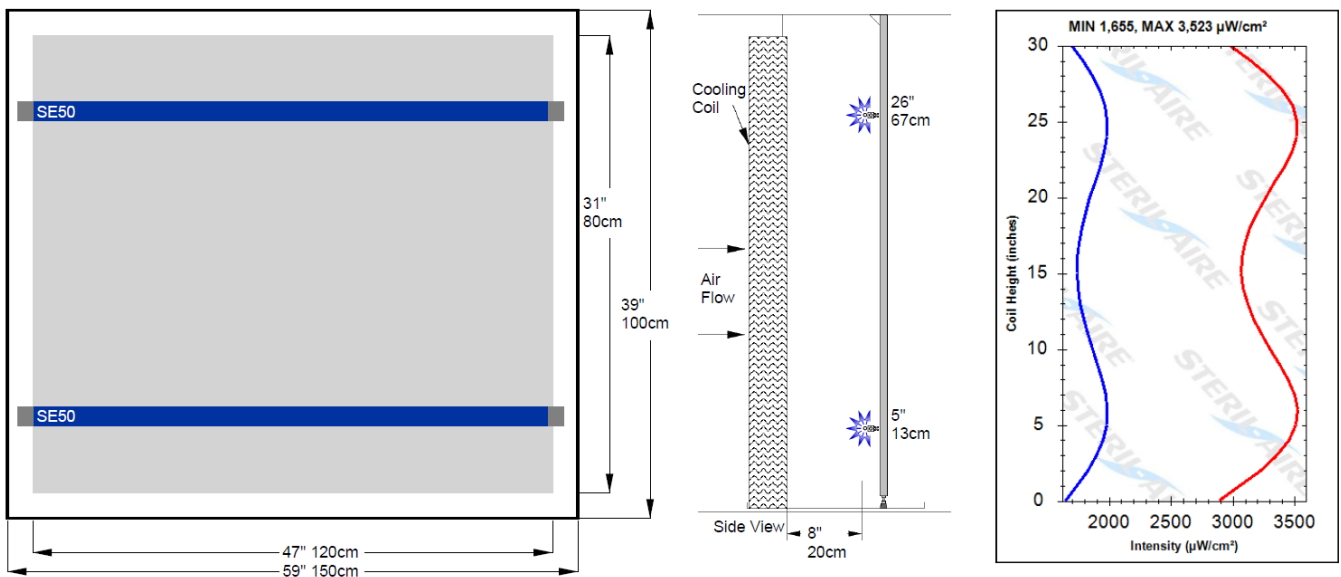


Diagram showing positioning of Emitters inside the AHU and the UVC Energy Fields generated

$$\mu = \text{Intensity } (\mu\text{W}/\text{cm}^2) \times \text{Time}$$

$$\text{SARS Corona Virus 99.9\% Inactivation} = 2730 \mu\text{W}/\text{cm}^2$$

$$\text{Coil Face Intensity (max)} = 3523 \mu\text{Watts}/\text{cm}^2$$

For 99.9% inactivation using our typical selection on an AHU

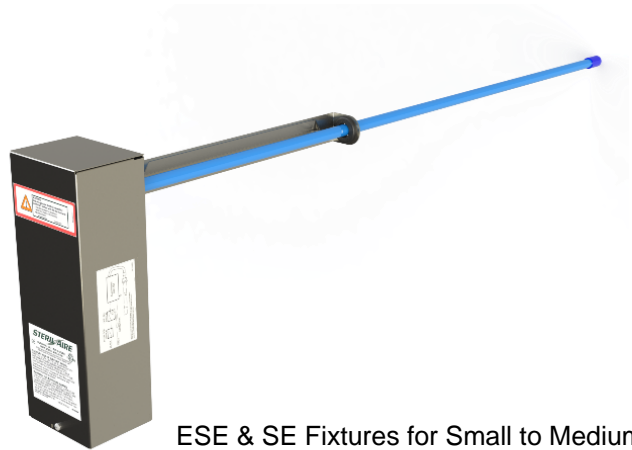
$$\text{Inactivation at coil face} = 2730 \mu\text{W}/\text{cm}^2 \div 3523 \mu\text{W}/\text{cm}^2 = 0.77 \text{ seconds}$$

Higher UVC energy fields closer to the lamps will result in quicker inactivation

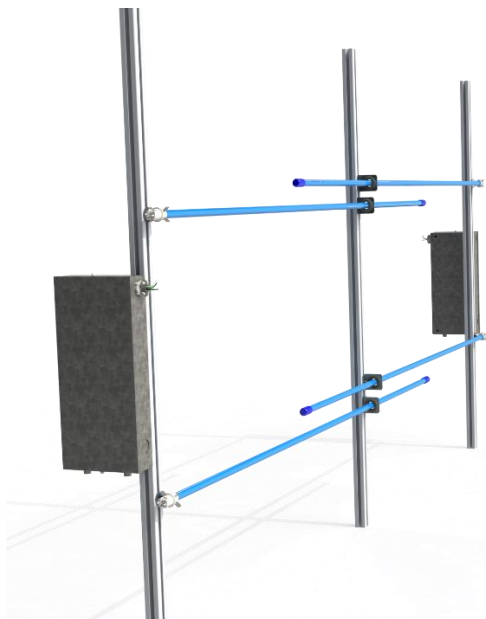
AHU, FCU, Rooftop Packaged Unit, Split System Steril-Aire Solutions:



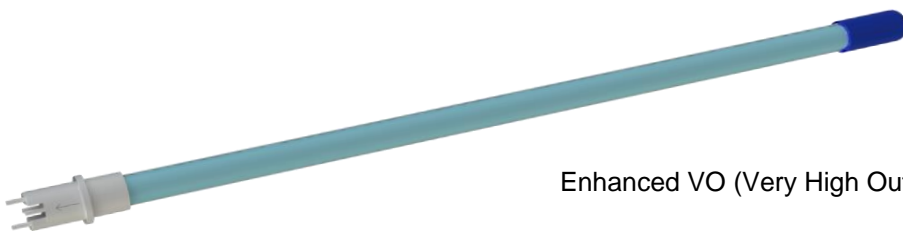
Enhanced VO UVC Kits for Air Handling Units



ESE & SE Fixtures for Small to Medium size AHU's, Fan Coil Units & Packaged Units



Enhanced VO UVC Kits
Rapid Installation Kits (RIK)



Enhanced VO (Very High Output) Germicidal UVC Emitters
Available from 190mm(7.5") to 1550mm (61")

Surface Decontamination and Stand-Alone Solutions:

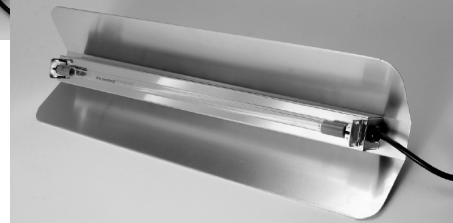


**RIDS
Remedial In-Room Decontamination System**

**Self-Contained Room Sanitizer
Decontaminate Air & Surfaces**



**Steril-Wand
Hand-Held UVC Emitter
Surface Decontamination**



DE422 Ceiling/Wall Mount Decontamination Unit



Steril-Zone

**3-Stage Cleaning Process In-Room Portable Air Purifier
Commercial or Residential Use**



‘Providing significant levels of Pandemic Protection whilst improving HVAC Efficiency through better heat transfer and reduced maintenance costs – No other proven technology can achieve this’

*Malcolm Cain
Managing Director – Steril-Aire Oceania*

Sources:

1. ‘Transmission of Influenza & other Viruses in Indoor Air’ - Federal Interagency Committee for IAQ, EPA 2009
2. ‘Microbiomes of the Built Environment’ – The National Academies of Science, Engineering, Medicine.
3. ‘Airborne Infectious Diseases’ – ASHRAE Position Document, 2009
4. ‘The effectiveness of UVGI Coil Treatment on Typical HVAC System Cooling Coils’ - Timothy Leach
5. ‘The Importance of Bioaerosols in Hospital Infections and the Potential for Control using Germicidal Ultraviolet Irradiation – L.A Fletcher Aerobiology Research Group, University of Leeds.