

STERIL-AIRE®

*UVC World Leaders for
Commercial Building IAQ
and AC Energy Savings*



Brochure for International use only.

Torre Mayor, Mexico

How Steril-Aire Benefits Office Buildings

INTERIOR ENVIRONMENT

Improved IAQ

- Air from AC System up to 99% free of microorganisms *
- Reduction in occupant sickness and absenteeism**
- Reduction in distribution of airborne infections (flu etc) ***
- Partial Pandemic Protection ****
- Partial Protection against Legionella
- Reduction in VOCs & odours*



FACILITIES *****

Automatic coil cleaning

- Reduced AC maintenance
- Reduction of maintenance labour & chemical costs
- AC energy saving (10-20%)
- Reduction in carbon footprint
- Improved sustainability
- Coil Condensate Recovery/Recycling



Extension of equipment life:

- Coil
- Chiller



* Subject to UVC Dosage applied

** See Case Study: McGill University, Montreal, Canada

*** ASHRAE Airborne Infectious Diseases Position Document

**** Use of Steril-Aire UVC at Tan Tock Seng Hospital at height of SARS pandemic (2003)

***** See Case studies at www.steril-aire.com



Government & Commercial Use of Steril-Aire UVC



HVAC systems

- AHUs
- Fan-coils
- Splits
- Wall Package Units
- Unit Ventilators
- Heat Wheels
- Refrigeration
- Forced Air Systems
- Humidifiers

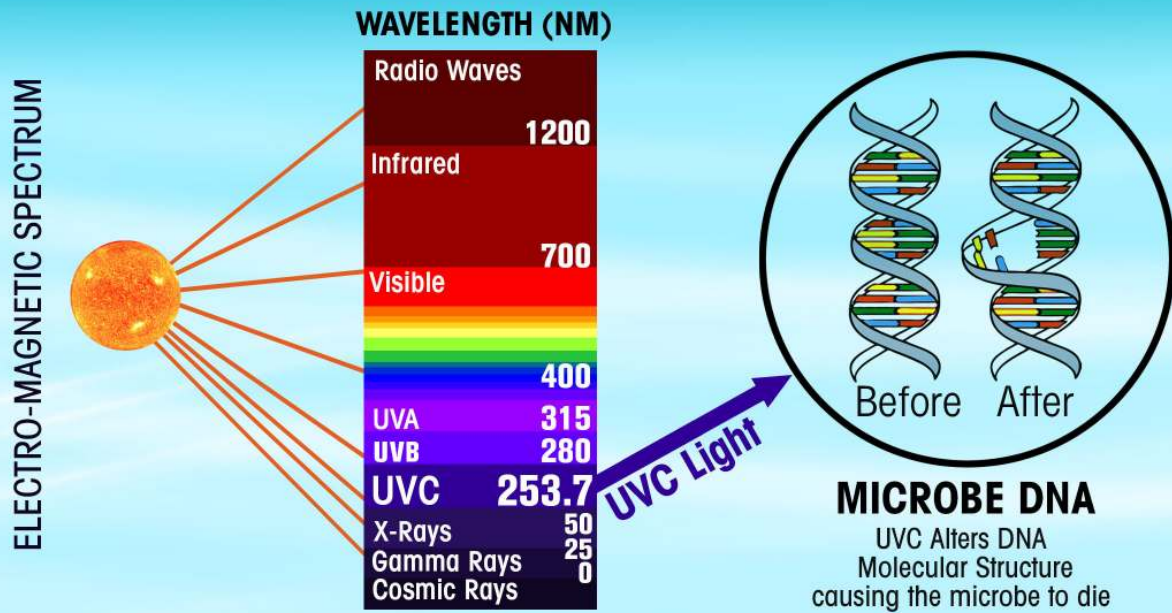
In Room

- Ceiling Mounted
(Only for use when room is unoccupied)
- Steril-Zone
- SterilWand

Locations

- Lobby
- Offices
- Conference Room
- Board Room
- Canteens / Kitchens
- Restrooms
- Elevators
- Waste Collection Areas
- Parking Structure Exhausts
- Retail Stores
- Cooling Towers

The Science of Steril-Aire UVC



Air-Conditioning Cooling Coil



AIR BIO-TEST



Before Steril-Aire

After Steril-Aire

IAQ, Health, Attendance, Energy Savings & Sustainability

Office Tower - Los Angeles - USA

"In 2011, we installed Steril-Aire's high output UVC Emitter®, in our air-handling units, in front of the cooling-coil and throughout the building. We have been very pleased with this product which has provided enhanced indoor air quality, AC energy savings, lower operating costs, and reduced labour and maintenance. We know that our fan coils will be free from mould and bacteria and that airborne viruses will be destroyed. This minimizes the spread of coughs, sneezes and influenza. We were also surprised that the filters stayed cleaner which has the benefit of extending their life. The evaporator pans and coils have also stayed clean, without the need for biocide tablets or chemicals. For those of you who are not familiar with Steril-Aire, they are the global leader in high-output ultraviolet germicidal solutions for improved indoor air quality and energy efficiency."

-Vice President Development and Operations

Cairns Post - (News Corporation) - Australia

"News Ltd's environment and climate change manager Dr. Tony Wilkins, was initially dubious about expansive energy-efficiency claims made by the provider of an air-conditioning add-on technology, but it far exceeded his expectations – and delivered much cleaner air."

-Carbon and Environment Daily

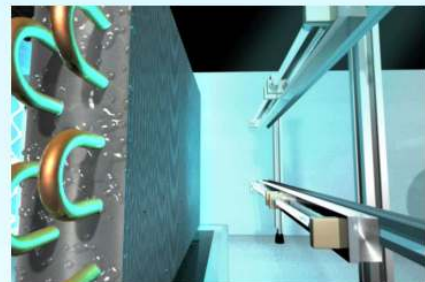
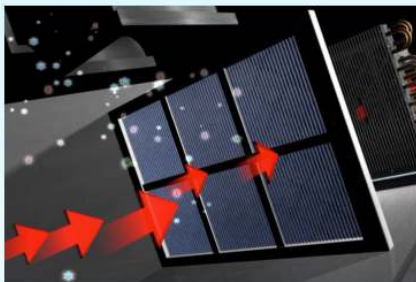
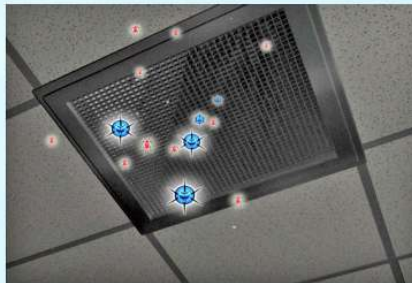
Reichman International - Mexico

"Our mission is to provide a sustainable, green and intelligent building, where the focus is on the people and where the inside air is better than the outside air and free from virus bacteria and mould. Everyday 9000 people come here to work and 1500 to visit. Our building is equipped with Steril-Aire's high powered UVC Emitters which are installed in the 46 cooling coils. They kill the mould, virus and bacteria recirculating in the ducts. Most buildings discard thousands of litres of condensate water created in the cooling coils. Steril-Aire's UVC Emitter® leaves the condensate clean allowing us to use the recycled water in the cooling towers & toilets. We provide the safest and healthiest building in Latin America."

-Director of Operations, Reichman International

IAQ and Hidden Problems

A sneeze releases viruses into the air that are sucked into the AC system and circulated throughout the building, making the inhabitants sick.



In air-conditioned buildings, sickness and related absenteeism are caused by two untreated sources of pollution, that easily pass through normal AC filters:

- 1: Bacteria and viruses that enter the building with the air and with people.
- 2: Mycotoxins and microorganisms that come from the mould/fungi growing on and in the AC coil and ducts.

By positioning the correct number of Steril-Aire UVC Emitters at the coil, these pollutants are destroyed. The air is left up to 99% free of pathogens.

Steril-Aire UVC Products

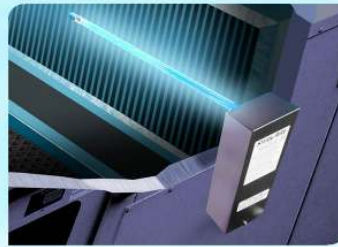
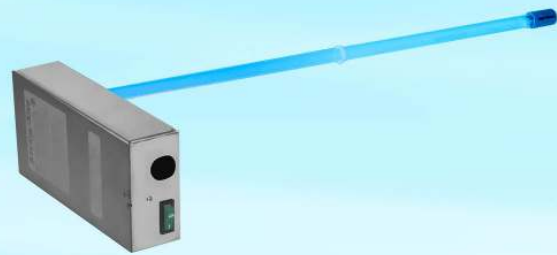
Full catalogue at www.steril-aire.com

DE SERIES UVC EMITTER®



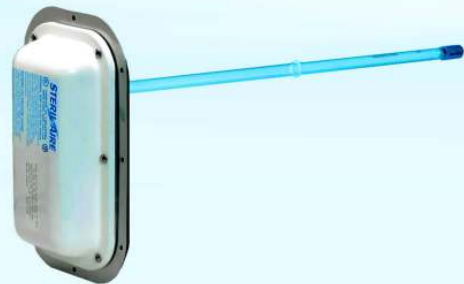
- For use in medium to large AHUs.
- Double-ended Emitters are mounted internally and fitted end-to-end to fit any size coil.
- Available in: 18", 24", 30", 36", 42", 62" inch lengths (46, 61, 76, 91, 107, 157 cm lengths).
- Universal power-supply: 110 to 277V - 50/60 Hz

SE SERIES UVC EMITTER®



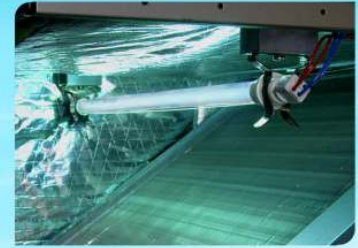
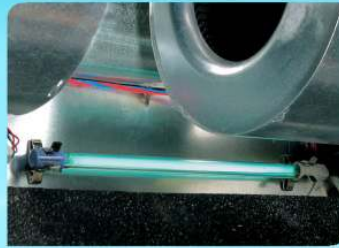
- For fan-coils, heat-pumps, unit ventilators, packaged AHUs, terminal units, and ducts.
- Mounted on exterior of AHU. Tube installed through a one-inch hole (2.54 cm) drilled through the AHU casing.
- Available in 12", 16", 20", 24", 30", 36", 42" inch lengths (30, 41, 51, 61, 91, 107 cm lengths).
- Universal power-supply: 110 to 277V- 50/60 Hz
- Also available as an internally mounted kit with 12" to 61" (30 to 155 cm) SE Emitter tubes.

SEN SERIES UVC EMITTER®



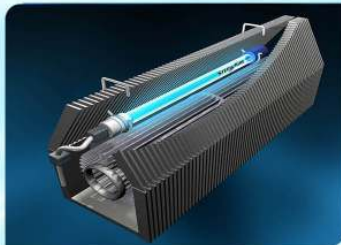
- For exteriors including roof-top units, AHUs, heat-pumps, fan-coils, terminal units, and ducts.
- NEMA 4 rated.
- Mounted on exterior of AHU. Tube installed through a one-inch hole (2.54 cm) drilled through the AHU casing.
- Available in 12", 16", 20", 24", 30", 36", 42", inch lengths (30, 41, 51, 61, 91, 107 cm lengths).
- Universal power-supply: 110 to 277V- 50/60 Hz

SE VO EMITTER® KIT FOR AIR HANDLERS



- Designed for air-handlers, fan coils, packaged systems, heat pumps and unit-ventilator systems.
- For coils larger than 15 inches high & up to 61 inches wide (38cm high & up to 155cm wide).
- The Kit includes a 110-277 V power supply (selection based on Emitter length) & one Mounting Kit selected from: 2 Short Hooks; 2 Small Spring Clips; Flat Plate Lamp Holder; Insert Emitter Holder, to fit most major brands.
- Available in: 12", 16", 20", 24", 30", 36", 42", 50" & 61" inch lengths (30, 41, 51, 61, 76, 91, 107, 127 & 155 cm).

SE HO EMITTER® KIT FOR UNITARY/SPLIT SYSTEMS



- Designed for air handlers below 5 tons, splits / mini splits, fan-coils, package units, PTAC units, & ceiling cassettes.
- For coils smaller than 15 inches high & 24 inches wide (38 cm high & 61cm wide).
- The Kit includes a 110V 60Hz or 220V 50Hz power supply (please specify) plus Mounting Kit, selected from: 2 Short Hooks; 2 Small Spring Clips; Flat Plate Lamp Holder; Insert Emitter Holder.
- Available in: 7.5", 10", 16", 20", 24" inch lengths (19, 25, 41, 51, 61 cm).

STERIL-ZONE® INDOOR AIR-CLEANER



- Recommended for rooms up to 70 m². 9,000 hours of operation (approximately 1 year of continuous operation)
- Variable speed fan for maximum user control. Max. air delivery up to 300 cmh (cubic meters per hour)
- Filters particles down to 0.3 micron in size with 95% efficiency. MERV 16 filter rating – the highest level for filter efficiency.
- Activated carbon filter absorbs chemicals, gases, cigarette smoke and odours.
- Safety features include a UVC shield and Ozone-free operation. Power: 110V 60Hz or 230V 50Hz
- Size: W 343mm x D 381mm x H 533mm (W 13.5" x D 15" x H 21")

How Steril-Aire Works

The intended purpose of air-conditioning ("AC") is to enable people to work, play and live in buildings with economical, clean and cold air – sadly this is seldom the case. Because the pollution in the air is mainly invisible it is often ignored, yet the US EPA, World Health Organization and ASHRAE all warn of the potential health risks of AC systems. The health risks come from two main sources; 1: The biofilm (mould) that grows inside the AC system, fed by the condensate created when the warm air passes through the cold cooling coils, sending out mould, bacteria and their products (VOCs) into the air. 2: The bacteria that enter into the building via ducts, doors and windows, and the viruses and bacteria (coughs and sneezes) that enter with the people, all of which are distributed by the AC system. This leads to cold and flu outbreaks, sickness, absenteeism and a drop in productivity.

Case studies confirm that the high output Steril-Aire Emitters remove the biofilm from the AC coil and microbes from the air-stream making the air exiting the AC registers up to 99% free of virus, bacteria and mould, and thereby reducing sickness and absenteeism. Air-conditioning uses a lot of energy, often as much as 60% of the total building's energy, and contributes proportionally to the carbon footprint. The chiller and pumps normally consume 70% of the AC energy. The biofilm on the coil restricts airflow and reduces the heat transfer capability of the coil, resulting in warmer and humid air. This causes the occupants to lower the temperature settings on the thermostats, or the maintenance department to lower the chiller set point, causing the chiller to work more and use more energy.

(The heat conductivity of aluminium used in cooling coils is approximately 200 W/m.K while that of biofilm is approximately 0.2 W/m.K. Most coils are only cleaned once or twice a year and, due to the physical structure of the coil, the inside of the coil is seldom cleaned. Even after the coil is cleaned the biofilm starts re-growing immediately).

A typical case study example came from Steril-Aire's Singapore, GETC Green Team, that was asked to improve the air and energy efficiency of the AC system in the Singapore Parliament Building. The Green Team introduced the Steril-Aire UVC Emitter® into the AHUs, which resulted in improved heat transfer efficiency at the cooling coil, raising the chilled water set-point from 6.6°C to 8.5°C. The parameters (tonnage and chilled temperature) for the cutting-in and cutting-out of the chillers, were readjusted to 'stretch' the chillers to maximize chiller efficiency. After the fine-tuning process, the return chilled water temperature was raised from the previous 9.8°C to 13.9°C. As a result, the chilled water ΔT was increased from 3.2°C to 5.1°C. The overall chiller plant efficiency improved from 1.1 kW/ton to 0.86 kW/ton (an improvement of 21.8% in chiller plant efficiency), enabling the Singapore Parliament House to secure the Green Mark Gold Award.

Before Improvement				After Improvement (UVGI for AHUs, Resetting of Chiller Plant Control Parameters)			
Chilled Water Supply Temp	Chilled Water Return Temp	ΔT	Chiller Plant Efficiency	Chilled Water Supply Temp	Chilled Water Return Temp	ΔT	Chiller Plant Efficiency
6.6 °C	9.8 °C	3.2°C	1.1 kW/ton	8.5 °C	13.6 °C	5.1°C	0.86kW/ton

Data Showing Improvement in Chiller Plant Efficiency with Contribution from Clean Coils Installed with Steril-Aire UVC Emitters

USA HOMELAND SECURITY RESEARCH

Dose $\mu\text{W}\cdot\text{sec}/\text{cm}^2$ per watt

STERIL-AIRE
SANUVOX TECHNOLOGIES
ULTRAVIOLET DEVICES
NOVATRON
LUMALIER
DUST FREE
ATLANTIC UV
AMERICAN UV
ABRACAIR LLC



Case Studies (www.steril-aire.com)

Industry UVC Acknowledgement: ASHRAE

- Director's Letter June 24th 2009
- Chapter 17 - 2012 ASHRAE Handbook (HVAC Systems and Equipment)
- Chapter 60 - 2011 ASHRAE Handbook (HVAC Applications)