
SANUVOX

Who is Sanuvox

- Canadian company founded in 1995
- Develops & Markets proprietary Ultraviolet Air & Object Purification Systems
- Manufactures complete line of UV systems for:
  - Residential
  - Commercial
  - Institutional
  - Medical
  - Military Applications
- Global leader in Ultraviolet Air & Object Purification

Are you familiar with “UV Lights”

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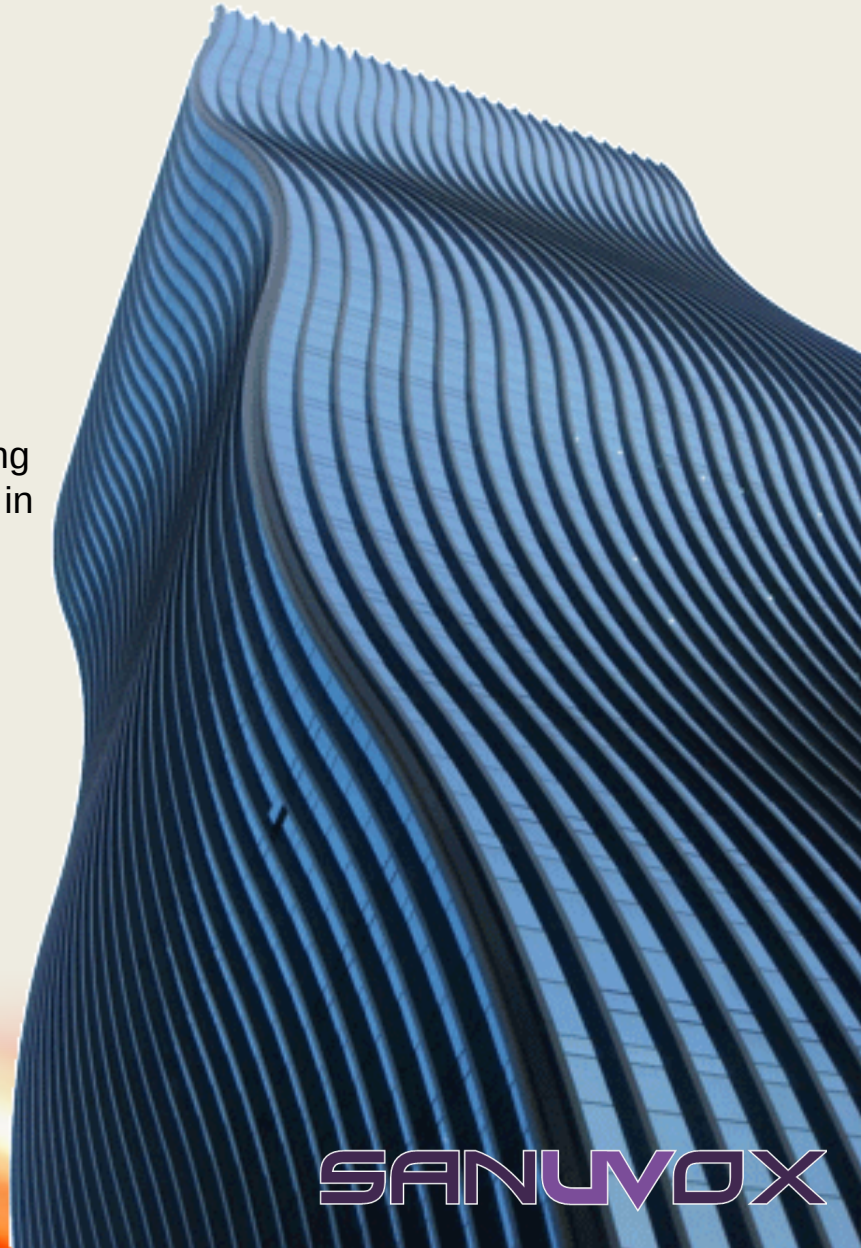
The ‘IAQ” Dilemma

- Buildings are built tight & insulated to combat energy loss.

- As a result, biological & chemical concentrations continually rise within the building’s envelope.

- Residential homes & commercial buildings face a myriad of IAQ issues from not bringing in enough outside air to poor being brought in from outside to garbage room odors, biological contaminants and VOC off-gassing to name a few.

- A dirty coil loses efficiency making the system work harder while negatively impacting the building’s IAQ.



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Filters are NOT Air Purifiers

Although a filter is effective in TRAPPING particulates, it is not effective on biological & chemical contaminants. For the most part "filters are as effective in trapping bio-chemical contaminants as tennis rackets are on capturing sand".

A filter is designed to trap particulates in the air and the UV air purification system will destroy the bio-chemicals.

A UV air purification system is one piece of a Complete IAQ Puzzle

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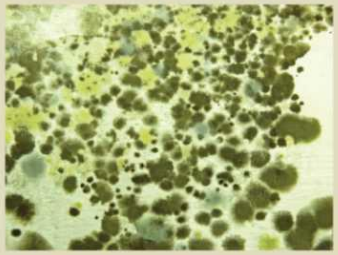
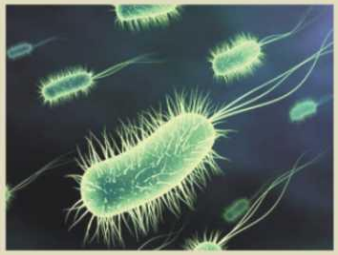
The ‘IAQ” Issues


mold


viruses


bacteria


dust mite fecal matter


smog


cooking odors


cigarette smoke & odors


lingering odors


pet odors & dander


VOCs & chemicals


allergy & asthma triggers


sick building syndrome

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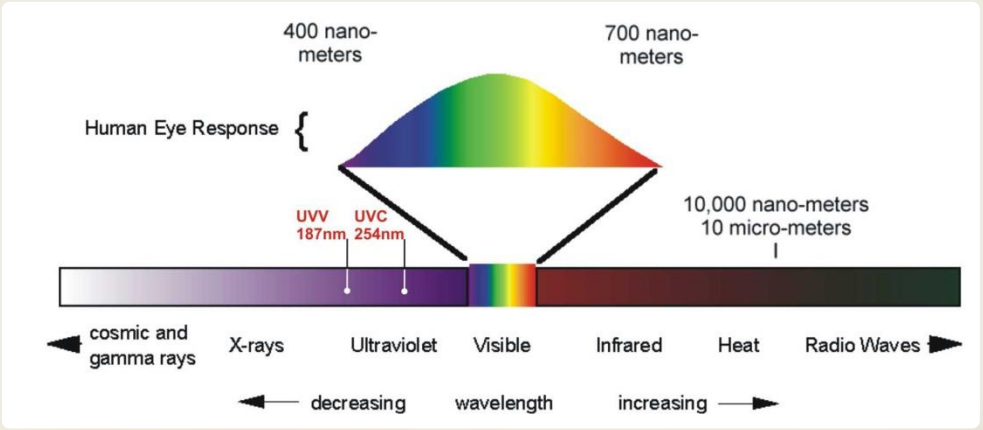
Ultraviolet Light

The Sun purifies the Earth's atmosphere by bombarding it with Ultraviolet Light.

Ultraviolet-C (254 nanometers) & Ultraviolet-V (187 nanometers)
light destroys the biological & chemical contaminants within our atmosphere.

Sanuvox High-Intensity UV Lamps produce the same UV-C & UV-V Light the Sun produces bringing the same purification process into the building.

Ultraviolet	Wavelength
UV - A	315 to 400 nm
UV - B	280 to 315 nm
UV - C	200 to 280 nm
UV - V	100 to 200 nm



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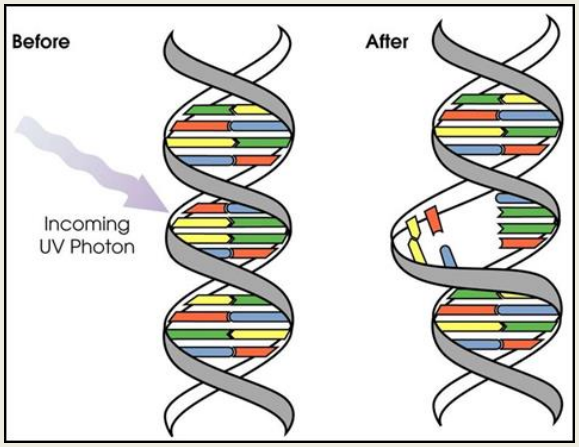
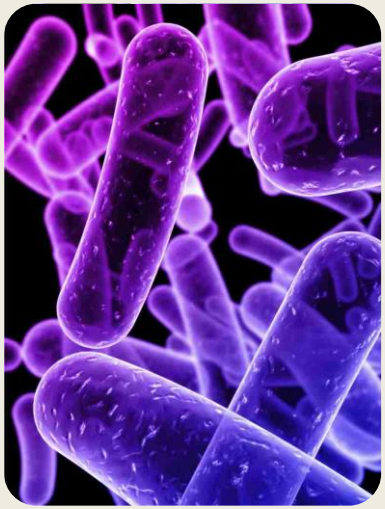
Ultraviolet UVC Germicidal Light

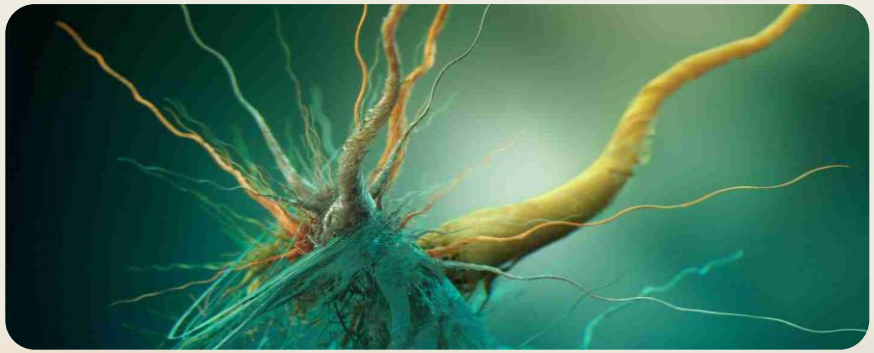
UVC Germicidal Ultraviolet wavelength (254nm) is effective in penetrating the cell membrane breaking the DNA structure of a micro-organism. DNA sterilization inhibits reproduction.



Ultraviolet radiation can damage DNA by distorting its structure. Credit: NASA's Earth Observatory/David Herring. Image courtesy of www.nasa.gov

Micro-organisms such as mold, bacteria & viruses will be destroyed with the required concentrations of germicidal energy.





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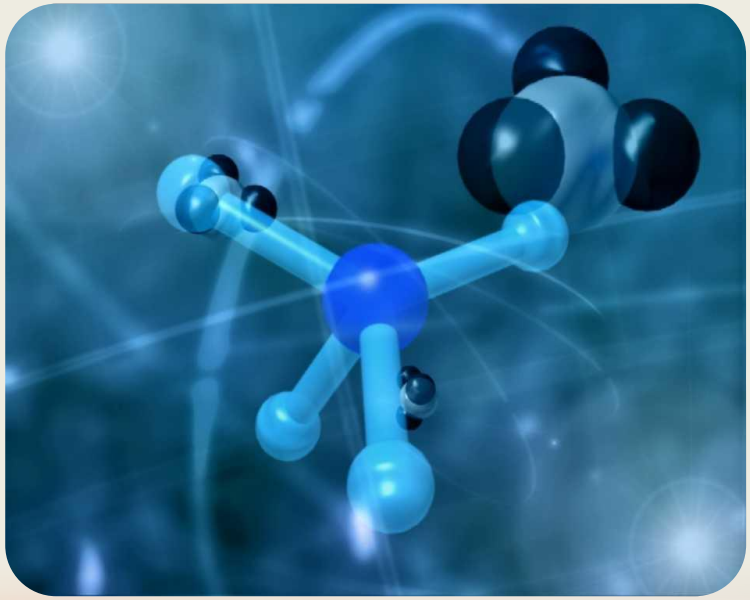
Ultraviolet UVV Oxidizing Light

UVV Oxidizing Ultraviolet Wavelength (187nm) is effective as an oxidizing reactor.

UVV produces activated oxygen atoms that react to chemicals, odors and VOCs degrading them by successive oxidation into odorless & inoffensive byproducts.

Effective at destroying chemical contaminants such as cigarette smoke, formaldehyde, solvents, diesel fumes, odors & VOCs



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IAQ Technologies

Pollutant Type	Examples	Remediation Technology
Solids	Dust	Filters
Chemicals	Solvents Formaldehyde VOC	Absorption on activated charcoal Thermal oxidation **UV-Photo-oxidation**
Biological	Fungi Molds Bacteria	Germicidal chemical products **UV Sterilization DNA**

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ASHRAE & UV: Past, Present & Future

<2005 IUVA (International Ultraviolet Association) was the predecessor to ASHRAE

2005 - ASHRAE SPC 185 formed

2005 ASHRAE Technical Group (TG)2.UVAS

This resulted in the first Handbook chapter regarding UV in 2008, titled:
UV Lamp Systems

Since 2008, there have been Two additional chapters in ASHRAE Handbooks:

2011 Handbook: HVAC Applications : Chapter 60: Ultraviolet Air and Surface Treatment Applications

2012 Handbook: "HVAC Systems and Equipment: Chapter 17: Ultraviolet Lamp Systems which includes information from Research Project 1509-RP on the degradation of Typical HVAC Materials, Filters and Components Irradiated by UVC Energy.

Moving Forward:
More Research Projects and RTARS.
Expanding the knowledge base of UVC

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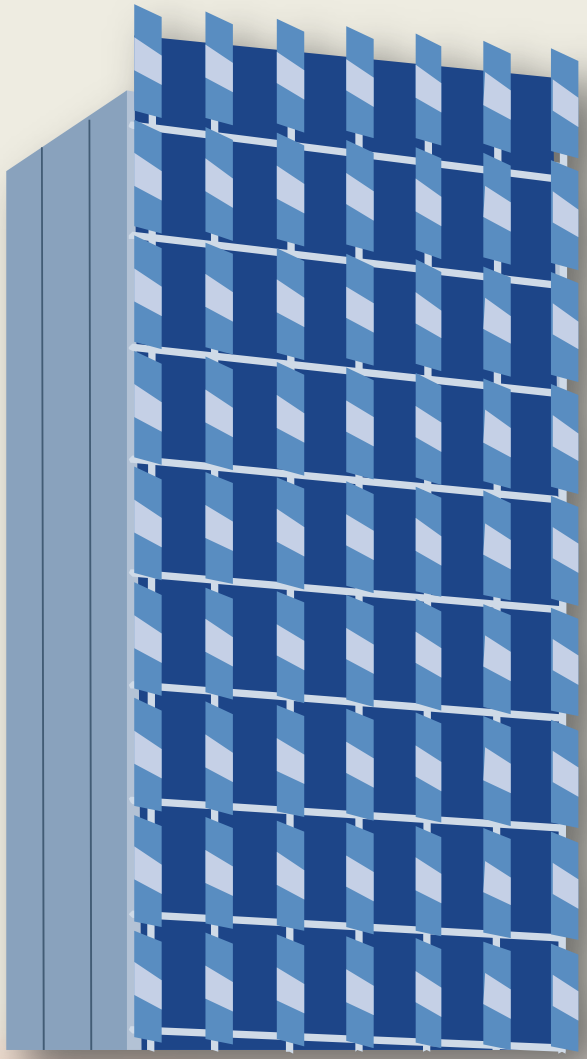
Concept: Bring UV Inside

1- **UV irradiation of INDOOR AIR**

Destruction of Bio-contaminants
(bacteria, mold, etc)
Elimination of their associated odors

2- **UV irradiation of surfaces (objects)**

Sterilization of heating
and cooling coils



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Using UV Effectively

TIME: The greater the exposure time (contact time between the contaminant and the UV source) the more UV energy can be delivered to the contaminant resulting in a greater Kill Rate.

INTENSITY: The greater the intensity (strength of the UV source) the more UV energy can be delivered to the contaminant resulting in a greater Kill Rate

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Maximize UV Effectiveness

There are many types of UV Lamps, these include: Hot-Cathode, Cold-Cathode, Regular Intensity, High Intensity, Amalgam, Soft Glass, Quartz Glass…

Although there are different types of UV Lamps, one thing is certain, ALL UV energy can BENEFIT from a few “helpful tools” which can dramatically increase the effectiveness of the UV light produced.

1. **The Ultraviolet Source**

2. **Dwell Time**

3. **Reflection**

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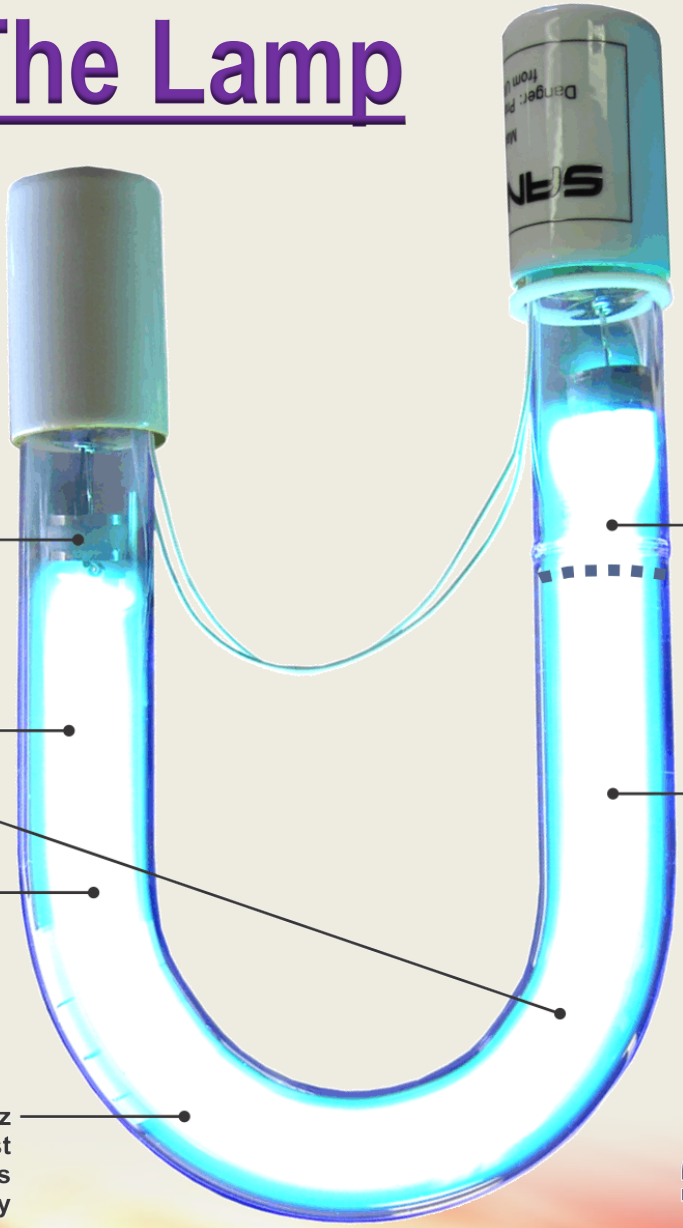
UV Source: The Lamp



Heavy Duty Filaments guarantees long Lamp life

Proprietary 'J' Shape Lamp effectively mimics two Lamps

Proprietary Mercury Vapor Gas Mixture (MVGM) produces the most stable, cleanest burning Lamp

Hot Cathode Pure Fused Quartz Glass Guarantees the highest quality, cleanest mineral glass and highest efficiency

Proprietary Splice: This is where the UVV Glass is fused to the UVC Glass. The UVC Glass makes up 90% of the Glass surface. UVV makes up 10%

Internal Alumina Coating (IAC): Prevents Solarization of the Lamp & increases stability

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High-Intensity 19 millimeter
Dual-Zone UVC Germicidal 254nm / UVV Oxidizing 187nm Lamp

Dwell Time: Kill Rates

Dosage of UV-C for complete destruction (uW-sec/cm^2)

BACTERIA			
Agrobacterium Lumefaciens^	8,500	Streptococcus Lactis*	8,800
Bacillus Anthracis*(**Anthrax**)	8,700	Streptococcus Pyrogenes^	4,200
Bacillus Anthracis ***Spores***^(**Anthrax**)	46,200	Streptococcus Salivarius^	4,200
BaciHus Megatherium Sp. (Veg)*	2,500	Streptococcus Viridans*	3,800
Bacillus Megatherium Sp. (Spores)*	5,200	Typhoid Fever^	4,100
Bacillus Paratyphosus*	6,100	Vibrio Comma (Cholera)^	6,500
Bacillus Subtilis*	11,000	Vibrio Cholerae^	6,500
Bacillus Subtilis Spores*	22,000	**MOLDS**	
Clostridium Tetani^	23,100	Aspergillus Amstelodami^	77,000
Clostridium Botulinum^	11,200	Aspergillus Flavus*	99,000
Corynebacterium Diphtheriae*	6,500	Aspergillus Glaucus*	88,000
Dysentery Bacilli*	4,200	Aspergillus Niger (bread mold)*	330,000
Eberthella Typhosa*	4,100	Mucor Mucedo^	77,000
Escerichia Coli*	8,600	Mucor Racemosus (A & B)*	35,200
Legionella Bozemanii^	3,500	Oospora Lactis*	11,000
Legionella Dumoffill^	5,500	Penicillium Chrysogenum^	56,000
Legionella Gormanil^	4,900	Penicillium Digitatum*	88,000
Legionella Micdadei^	3,100	Penicillium Expansum*	22,000
LegioneHa Longbeachae^	2,900	Penicillium Roqueforti*	26,400
Leglonella Pneumophfla		Rhizopus Nigricans (cheese mold)*	220,000
(Legionnaire's Disease)	2,760	**VIRUS**	
Leptospiracanicola-		Adeno Virus Type III^	4,500
Infectious Jaundice^	6,000	Bacterlophage (E.Coli)*	6,600
Leptospira Interrogans^	8,000	Coxsackie A2^	6,300
Micrococcus Candidus*	12,300	Infectious Hepatitis^	8,000
Micrococcus Sphaeroides*	15,400	Influenza*	3,400
Mycobacterlum Tuberculosis^	10,000	Rotavirus^	24,000
Neisseria Catarrhalis*	8,500	Poliovirus^	21,000
Phytomonas Tumefaciens*	10,500	Variola** (**Smallpox**)	24,000

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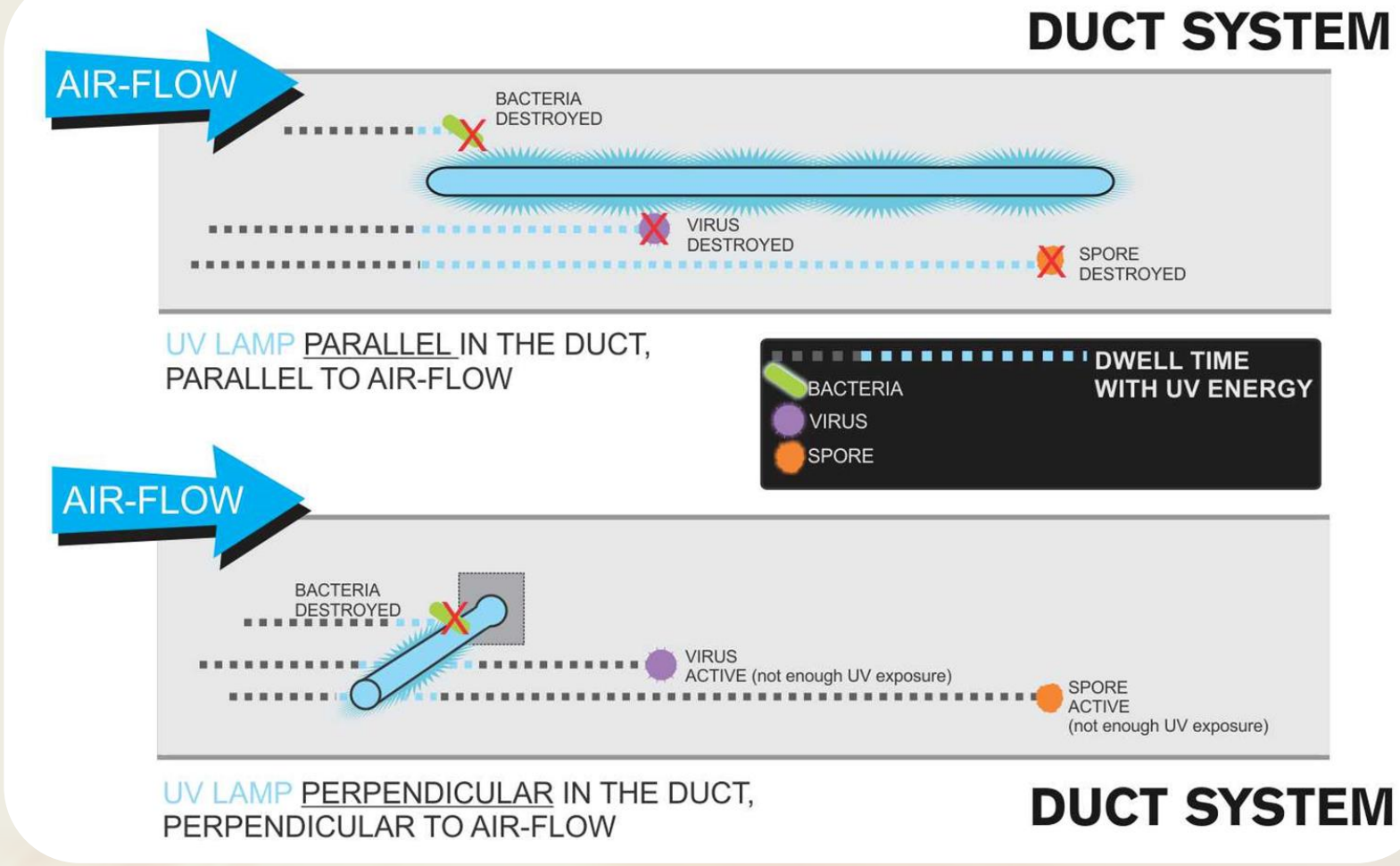
Dwell Time: Parallel



Reflection

- Direct virtually 100% of the Lamp's UV energy where needed most

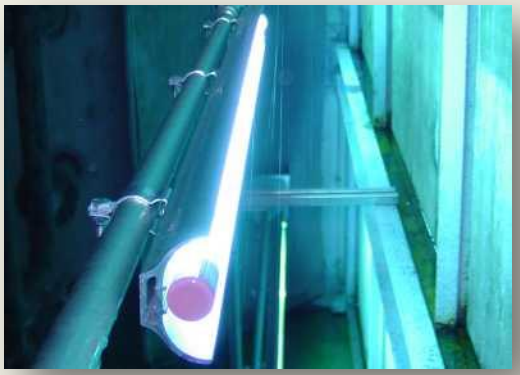
- Protects the UV Lamp from air buffeting (air striking the UV Lamp) which results in better efficiency

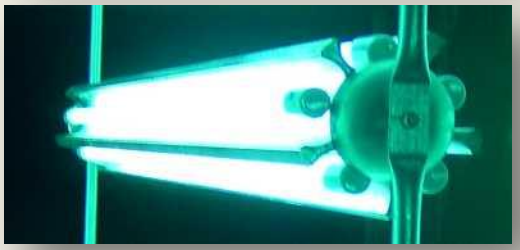
- Dramatically increases Lamp life

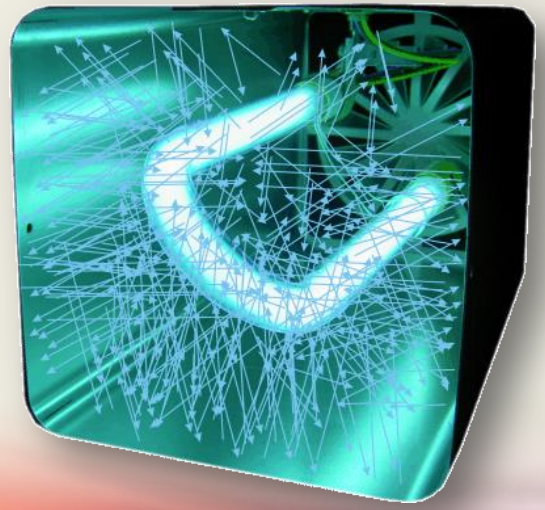
- Allows the Lamp to be self-cleaning by directing UV back on itself burning off the bio-aerosols that adhere to the Lamp surface

- Protects plastics and rubber from dangerous UV exposure

- Supports Lamps that may be as long as 60" protecting them from breakage







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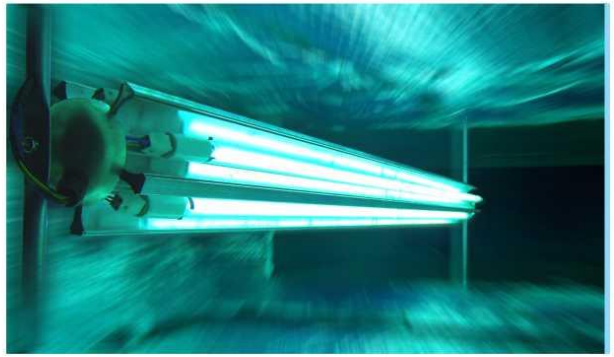
The Question: Air or Coil?

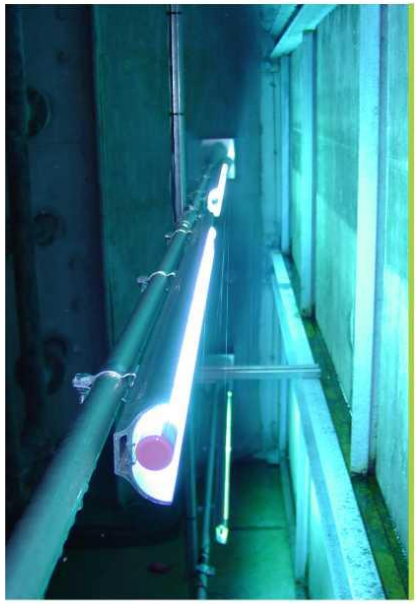
AiR



Destroy bio-chemical contaminants
circulating through the facility

AiR: SHORT EXPOSURE TiME

COiL



Destroy mold & other microbial
growth on the coil & surrounding areas.
Improve energy efficiency by maintaining a clean coil

COiL: LONG EXPOSURE TiME

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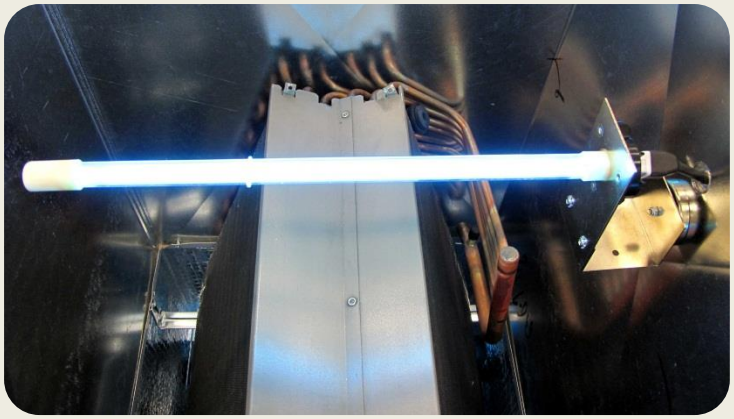
The Question: Air or Coil?

AIR = SHORT EXPOSURE TIME

Treat the moving air-stream destroying bio-chemical contaminants



COIL = LONG EXPOSURE TIME

Treat the stationary coil destroying & preventing mold & microbial growth

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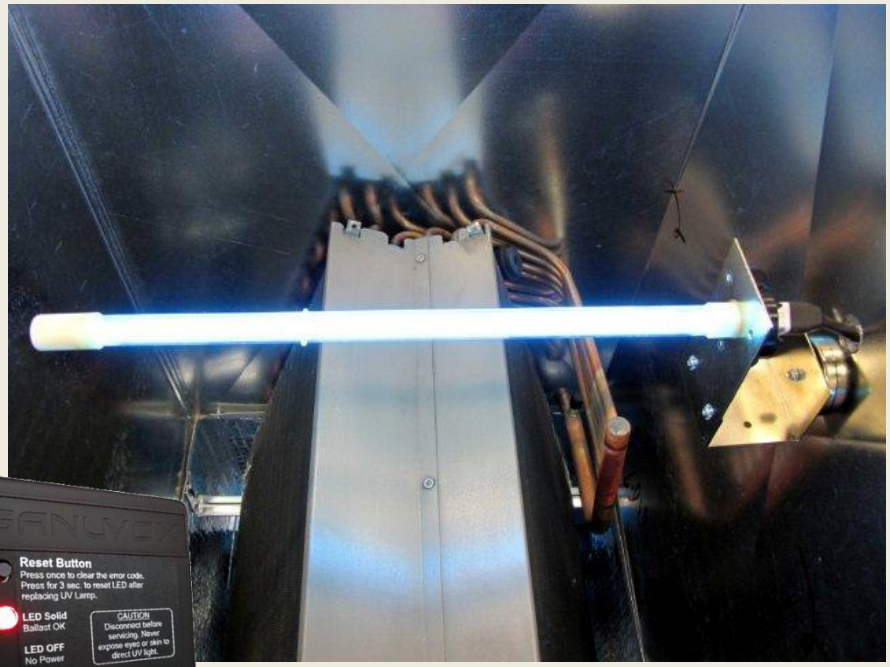
Residential Coil Treatment



SABER PRO WIRELESS

- 16" UVC Lampdestroys mold & bio-film on the coil
- Remote wireless LCD display
- 3" LCD Display provides important user information
- *LCD customization available
- 1 year warranty including UV Lamp
- **FREE SECOND UV LAMP INCLUDED**

* Min. Qty Required, Call Sanuvox at 1-888-726-8869

SABER MAGNET 24V

- 16" UVC Germicidal Coil Cleaner destroys mold & their associated odors on the coil
- Improve energy efficiency
- LED Status Display provides important user information
- Magnetic Multi-Bracket
- 1 year warranty including UV Lamp

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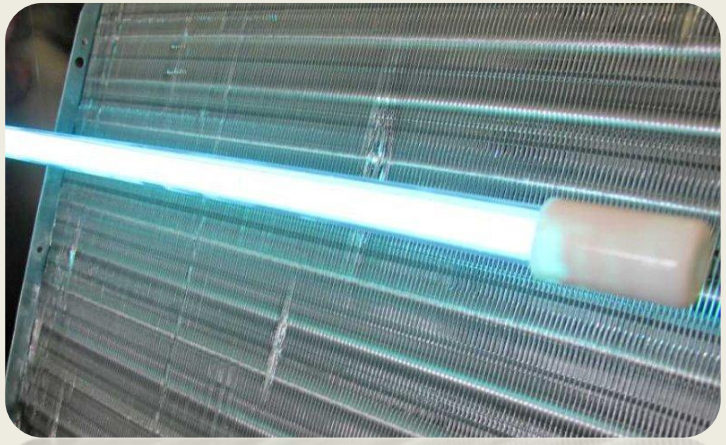
PENN STATE Testing



The Saber has been tested by Penn State University and has shown to destroy 99% of spore forming B. Subtilis in less than eight minutes at a distance of 30” at an air-flow of approx. 500 fpm.

PENNSTATE 1855

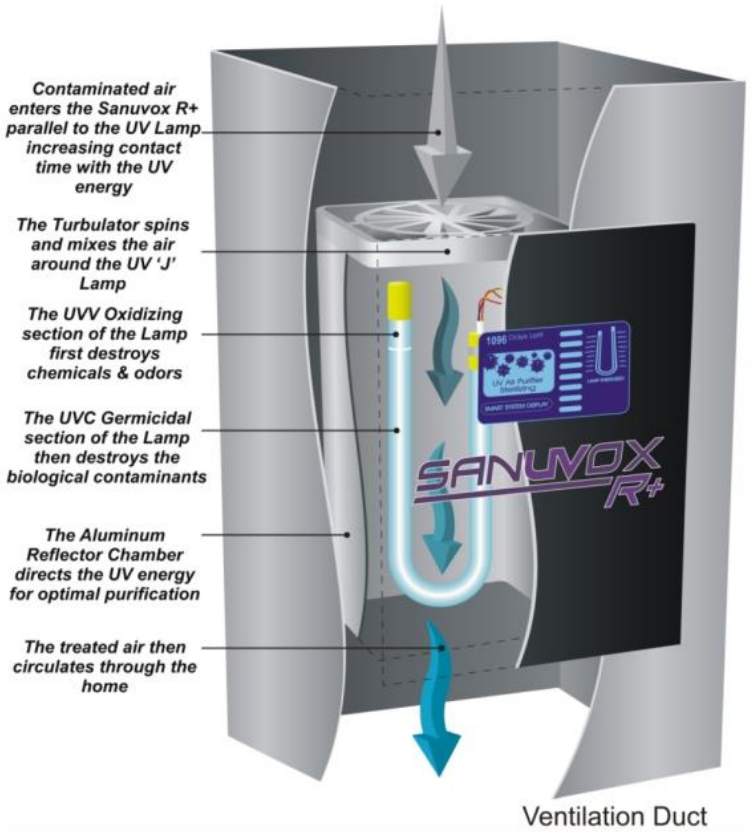
High Flow (approx. 500 fpm)				Water Immersed B. Subtilis spores	
Distance from Lamp (in.)	Irradiance (µW/cm2)	Flow (fpm)	Temperature (°F)	t(sec) to 99% Reduction	t(min) to 99% Reduction
6	995.0	499.1	70.5	33.06	0.55
12	348.0	499.1	70.5	94.52	1.58
18	167.8	499.1	70.5	196.03	3.27
24	102.1	499.1	70.5	322.16	5.37
30	68.6	500.6	70.5	479.49	7.99
36	48.2	499.1	70.5	682.43	11.37

Before

**After

**The lines in the agar are the impressions made from pressing the plates against
the fins of the coil

Residential / Light Commercial In-Duct UV System



- Whole-Home Air Treatment
- Dual-Zone UVC / UVV Lamp
- Biological Destruction
- Chemical Oxidation
- Patented Process
- 3" Status Display
- 3 Year Replacement Warranty incl. UV Lamp
- Leader in Indoor Air Quality
- Tested & Published results
- Sanuvox uncompromising quality

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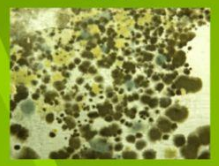
www.sanuvox.com

DUAL VOLTAGE 120/240V

BACTERIA

VIRUSES



MOLD

CHEMICALS

ALLERGENS

PET ODORS & DANDER

Patented Sanuvox Process
- Turbulator
- High-Intensity UVC/UVV 'J' Lamp (18" arc length)
- Self-Cleaning, no maintenance

3 Year Lamp Life (1096 Days)

120/220V Auto-Sensing Smart Ballast

Aluminum **Sterilizing / Oxidizing Chamber**

5/8" **Slim Fit allows for easy installation in tight spaces**

Microprocessor controlled Thermistor to automatically treat the air

3" Back-Lit **LCD Status Display provides important user information**

Horizontal or vertical, up-flow or down-flow; the R+ Sterilizing / Oxidizing Chamber rotates 360°

Sanuvox R+ In-Duct UV Air Purification System

DUST MITE FECAL MATTER

LINGERING ODORS

LAVATORY ODORS

FOOD / COOKING ODORS

SICK BUILDING SYNDROME

TOBACCO SMOKE

DESTROY THOUSANDS OF AIRBORNE CONTAMINANTS

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Residential In-Duct UV Systems

Sanuvox SR+ In-Duct UV Air Treatment
- For homes up to 2,000 sq. ft.
- LED Status Display
- Bio-Chemical Destruction

Sanuvox R+ In-Duct UV Air Treatment
- For homes up to 4,000 sq. ft.
- 3 inch LCD Status Display
- Bio-Chemical Destruction

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Stand-Alone Systems

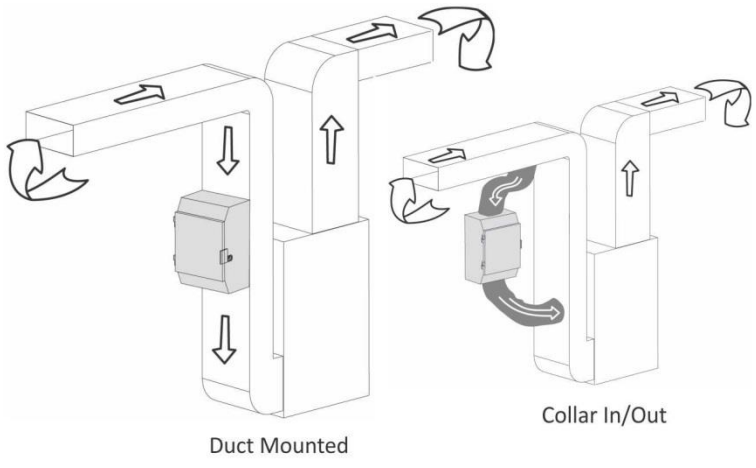
P900GX

Portable UV Air Treatment

- For areas up to 900 sq.ft.
- Ideal for problem areas
- Bio-Chemical Destruction

S300FX-GX UV / HEPA System

- True HEPA Filtration
- Two Speed 200/300 CFM blower
- Stand-Alone / Duct Mount / By-Pass



Commercial In-Duct Air Treatment

UV Bio-Wall
QUATTRO
- Treat 100% of the air on one pass

UV Bio-Wall
- Available in sizes up to 60” in length
- For large systems

The UV Bio-Wall was EPA & Homeland Security (NHSRC) tested against Biological Warfare against (BWAs).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Commercial In-Duct Air Treatment

UV Bio-Wall

- Dramatically improves Indoor Air Quality
- Continuously treats the entire duct
- Destroys up to 99.9999% of bio-chemical contaminants
- Available in 40”, 50” and 60” lengths
- 5 High-Intensity Pure Fused 19mm. Quartz UVC Lamps
- Anodized Aluminum Parabolic Reflectors maximizes UV energy
- Digital Timer. LED & Audible Alarm on Control Panel
- Available with Dry Contacts
- 2 year Lamp warranty; 15 year Ballast Warranty
- CSA C/US Certified and CE Approved

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UV Bio-Wall Sizing

To size the UV Bio-Wall, we simply need to know the:

Duct Size

CFM or FPM

With that, we can provide free-of-charge the “Real-Time” Kill-Rates per pass.

SANUVOX TECHNOLOGIES BIOWALL SIZING

NOTE: RESULTS ARE AS AT LAMP CHANGEOUT TIME (17,000 OPERATING HOURS)

INACTIVATION

8 Pass Inactivation Rates

Calculated UVC dose

minimum	15.084 J/m2
average	27.288 J/m2
maximum	244.702 J/m2

TARGET

influenza A virus — Required for Inactivation

Number of Passes	1	2	3
Minimum %	83.31%	97.21%	99.54%
Average %	96.08%	99.85%	99.99%
Average LOG	1	2	4

tuberculosis — Required for Inactivation

Number of Passes	1	2	3
Min %	95.99%	99.84%	99.99%
Average %	99.70%	100.00%	100.00%
Average LOG	2	5	7

smallpox — Required for Inactivation

Number of Passes	1	2	3
Min %	90.02%	99.00%	99.90%
Average %	98.45%	99.98%	100.00%
Average LOG	1	3	5

parvovirus — Required for Inactivation

Number of Passes	1	2	3
Min %	62.94%	86.26%	94.91%
Average %	83.40%	97.24%	99.54%
Average LOG	0	1	2

Note: A 4 Log inactivation equals 99.99%. An inactivation that is greater than
For example an Average Inactivation Rate of 99.9992% would be shown as 1

SANUVOX TECHNOLOGIES BIOWALL SIZING PROGRAM

NOTE: RESULTS ARE AS AT LAMP CHANGEOUT TIME (17,000 OPERATING HOURS)

SINGLE PASS* Inactivation (Sterilization)

Basic Engineering Data

BIOWALL Model and number of units	Bio 60	1 Unit(s)
Selected BIOWALL unit length		60 in
Duct width		96.00 in
Duct height		72.00 in
Airflow		30000 CFM
Air velocity in the free duct		625.00 ft/min
Air velocity at BioWall section		626.44 ft/min
Pressure drop at Biowall installation point		0.0003 in H2O
Total power consumption		736 W
Air temperature increase due to BioWall system		0.04 °C
AVG APPLIED Germicidal UV dose to the air stream		2729 µJ/cm2

SINGLE PASS* INACTIVATION (STERILIZATION) RATES

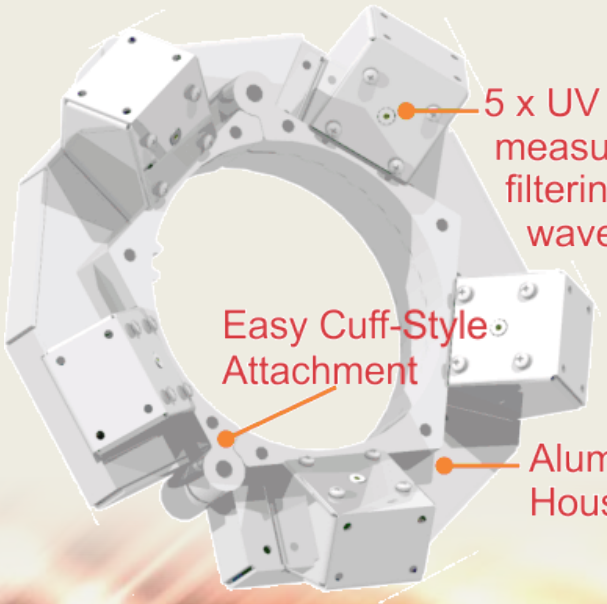
	Minimum	Average	LOG
influenza A virus	83.31%	96.08%	1
tuberculosis	95.99%	99.70%	2
smallpox	90.02%	98.45%	1
parvovirus	62.94%	83.40%	0

A 4 Log inactivation equals 99.99%. An inactivation rate that is greater than 99.99% is shown as 100% with the corresponding Average Log Reduction. For example an Average Inactivation Rate of 99.9992% would be shown as 100% and the Average Log reduction would be 5.

*Single Pass Inactivation means that the air is exhausted after it is treated and is not recirculated

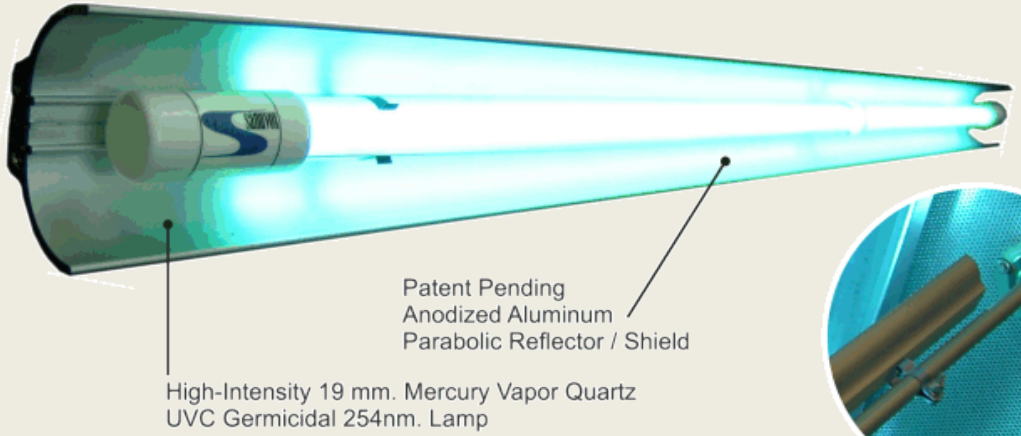
UV Bio-Wall Sensor

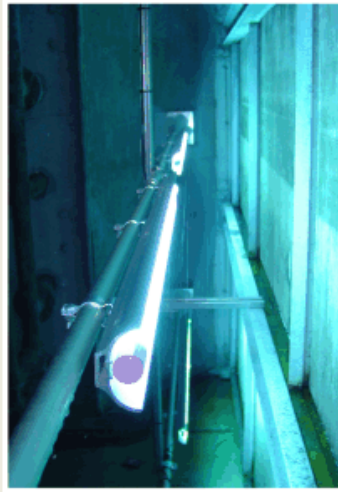
- Specially designed sensors to filter out all but UVC (254nm)
- Control LCD Panel monitors each individual UV Lamp in Real-Time
- Dry contacts allow for building automation integration
- Audible alarm signals should the UV output fall below the predetermined setting
- The only UV monitoring system of its kind. A must for those applications that must guarantee a specific UV dosage



UV Coil Clean IL

- Destroys mold and other microbial growth on the ‘Object’ as well as biological odors
- Improves energy savings & reduces coil maintenance
- High-Intensity 19mm. UVC Quartz Lamp
- Patent pending Anodized Parabolic Reflector intensifies, directs and reflects UV Energy while protecting plastics from destructive UV Rays
- University tested & published results in The Lancet Medical Journal
- Higher UV intensity & reliability than other UV Lamp / Emitters (ballast on the outside of the AHU)
- Longer warranty than competing products.
  UV Lamp: 2 years;
  Ballast: 15 years





SANUVOX

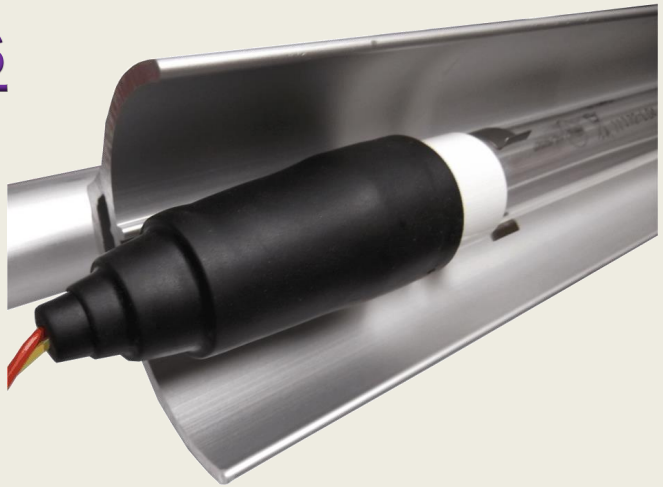
Coil Clean IL New Features

LED Status Display

Each CoilClean IL system includes an LED Status Display incorporated into each Ballast. The 3 color LED notifies the end-user on the status of the UV system and when the UV Lamp needs to be replaced.

Dry Contacts

Each UV CoilClean IL system includes a pair of Dry Contacts (NO & NC). Dry Contacts make it possible for the CoilClean ILs to be easily tied to building automation systems.

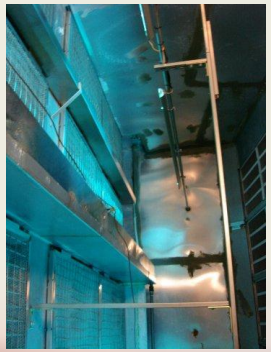


UV Lamp Boot

Each UV CoilClean system includes a UV Lamp Boot which seals the connection protecting the contacts from humidity and moisture.







SANUVOX

Upstream or Downstream

UV systems may be installed either UPSTREAM (return side) or DOWNSTREAM (supply side) of the evaporator coil. Either installation will keep the evaporator coil clean. (2008 ASHRAE Handbook HVAC Systems & Equipment. Chapter 16).

The two greatest factors that influence the efficiency of a UV Lamp are:

a) Lamp Cooling Effects & b) Lamp Fouling.

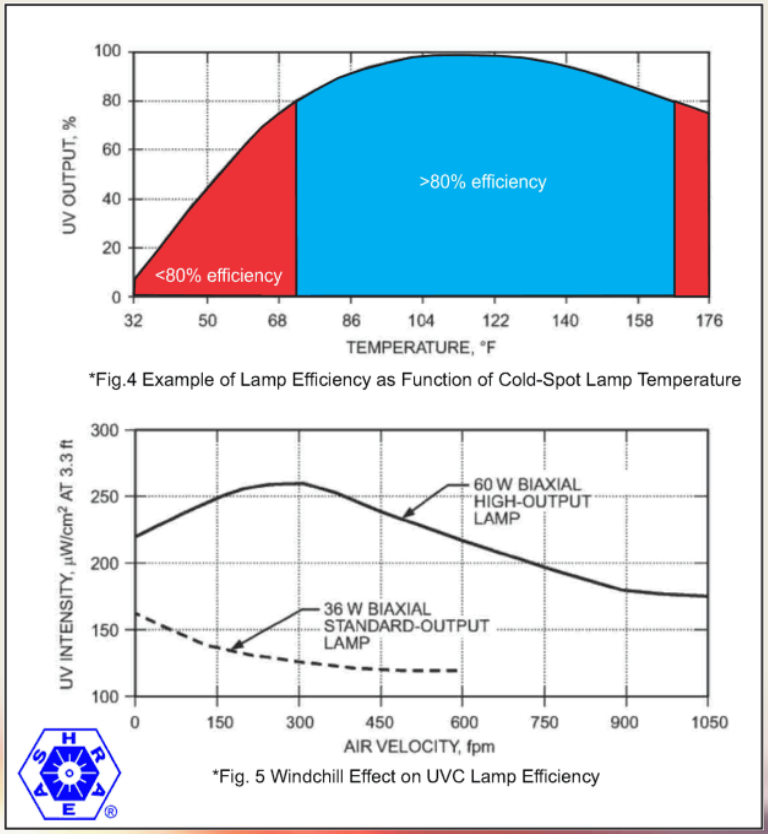


*Fig.4 Example of Lamp Efficiency as Function of Cold-Spot Lamp Temperature

*Fig. 5 Windchill Effect on UVC Lamp Efficiency

*Fig. 4 & 5 can be found in the ASHRAE 2008 Handbook chapter 16.5

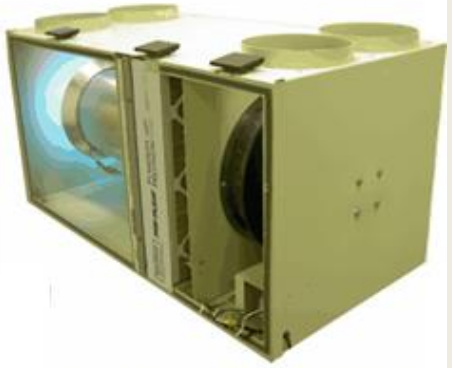
SANUVOX

Stand-Alone Systems

P900GX PORTABLE
IDEAL FOR DAYCARE,
OFFICES, CLASS ROOMS
& BREAK-ROOMS

MB500X CEILING TILE MOUNT PURIFIER
EASILY INSTALLED INTO A DROPPED
CEILING.
QUIETLY TREATS UP TO 500 S.F.

S300FX-GX HEPA FILTER /
UV AIR PURIFIER
STAND ALONE OR DUCT MOUNTED
WITH A 200/300 CFM BLOWER



S1000FX FILTER / UV AIR PURIFIER
IDEAL FOR VOC, GARBAGE ROOMS
& SMOKING APPLICATIONS.
OPTIONAL CLEAN ROOM KIT INCL.
HEPA AND SECOND UVC LAMP

SANUVOX

- Illustrates that UV can solve many more issues than originally thought
- Empowers the Engineer to specify the right unit for the job
- Explain the fundamental principles involved and special attention to be given to each of the various applications

SANUVOX

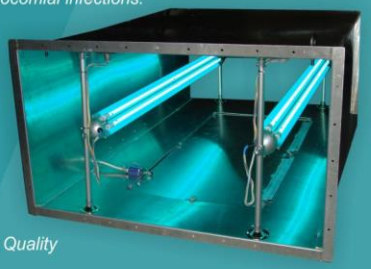
UVGI AIR STERILIZATION

SANUVOX

Facility Air Sterilization

Studies show that Hospital Acquired Infections (HAI) cost the healthcare industry 30-40 billion dollars annually. HAIs are now considered a preventable injury and is no longer reimbursable. Viral & bacterial contamination both airborne & surface may very well be the leading cause of nosocomial infections.

The Sanuvox UV Bio-Wall is the most effective in-duct air sterilization system available. The proprietary design allows for the UV assembly to be positioned parallel to the airstream guaranteeing the longest dwell-time possible.



UV Bio-Wall In-Duct Air Treatment System

Features

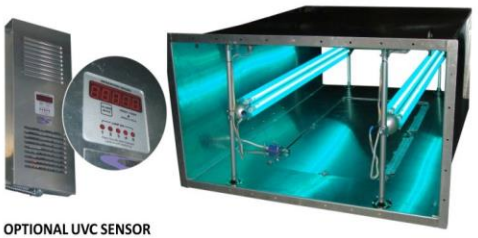
- *Reduce airborne infection rates, building related illnesses, workplace absenteeism while dramatically improving Indoor Air Quality*
- *Continuously treats the entire duct*
- *Destroys up to 99.9999% of bio-chemical contaminants*
- *Compliments filtration*
- *Sanuvox provides detailed real-time kill rates & sizing calculations*
- *Tested by the US EPA and National Homeland Security to destroy >99.9% of bio-contaminants on a single pass*

OBJECTIVE: Eliminate up to 99.99 99% of airborne bio-contaminants including viruses and bacteria that circulate through the ventilation system without increasing the pressure drop resulting from high efficiency filtration.

EQUIPMENT: UV Bio-Wall UVC systems installed in the ventilation duct parallel to the airflow, allowing sufficient contact time that is required for airborne sterilization. The UVC intensity of each lamp can be measured in "real-time" with an optional UVC sensor, ensuring the required inactivation intensity will be delivered to the contaminant.

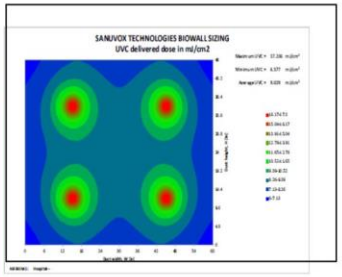
OPERATION: To create the sterilization chamber in the existing duct (up to 5 f eet long), the walls are covered with an aluminum reflective material. The proprietary sterilization sizing calculations take into account : air velocity, dimension s of the duct, the UV lethal dose needed to sterilize the microorganism for the desired inactivation rate . The sizing calculations will determine the number and length of UV Bio-Wall(s) required. The optional UVC sensor will guarantee that the UVC emitted from the lamp will exceed the amount of UVC that is required at all times.

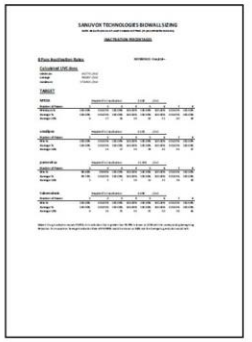
SIZED INSTALLATION



OPTIONAL UVC SENSOR

STERILIZATION SIZING CALCULATIONS





UVC GERMICIDAL PRINCIPLE : The 254 nm UVC germicidal wavelength has been used for decades for sterilization and its effect on microorganisms is well documented . UVGI inactivates microorganisms by damaging the DNA structure of the microorganism, making it incapable of reproducing. The germicidal efficiency can deliver virtually a 100% disinfection rate. The system can achieve exceptionally high disinfection rates as a result of the UV Bio-Wall being mounted parallel to the airflow and the desired intensity is sized for each particular application.

ADVANTAGES

- Low pressure drop, high efficiency sterilization
- Electronics-connected to a PLC and/or BMS
- Low cost compared to a HEPA filter installation with the additional blower requirements due to increased static pressure.
- Lower maintenance and longer service intervals compared to a HEPA filtration installation

TARGETS

- Hospitals
- Offices towers
- Private clinics, Veterinarians, etc.
- Schools, Universities, College, etc.
- Fertility Centers
- Commercial Buildings

SANUVOX

Make-Up Air: Odors & Bio-Contaminants

It is not uncommon for outside contaminants including odors and allergens to find their way migrating into a building. Restaurant odors, manufacturing off-gassing, diesel fumes from idling trucks even jet fuel from helipads can be pulled into the make-up air and distributed throughout the HVAC system and building.

Sanuvox Technologies' line of in-duct UV air treatment systems are the ideal solution for these often troublesome issues. Sanuvox offers exceptionally cost-effective systems that can address IAQ issues that filters and absorption media cannot.

***UV Bio-Wall QUATTRO** *Shown here*
***UV Bio-Wall In-Duct Air Treatment System** **Available*

Features

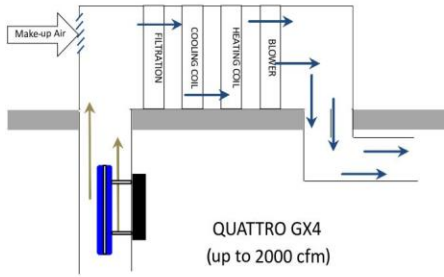
- *Sanuvox proprietary system eradicates biological contaminants such as mold, bacteria, viruses, germs & allergens*
- *Reduces chemicals, VOCs & biological odors*
- *Installed PARALLEL to the air-stream results in greater 'Dwell Time' between the air & the UV Lamps*

EXTERIOR ODORS

OBJECTIVE: Substantially reduce odors introduced into the workspace (offices) due to the supply of contaminated "fresh" a from outside. For example: odors from restaurants, factories, diesel engines, sewage, etc. that are drawn into the building b the HVAC fresh air intake.

EQUIPMENT: Duct mounted units installed in the return or supply side of the HVAC system parallel to the airflow and supplied with multiple Germicidal UVC lamps, each with a section of Oxidizing UVV that can be covered or uncovered depending on the concentration of odors.

Typical installation on the HVAC return's side



QUATTRO GX4
(up to 2000 cfm)

OPERATION: The UV lamps treat the recirculating air in two ways:

1. The g ermicidal UVC section destroys airborne biological contaminants (viruses, bacteria, mold).
2. The oxidizing UVV section of the l amp reduces the chemical components in the air through photo-oxidation. Select units are designed to be "dosed" on site, such as the QUATTRO GX4.

GENERAL: SANUVOX™ PROCESS ON BIOLOGICAL AND CHEMICAL CONTAMINANTS

1-ACTIVATION PHASE $O^2 + O^* \rightarrow O^* + O^*$

Ultraviolet photon energy (170 -220nm) is emitted from a high -intensity source to decompose (break -down) oxygen molecules into activated monoatomic oxygen. The rate of production or effectiveness of this process depends on the wavelength and intensity of its source.

2-REACTION PHASE: $O^*+P \rightarrow PO$

The activated oxygen atoms (O*) are then mixed in the airstream; the process will react with any compound containing carbon-hydrogen or sulfur, reducing them by successive oxidation to odo rless and harmless by -products. If airborne contaminants are outnumbered by the activated oxygen atoms, then there will be formation of residual ozone (O^3) which wi occur following the oxidation of normal oxygen molecules (0^2).

3- NEUTRALISATION PHASE: (also GERMICIDAL) $O^3+UV(C) \rightarrow O^2+O^*: O+O \rightarrow O^2$

CHEMICAL DECOMPOSITION:

- Formaldehyde $CH_2O + O^* \rightarrow CO_2 + H_2O$
- Ammonia $NH_3+O^* \rightarrow N_2 + H_2O$
- Styrene $C_8H_8 + O^* \rightarrow CO_2 + H_2O$
- Mercaptans $H_2S + O^* \rightarrow SO_2 + H2O$

ADVANTAGES

- Odors in the workplace are substantially reduced
- Low maintenance
- Lamp replacement 1-2 years
- Improved indoor air quality (IAQ)

TARGETS

- Buildings near Airports & Helipads
- Buildings with adjoining
  - Warehouse (diesel)
  - Printing shop, restaurants, etc.
  - Mechanical workshop
- Crematorium

Garbage Rooms / Noxious Areas

Facilities, apartments and condominiums often suffer from odors migrating from the garbage room to other parts of the building. It is not uncommon for garbage room odors to be pulled from the holding area and distributed up the elevator shaft or into the HVAC system.

The Sanuvox S300FX equipped with a Remote Oxidation Control will automatically tailor the amount of oxidation for each application destroying bio-chemical contaminants that are so troublesome for garbage rooms.

S300FX w/ Remote Oxidation Control System

Features

- *Reduce odors & chemicals*
- *Destroy biological contaminants & biological odors*
- *Stand-Alone / Wall-Mount / Duct-Mount*
- *Remote Oxidation Control System (OCS) monitors residual ozone levels and controls the secondary Booster Oxidation Lamp (UVV) to maintain ozone levels at .025 ppm*

SANUVOX

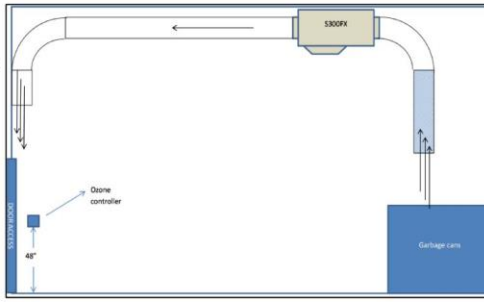
GARBAGE ROOMS

OBJECTIVE: Re-circulate the air in a garbage/trash room to reduce odors and bacteria while maintaining and monitoring the oxidation process.

EQUIPMENT: Stand-alone UV air purifier that incorporates a blower of either 300 or 1000 cfm, filters to capture particulates, one dual zone UVC/UVV lamp & one oxidizing UVV lamp, the latter controlled by an ozone detector set to a max ozone concentration level of 0.025

OPERATION: Untreated air is drawn into the unit from the top of the garbage cans or containers and treated by the UV germicidal and oxidizing lamps. The treated air is exhausted above the entrance to the room, creating a curtain of clean air, insulating the room. The ozone controller samples the air every 70 seconds and will shut off the oxidizing lamp should the ozone concentration level exceed 0.025 ppm.

TYPICAL INSTALLATION
S300FX-GX & SUBKITOZDS300



SIZING: Approximately 6 to 8 air changes per hour are required.

- A **P900X-SP** unit with an all UVV lamp will be required for an 800 cu ft room (10' X 10' X 8'). Since there is no ozone controller, the UVV lamp will be manually covered with foil for an acceptable ozone concentration.
- An **S300FX-GX** unit (300 cfm) will be required for a 2400 cu ft room (15' X 20' X 10'). This relates to 6 air changes per hour. Factory installed accessory (**SUBKITOZDS300**) is also required.
- An **S1000FX-GX** unit (1000 cfm) will be required for a 9600 cu ft (24' X 40' X 10'). This relates to 6.25 air changes per hour. Factory installed accessory (**SUBKITOZDS1000**) is also required.

MAXIMUM OZONE CONCENTRATION LEVELS

Agencies/ Concentration exposure limit	1 hour	8 hours	24 hours	1 year
City of Montreal	0.082 ppm	0.038 ppm	0.025 ppm	0.015 ppm
Environment Canada		0.065 ppm	0.025 ppm	
Health Canada	0.120 ppm			
EPA (USA)	0.120 ppm	0.080 ppm		
OSHA	0.300 ppm (15 min)	0.100 ppm		
WHO		0.050 ppm		
ACGIH		0.050 to 0.100 ppm		
NIOSH (IDLH 5 ppm)	0.100 ppm			

BENEFITS

- Substantially reduces odors
- Low maintenance
  - Lamp replacement 1-2 years
  - Periodic filter replacement
  - Controller Recalibration not required for 3 years
- Low cost compared to refrigeration (for odor control)

MARKETS

- Condos with garbage chutes
- Public buildings with restaurants
- Hotels and meeting rooms
- Sports centers or amusement parks

Smoking Rooms & Tobacco Smoke

Designated smoking areas although typically separated from working and living areas often cause problems with air that may very well circulate in and out of the designated areas. The smoking area itself may be overwhelmed with cigarette smoke causing smokers to seek alternative areas to smoke.

Sanuvox Technologies offers two UV / Filter stand alone / ducted models that are effective at removing tobacco smoke from the air and reducing odors as well as nicotine and smoke which is so problematic in these applications.

S300FX-GX UV / Filter System (200/300 CFM) **Available*
S1000FX-GX UV / Filter System (1000 CFM) ***Shown here*

Features

- *Unlike conventional technology, Sanuvox UV systems do not use costly carbon for absorption, or rely solely on filters which easily become coated with tar & nicotine*
- *The Sanuvox UV process changes the molecular structure of the tobacco smoke into a fine power which is then easily captured on the filter media*
- *It is recommended that the UV systems are sized to provide a re-circulation rate of 6-8 air changes per hour*

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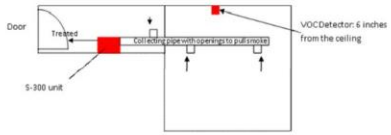
SMOKING ROOMS

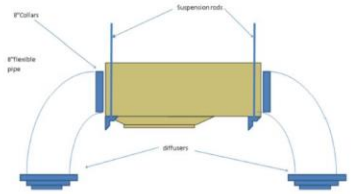
OBJECTIVE: To re-circulate the air in a room where there are varying numbers of smokers, reducing odors, nicotine and smoke. Equipment producing 6-8 air changes per hour is required.

EQUIPMENT: Stand-alone 300 or 1000 cfm air purifiers that will include germicidal and oxidizing ultraviolet lamps, pre-filters and main filter to capture the nicotine and smoke. An optional VOC (Volatile Organic Compound) detector can be used with optional multiple lamps when the number of occupants increases.

OPERATION: Sanuvox Dual Zone UV lamp will reduce odors, nicotine and smoke in the air in the room through recirculation. With the optional UVV lamp(s) and VOC detector, if the smoke level increases (more smokers), the VOC detector will trigger the additional oxidizing lamp(s), then shut them off when the level decreases. The cycle is repeated, lowering the odor, nicotine and smoke levels, until the maximum reduction is reached.

TYPICAL INSTALLATION





GENERAL

Cigarette smoke is composed mainly of:

- White ash
- Nicotine molecules
- Chemical by-products

Ash will be trapped by the pre-filters.

Nicotine will be transformed into a type of yellow powder that will be captured by the pre-filters and the main filter.

The chemical by-products will be oxidized by the UV process: high frequency UVV energy activates the organic molecules and accelerates the chemical reaction, resulting in the air being oxidized.

Odors are oxidized by the process of photolysis that initiates the breaking of chemical bonds by the action of the ultraviolet light. The oxidation process will reduce odors and chemical contaminants by changing the complex molecular contaminants into CO_2 and H_2O

SIZING: Approximately 6 to 8 air changes per hour are required. This reduces the standard of fresh air required by two thirds.

- An S300FX-GX unit (300 cfm) will be sufficient for a 1920 cu ft room (12' X 20' X 8') – 9.3 changes per hour- Optional factory installed accessories (SUBKITVOCS300)
- An S1000FX-GX (1000 cfm) will be sufficient for a 9600 cu ft room (20' X 40' X 10') – 7.5 changes per hour - Optional factory installed accessories (SUBKITVOCS1000)

BENEFITS

- Reduced Odors and Smoke
- No tar buildup in the unit - UV irradiation crystallizes the nicotine molecules
- Low maintenance -
  - Lamp replacement 1-2 years
  - Periodic filter replacement

MARKETS

- Eldercare homes
- Private homes
- Poker rooms / Casinos
- Bingo halls
- Cigar bar
- Smoking Rooms

Locker Rooms & Lavatory Odors

Locker Room odors are the result of perspiration which is excreted by the sweat glands in our skin. Sweat itself is not the source of the odor, but rather the off-gassing of the bacteria which feeds on sweat. The source of this unpleasant off-gassing can be found on occupants, clothes, towels and equipment as well as other soft materials.

Sanuvox Technologies' S300FX-GX UV / HEPA System is the ideal solution to reduce & eliminate unpleasant odors such as locker room and lavatory odors. The proprietary Sanuvox process will sterilize and oxidize bacteria, viruses, chemicals and odors dramatically improving the air quality in these sensitive applications.

S300FX-GX UV / HEPA System

Features

- *Pre-filter & HEPA filter captures particles down to 0.3 microns in size*
- *Sanuvox proprietary system eradicates biological contaminants such as mold, bacteria, viruses, germs & allergens*
- *Reduce chemical & biological odors*
- *Can be used as a stand-alone, wall-mount or HVAC duct-mount system*
- *Two speed 200/300 CFM system*

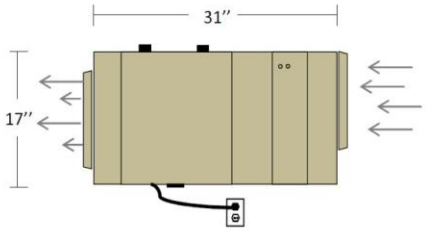
LOCKER ROOMS

OBJECTIVE: Reduce odors resulting from perspiration and sweat in locker rooms by killing bacteria and decreasing VOC chemical concentrations to achieve better air quality.

EQUIPMENT:
Stand-alone: Model P900 equipped with a blower of 80 cfm; Model S300 with a blower of 300 cfm or Model S1000 with a blower of 1000 cfm. Filters (except P900) to capture particulates, (pet hair, etc.) and a dual zone UVC/UVV "adjustable" lamp are standard. The S300 unit can be used as stand-alone system with optional intake and exhaust louvers or ducted using an 8-inch flexible duct with optional collars.

OPERATION: Untreated air is drawn into the inlet of the unit, purified with the germicidal/oxidation UV lamp, filtered and then exhausted. Recirculating the air in the room continuously reduces bacteria and odors, improving overall air quality.

WALL INSTALLATION: S300FX-GX with MSCLOU1



SIZING:

Approximately 6 to 8 air changes per hour are required.

- A **P900-GX SP** unit (80 cfm) w/ a dual zone UVC/UVV lamp will be required for a 1,200 cu ft room, (15' X 10' X 8').
- An **S300FX-GX** unit (300 cfm) w/ a dual zone UVC/UVV lamp will be required for a 4,500 cu ft room, (25' X 20' X 10'). Collars (MSCCOL1) can be ordered to duct the unit using an 8 inch diameter duct, or an intake and exhaust louver grill(s) (MSCLOU1) can be ordered if the unit will be used as a stand-alone system.
- An **S1000FX-GX** unit (1000 cfm) w/ a dual zone UVC/UVV lamp will be required for a 15,000 cu ft. room, (50' X 20' X 15'). The system uses 2 x 8 inch inlets and 2 x 8 inch exhaust outlets (collars).

Unit should be positioned near the center of the room to be as effective as possible. Excluding the P900GX unit, all other units can be installed in the plenum above the ceiling or in an adjoining room and ducted with 8 inch round duct.

FEATURES:

All Sanuvox air treatment systems are equipped with a dual zone "J" UVC/UVV lamp. All Dual Zone lamps have a maximum oxidizing UVV section in order to minimize residual ozone. In situations where odors are more concentrated, it is possible to outfit the units (except unit P900-GX) with special lamps incorporating a larger section of oxidation, with the installer making the final odor adjustments on the job site.

For more details on any of these units or their operation, please contact your Sanuvox representative.

ADVANTAGES

- Greatly reduced odors
- Low maintenance
  - Lamp replacement every 2 years
  - Periodic filter replacement
- Improved indoor air quality (IAQ)

MARKETS

- Sporting (Hockey, Football, Soccer, etc.) team dressing room, fitness centers, etc.
- Laundry rooms
- Dirty laundry storage
- Basement odors, mold odors, heating oil odors

Shelter / Kennel / Veterinarian Air Sterilization

Illness among animals especially dogs can be significantly higher when so many are boarded within close proximity or kept within the same room or building. Airborne illness can easily be transmitted from one animal to another. Odors may very well cause issues all of their own when odors migrate to other areas or cause issues for staff and visitors.

Sanuvox Technologies' UV systems are the ideal solution for destroying airborne viruses and bacteria as well as reducing the concentration of unpleasant odors.

***UV Bio-Wall QUATTRO** *Shown here*
***S300FX-GX UV / HEPA System** **Available*

Features

- *Sanuvox proprietary system eradicates biological contaminants such as bacteria, viruses, germs & allergens*
- *Destroys chemicals & biological odors*
- *Multiple application UV systems can be used for both stand-alone and duct-mount installations*

*

SANUVOX ANIMAL KENNEL, SHELTER

OBJECTIVE: Substantially reduce odors such as ammonia produced by animals in kennels, shelters, pet stores and veterinarian clinics and sterilize the air to reduce the risk of airborne viral & bacterial infection between animals.

EQUIPMENT:

1. **Stand-alone**: Model P900 equipped with an 80 cfm blower; Model S300 with a 300 cfm blower or Model S1000 with a 1000 cfm blower. P900 & S300 are equipped with filters to capture particulates, (pet hair etc.). A dual zone UVC/UVV lamp is standard. An "adjustable" oxidizing lamp is available.
2. **In-Duct** QUATTRO GX4 unit installed parallel to the airflow includes four UVC/UVV lamps, each with a one-inch section of oxidizing UVV. Two of the lamp's oxidizing sections are masked with removable foil, allowing for increased oxidation if necessary.

TYPICAL INSTALLATIONS

OPERATION: Each unit treats the air through recirculation in two ways:

1. The Germicidal UVC lamp portion destroys airborne biological contaminants (viruses, mold, bacteria.)
2. The Oxidizing UVV lamp portion reduces airborne chemical contaminants & VOCs through photo-oxidation.

GENERAL: SANUVOX™ PROCESS ON BIOLOGICAL AND CHEMICAL CONTAMINANTS

1-ACTIVATION PHASE $O^2 + O^* \rightarrow O^* + O^*$

Ultraviolet photon energy (170-220nm) is emitted from a high-intensity source to decompose (break down) oxygen molecules into activated monoatomic oxygen. The rate of production or effectiveness of this process depends on the wavelength and intensity of its source.

2-REACTION PHASE: $O^* + P \rightarrow PO$

The activated oxygen atoms (O^*) are then mixed in the airstream; the process will react with any compound containing carbon-hydrogen or sulfur, reducing them by successive oxidation to odourless and harmless by-products. If airborne contaminants are outnumbered by the activated oxygen atoms, there will be formation of residual ozone (O^3) which will occur following the oxidation of normal oxygen molecules (O^2).

3- NEUTRALISATION PHASE: (also GERMICIDAL) $O^3 + UV(C) \rightarrow O^2 + O^*: O + O \rightarrow O^2$

CHEMICAL REACTION

- Ammonia $NH_3 + O^* \rightarrow N_2 + H_2O$

BENEFITS

- Indoor odors greatly reduced
- Reduce cross-contamination between animals
- Improved air quality
- Low maintenance

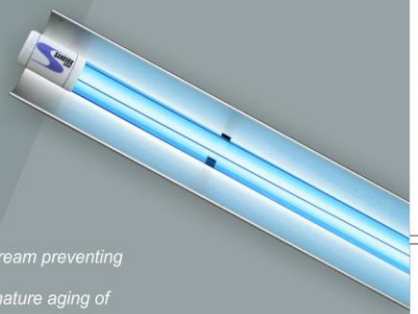
MARKETS

- Kennels, pet boarding and animal shelters
- Laboratories
- Veterinarian Centers
- Zoos and pet stores

Cold Room Air Sterilization & Ethylene Reduction

Mold and bacteria can severely impact the quality of meat, chicken, fish, fruits & vegetables that may be stored or prepared in warehouses and cold rooms. Ethylene off-gassing cause fruits and vegetables to prematurely ripen & age, dramatically shortening shelf-life.

Sanuvox UV CoilClean IL systems are installed facing the cooling coil and designed to bask the coil and air with ultraviolet energy destroying microorganisms including bacteria, mold and viruses while oxidizing & reducing ethylene off-gassing.



Sanuvox UV CoilClean IL Muti-split

Features

- *Patented Sanuvox process sterilizes the cooling coil and airstream preventing and destroying bacteria, mold & viruses*
- *Destroy ethylene off-gassing which is a leading cause of premature aging of fruits & vegetables*
- *Easily retrofitted into pre-exhisting systems*
- *Available in lengths from 12" to 60"*

SANUVOX

COLD ROOMS

OBJECTIVE: Destroy airborne bio-chemical contaminants such as bacteria, viruses & mold that may affect the storage and preparation of fish, chicken and meat. Destroy ethylene off-gassing which causes produce to ripen faster extending shelf-life.

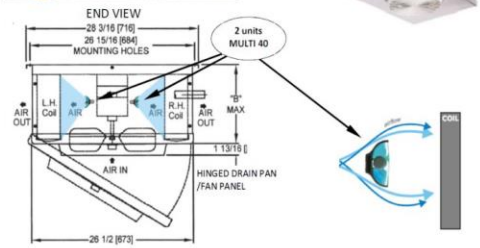
EQUIPMENT: IL MULTISPLIT units installed facing the cooling coils in the fan coil unit. Each IL unit includes a UVC /UVV lamp mounted in an anodized aluminum parabolic reflector. The ballast box incorporates LED status lights for providing lamp status & replacement (2 yrs.) and can be remotely monitored.

TYPICAL INSTALLATION

OPERATION: The fan coil unit recirculates the air, where:

1. The UVC germicidal section of the UV lamp destroys airborne biological contaminants (viruses, mold, bacteria and spores)
2. The UVV oxidizing section of the UV lamp reduces ethylene, slowing down the ripening process of vegetables and fruits.

Coils remain clean, more energy efficient



SLOWING DOWN THE CONTAMINATION SPREAD WITH UVC

Produce will degrade due to the rotting process. Rotting is caused by parasitic fungi and mold. Food deterioration begins with the breakdown of the cellular tissue by enzymatic action that allows the growth of microbes. Germicidal UV (UVC) is extremely effective at preventing the reproduction of bio-contaminants. UVC destroys airborne fungi, molds and their spores, limiting the contamination spread from one fruit to another. Meat, fish & chicken are especially vulnerable to airborne bio-contamination. UVC sterilizes the air destroying contaminants as they circulate within the cold room.

RETARDING THE RIPENING PROCESS WITH UVV

Photo-oxidation with UVV can be used to reduce chemicals that trigger the ripening of fruits and vegetables. The life stages of a plant are influenced by plant hormones. An organic compound involved with ripening is ethylene, a gas created by plants from the amino acid, methionine.

Ethylene increases the intracellular levels of certain enzymes in fruit and fresh-cut products, which include:

- Amylase, which hydrolyzes starch to produce simple sugars, and
- Pectinase, which hydrolyzes pectin, a substance that keeps fruit hard.

UVV oxidizes and thus neutralizes the ethylene molecules released by the ripening process, slowing down the spread of ripening to the surrounding produce.

This oxidation process breaks down ethylene into carbon dioxide and water vapor.

Ethylene C_2H_4 $\quad C_2H_4 + O^* \rightarrow CO_2 + H_2O$

BENEFITS

- Extended shelf life for vegetables and fruits
- Sterilize airborne bacteria, viruses & mold
- Cleaner cooling coils - more energy efficient
- Low maintenance -
  - Lamp replacement every 2 years
  - 15 years ballast warranty

MARKETS

- Cold storage rooms, groceries
- Meat, fish & chicken storage & preparation facilities
- Fruit and vegetable retailers
- Fruit and vegetable warehousing
- Fruit and vegetable transportation

Fruit & Vegetable Surface Sterilization

Surface contamination of fruits & vegetables is a problem for growers, distributors and retailers. Mold and bacteria can have severe effects causing produce to spoil.

FoodSafe UV Sterilizers are exceptionally safe & versatile disinfection systems for surface, packaging & conveyor applications designed to bask meat, fish & poultry, fruits & vegetables, baked goods and packaging with UVC germicidal light. The UV system is extremely effective at destroying surface contamination while extending product shelf-life. Only a few seconds of exposure can achieve up to a 99.999% destruction of common biological contaminants that are problematic in the food industry.

FoodSafe IL UV Surface Sterilization

Features

- *Incorporate UV fixtures into the production line (i.e. over conveyer belts) to bask the products and surfaces prior to packaging maintaining a sterile product ready for distribution and consumption*
- *Surface sterilization of meat, fish & poultry, fruits & vegetables, baked goods and packaging*
- *Easily incorporates into pre-existing sorting, manufacturing and packaging equipment*
- *All FoodSafe IL UV Lamp systems are TEFLON® coated to insure that no UV Lamp contents will escape in the event of Lamp breakage*

SANUVOX

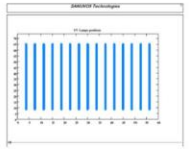
PRODUCE DISINFECTION

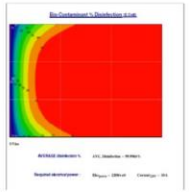
OBJECTIVE: Prevent & destroy microbial contamination such as bacteria and fungi that occur naturally on fruit and vegetable surfaces, and are responsible for premature decay. The process will leave no residue as is found using chlorine or irradiation treatments with gamma rays. At the producer level, sterilization of fruits and vegetables could reduce the use of pesticides.

EQUIPMENT: FoodSafe IL units in various widths, equipped with parabolic reflectors and Teflon coated lamps will be positioned equidistant across the conveyer, parallel to the conveyor. Computerized sizing programs taking into account the speed of the conveyer and the contaminant(s) to be treated will determine the size of the lamps.

OPERATION: The end user will determine the location and design of the lamp assembly enclosure that will attach to the conveyer guaranteeing there is no direct UV exposure to employees. Fruits and/or vegetables will be exposed for a predetermined period of time to UV radiation as they move through the enclosure on the conveyor. This predetermined time will be sufficient to sterilize the fruit and/or vegetable pathogens and slow down ripening process.

TYPICAL INSTALLATION





Pictured here a Sanuvox UV installation for surface sterilization of Bell peppers

RESEARCH ON STRAWBERRIES

Researchers from the Department of Food, Science and Nutrition (Laval University, Quebec, Canada) demonstrated that exposing strawberries to ultraviolet radiation prolongs their shelf life. Freshly picked strawberries exposed to Germicidal Ultraviolet Irradiation (UV-C) have retained their freshness for 14 to 15 days, while untreated freshly picked strawberries were “almost done” on the tenth day.

The conclusions from this research have been published in the Food Science Journal. Refrigeration, which slows the growth of microorganisms and fruit ripening, allows a limited but effective mean regarding conservation of strawberries.

"Exposure to UV-C is a very interesting approach to facilitate the marketing and distribution of fresh fruits and vegetables", says researcher Joseph Arul. This treatment slows the ripening of strawberries: they remain firm longer, their respiratory rate is lower, their color is more attractive and the taste is not altered. "It is believed that exposure to UV-C would kill some mold on the surface of the fruit or, more likely, the treatment would stimulate the defense mechanisms of the produce," suggests the researcher.

Arul's team has already demonstrated the benefits of UV-C exposure for the conservation of **carrots, broccoli, tomatoes** and **blueberries.**

Arul does not anticipate negative reactions from consumers, unlike gamma irradiated food, or more recently, genetically modified organisms. "The technique is more acceptable to a consumer. In low doses, UV is beneficial. It is a light source and I do not think people have problems with that."

BENEFITS

- Complete sterilization without pesticides
- No residue, no visual change of vegetables
- Increased shelf life
  Low maintenance - lamp replacement every 2 years
- Teflon covered lamps - in case of breakage, broken glass & contents remain inside the Teflon sleeve

MARKETS

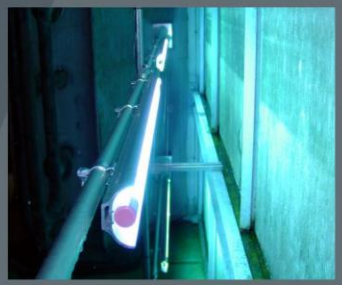
- Vegetable Growers
- Fruit and vegetable importers
- Hydroponic producers
- Value-added packagers

SANUVOX

Coil Cleaning: Mold & Bio-Film / Improve Efficiency

Because of environmental factors, evaporator coils are the ideal breeding ground for bio-contaminants & the source of many issues that effect a building's Indoor Air Quality. Bio-contaminants such as mold & bio-film insulate the coil fins restricting airflow and reducing the ability to transfer heat. The insulation of the coil fins causes the system to work harder resulting in a loss of equipment efficiency. The "blow-off" of mold and odors causes these contaminants to be released into the building.

The Sanuvox UV CoilClean IL is specially designed to direct virtually 100% of the UVC germicidal energy onto the coil preventing mold & bio-film from growing on the coil and surrounding areas.



UV CoilClean IL

Features

- *The patented UV CoilClean IL incorporates a High-Intensity UVC germicidal Lamp and an Anodized Aluminum Parabolic Reflector to direct the UV light onto the coil*
- *Available in sizes from 12" - 60" lengths. Any number of units can work together to treat any size evaporator coil*
- *Each UV CoilClean IL includes: Ballast box w/ LED Status Display (monitors system performance), dry contact for building automation integration, UV Lamp Moisture Boot and mounting hardware*

SANUVOX

EVAPORATOR COIL

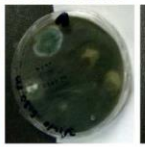
OBJECTIVE: To destroy mold & bio-film on the evaporator coil and surrounding areas and to limit the spread of pollutants distributed by the HVAC systems. Maintain peak system efficiency, lower energy costs & reduce conventional coil cleaning as well as eliminating biological "blow-off" & odors that can be introduced into the building or facility as a result of a fouled coil.

EQUIPMENT: Sanuvox IL Coil Clean Object Purifiers for HVAC coils utilize patented technology to focus the maximum UV energy on any surface. The patented anodized aluminum parabolic reflector serves two purposes:

1. Redirects the maximum amount of UV energy produced by the lamp onto the coil surface, requiring less or shorter lamps and fixtures
2. Protects the UV lamp from fouling

OPERATION: Prolonged exposure to UV radiation will keep the air conditioning coil clean and free of bio-contaminants, including viruses, fungi, bacteria & bio-film that may grow on the coil. Maintaining a coil free of microbial growth will maximize the efficiency of coil heat transfer and reduce the hours of operation of the compressors, resulting in lower energy costs.

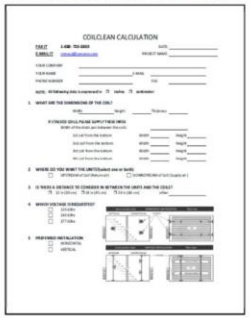
INSTALLATION BENEFITS



Before

After

STERILIZATION SIZING CALCULATION:



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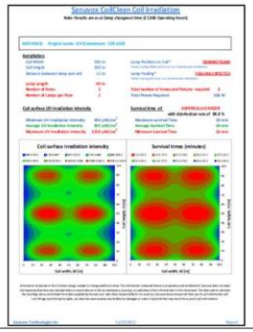

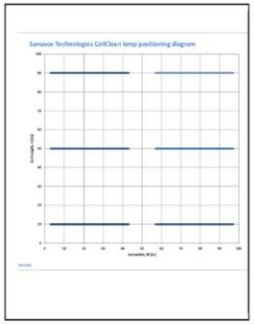

UVC GERMICIDAL PRINCIPLE: - The 254nm UVC wavelength is well documented for its germicidal properties. The effects of ultraviolet radiation on biological contaminants have also been included in the latest ASHRAE Handbooks. Generally, this relationship is similar to the absorption curve of nucleic acid (DNA) the basis of all living organisms. The germicidal destruction rate for any specified bio-contaminant can be greater than 99.9% as the maximum UV intensity produced by the UV lamp is directed onto the coil and each application is sized according to its requirements.

BENEFITS

- Improved energy efficiency
- Low maintenance- requires lamp replacement after 17,000 hours or 2 years of operation
- Improved air quality
- Remote monitoring electronics

MARKETS

- Commercial buildings, High Rise
- Facilities such as schools & universities
- Medical facilities
- Restaurants & Hospitality

Sanuvox Technologies is a global provider of UV solutions that vary from biological sterilization to chemical & odor control. Below you will find examples of Sanuvox users from various industries that benefit from Sanuvox UV Systems.

3i Corporation
911 Emergency Response Center
ALCAN
Alfred Dallaire Mausoleum
Algoma Retirement Center
Allendale Retirement Center
Alliance Assurance
Ambulance Service
American Fidelity Company
Anatole Hotel Dallas
Andrews Air Force Base
Bank of America
Bar S Foods
Bay/Adelaide Center
Bayer Labs
Baystate Medical-Mary Lane Hospital
Beijing University - China
Bikram Yoga Studios
Boca Raton Medical Center
Bombardier
Bradenton Towers
Bradford Middle School
British Printing Press - Kuwait
Brookfield Properties
Brookhaven Sewer Project
C.L.S.C.
Caisse de Depot
Camp Pendleton Marine Corps Base
Canada Post
Canadian Air Force
Canadian Army - Calgary, Alberta
Canadian Embassy - Mumbai, India
Canton Hospital
Capistrano School District
Carnegie Research, Stanford University
CBRE
Cecil Facer Medical Center
Cell Signaling
Excellence in Bio-Research - Thailand
Charter Springs Hospital
Chateau Poochie
Chesapeake Energy
Chickasaw Nation Medical Center
Children's Hospital Boston
Children's Hospital Texas
Chulalongorn Hospital
Circles Of Care
City Hall - Upland, California
City of Brownsville, Texas
City of Gainesville, Florida
City of Montreal
City of Orlando, Florida
City of Pharr, Texas
City of Quebec
City of Rancho Viejo, Texas
Civil Courts - New Orleans
Clayton County
Cleveland Clinic - Abu Dhabi
Cleveland VA Medical Center
Club Mardi Gras
Conoco-Phillips
Cornell University
Costco Stores
Covenant House
Coweta County School
Cunningham Elementary
Cupertino City Hall
Curtis Draper
Daniel Foods
Dante Restaurant
DC Superior Courthouse
Defence Acquisition University
Del Monte Foods
Department of Transportation
Desjardins Bank
Doha International Airport, Doha-Qatar
East Texas Medical Center
Eastern University
El Conquistador Resort -Puerto Rico
Emerson Hospital
Ephrata Hospital
Evangel Assembly Church
Experion Credit Agency
FAA Training Center
Fairview Shopping Complex
FBI Indianapolis
First Choice Pharmacy
Florida Navel Hospital
Fort Drum United States Army
Fort Gordon United States Army
FOX NEWS New York City
Florida State University
Gaston Memorial Hospital
Geisinger Medical Center
Gilmer Courthouse
Goglanian Bakery
Guelph County Public Health
Gulfport Juvenile Detention Facility
Hamilton General Hospital
Harrison School District
Hartford General Hospital
Hattie Latham Children's Hospital
Health Central
Healthcare for the Homeless
Heinz Packaging
Hershey Chocolate
Hickam United States Air Force Base
Hines Property Management
Holiday Inn - Muscat - Oman
Holly Cross University
Houma Elementary School
Huntersville Presbyterian Hospital
Huntington Hospital
Il Fornio Bakery
Indiana State University
Industrial Alliance Insurance
Institute for Specialized Medicine
IVF Clinic
J Edgar Hoover FBI Headquarters
Jack Astor
Jackson County Memorial Hospital
James Gibson Library
James Tighe-Gilmer Courthouse
Japan Tobacco (JTI)
Keesler Hospital Air Force Base
Kentucky State Penitentiary
Knights of Columbus
Kuwait Hospital
LA Mission Hospital
Lancaster General Hospital
LAX Fire Station
Lucky Truck Stop Casino
Marble Medical
Marina View Tower – Singapore
Massachusetts General Hospital
Maxwell Meighen Homeless shelter
MD Anderson Hospital
Medanta - The Medicity, India
Meridian Bio-Science
Metro East Detention Centre
MGM Tower
Miami 1111 Building
Miami Dade College
Ministry of Human Resources
Miramar Library
Mission Regional Hospital
Montreal Jewish hospital
Moore Regional Hospital
Moose Lodge
Motor City - Dubai
NAS Jacksonville Youth Center
National Art gallery Ottawa
National Library
National Medical Centre - Pakistan
Nature Fresh Farms
NAV Canada
Norfolk Southern Railroad Building
NORTEL
North East Medical Center
Oak Ridge
Oak Tree Run Bakery
Oakville Daycare Center
OLG Brantford
Orlando Health
Orlando Regional Medical Center
Palm Desert Police Department
Paramount Pictures
Peck Federal building
Penn State Outreach Building
PHF Research Complex
Pike County School
Place Dupuis
Polaris Sea Vessel
Portola Packaging
Power Stream Cleaning Services
Pratt & Whitney
Princess Noura University, Saudi Arabia
Providence Medical Center
Providence St Mary's on the Lake
Purdue Pharmaceutical
Radius Restaurant
Rama Hospital
Region of York Public Health
Research Park Plaza Building
Ricoh
Royal IT Center - Thailand
Salon
Salvation Army Homelss Shelter
San Diego Sports & Surgery Center
Santa Fe Community College
Scotia Center
Seafarers Union Building
Shell Oil
Shire Pharmaceutical
Siriraj Hospital - Bangkok
Sojourn House
South Florida Water Management
Southeast Bldg Solution
Southern Methodist University (SMU)
St. Anthony Bone & Joint Hospital
St. Paul's Retirement Facility
St. Simons shelter
St. David's Hospital
St. Rose Hospital
Stamford CT Police Station
Sushi Shop
Swiss Army - Switzerland
Tampa Port Authority
Taylor Hospital
The Gran Melia Resort Hawaii
The Hockey Hall of Fame
The Toronto Stock Exchange (TSE)
Times Customer Service
Toronto Public Health
Transco Tower
Travis Commercial Building
Trinity Baptist College
Uncle Wally's Bakery
United Nations - Tajikistan
United States Dept. of Transportation
University of Houston
University of New Hampshire (UNH)
University of North Carolina
University of Tampa
University of Texas at Austin
University of Toronto
VA Hospital
Verizon Corporate Office Building
VIA Rail Canada
Victoryland Casino
Virginia Department for the Blind
Walnut Creek Elementary School
Walter Reed Army Medical Center (DC)
Washington National Zoo
Wellington Dufferin Guelph Public Health
Wellspan Surgical & Rehab Center
West Boylston Prison
West Capella Sea Vessel
Westminster Services
Westminster Suncoast
White Oaks Plantation
Wilson Memorial Hospital
Winchester Hospital
Yale School of Medicine

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Air Conditioning | Heating | Refrigeration

the NEWS

THE HVACR CONTRACTOR'S WEEKLY NEWSMAGAZINE SINCE 1926

FOCUS

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UV DEVICES

Using UV: More Than Just Sticking a Lamp in a Duct

industry news

FULL RECOVERY

CleanRooms

Automation takes aim at contamination

Intel 65-nm process leaves no room for tiniest particles

UV-based purification technology promises total bacteria knock-out

CaseInPoint

UV and a filter overhaul team up to clean up IAQ in Miami

Ultraviolet Lamps Create Cleaner Indoor Air, a Greener Building and Energy Savings

FOCUS

High-Intensity UV Prevents Sick Buildings?

NEW PRODUCT 4 NEW REVENUE?

What Industry Contractors are Saying:

What Contractors have Experienced:

Panasonic Fans Selected

Del HVACR TRAINING BOOKS AND DVDS at the AEC Store

DeWALT

Room air conditioners built to take the heat— so you don't have to.

Friedrich

Who uses Sanuvox Systems?

3M Corporation
911 Emergency Response Center
ALCAN
Algoma Retirement Center
Allendale Retirement Center
Alliance Assurance
Ambulance Service
American Fidelity Company
Anatole Hotel
Andrews Air Force Base - MD
Bank of America
Bar S Foods
Bay/Adelaide Center
Baystate Medical Center
Beijing University - China
Bettram Yoga Studios
Boca Raton Medical Center
Bombardier
Bradenton Towers
Bradford Middle School
Brookfield Properties
C.L.S.C. 5 Buildings
Caisse de Depot
Canada Post
Canadian Air Force
Canadian Army - Calgary, Alberta
Capistrano School District
Carnigie Research Institute, Stanford University
CBRE
Cecil Facer Medical Center
Cell Signaling
Center of Excellence in Bio-Medical Research - Thailand
Charter Springs Hospital
Chateau Poochie
Children's Hospital Boston
Chulalongorn Hospital
Circles Of Care
City Hall - Upland, California
City of Brownsville, Texas
City of Gainesville, Florida
City of Montreal
City of Orlando
City of Pharr, Texas
City of Quebec
City of Rancho Viejo
Civil Courts - New Orleans
Clayton County
Cleveland VA Medical Center
Club Mardi Gras
Conoco-Phillips
Costco Stores (Club Price)
Covenant House
Coweta County School
Cupertino City Hall
Daniel Foods
Dante Restaurant
Jeuness Day care center
Del Monte Foods
Department of Transportation
Desjardins
Dog Bone Factory
East Texas Medical Center
El Conquistador
Emerson Hospital
Evangel Assembly
Experion Credit Agency
FAA Training Center
Fairview Shopping Complex
First Choice Pharmacy
Florida Navel Hospital
Fort Gordon
FOX NEWS New York City
FSU
Gaston Memorial Hospital
Gilmer Courthouse
Goglanian Bakery
Gulfport Juvenile Detention Facility
Hamilton General Hospital
Harrison School District
Hartford General Hospital
Hattie Latham Children's Hospital
Health Central
Healthcare for the Homeless
Heinz Packaging
Hershey Chocolate
Hickam U.S. Air Force Base
Hines Property Management
Holly Cross University
Houma Elementary School
Il Fornio Bakery
Indiana State University
Industrial Alliance Insurance
IVF Clinic
Jack Astors Restaurant
Jackson County Hospital
James Tighe-Gilmer Courthouse
Japan Tobacco (JTI)
Keesler Hospital,
Kentucky State Penitentiary
Knights of Columbus
Kuwait Hospital
Lucky Truck Stop Casino
Marble Medical
Massachusetts General Hospital
Maxwel Meighen Homeless shelter
MD Anderson Hospital
Meridian Bio-Science
Metro East Detention Centre
MGM Tower
Miami 1111 Building
Miami Dade College
Ministry of Human Resources
Miramar Library
Mission Regional Hospital
Moore Regional Hospital
Moose Lodge
Motor City - Dubai
NAS Jacksonville Youth Center
National Library
NAV Canada
Norfolk Southern Railroad Building
NORTEL
Oak Ridge
Oaktree Run Bakery
OLG Brantford
Orlando Health
Orlando Regional Medical Center
Paramount Pictures
Peck Federal building
Penn State Outreach Building
Pet store
PHF Research Complex
Pike County School
Place Dupuis
Polaris
Portola Packaging
Power Stream
Pratt & Whitney
Providence Medical Center
Providence St Mary's on the Lake
Rama Hospital
Research Park Plaza Building
Rex Services
Royal IT Center - Thailand
Salon
Salvation Army
Salvation Army Shelter College St
Salvation Army Shelter Dundas St
Salvation Army Shelter Jarvis St
Salvation Army Shelter Queen St
San Diego Sports & Minimally Evasive Surgery Center
Santa Fe Community College
Seafarers Union Building
Shell Oil
Shire Pharmaceutical
Siriraj Hospital
Sojourn House
South Florida Water Management
Southeast Bldg Solution
Southern Methodist University
St Anthony Bone & Joint Hospital
St Paul's Retirement Facility
St Simones shelter Bloor St East
St David's Hospital
Stamford CT Police Station
Sushi Shop
Swiss Army - Switzerland
Tampa Port Authority
Taylor Hospital
The Gran Melia
The Hockey Hall of Fame
The Toronto Stock Exchange TSE
Times Customer Service
Toronto Public Health
Travis Commercial Building
Trinity Baptist College
United Nations - Tajikistan
United States DOT
University of New Hampshire
University of Tampa
University of Texas at Austin
University of Toronto
VA Hospital
Verizon Corporate Office Building
VIA Rail Canada
Victoryland Casino
Virginia State Center For The Blind
Walnut Creek Elementary School
Walter Reed Army Medical Center
Wellington Guelph Public Health
West Boylston Prison
West Capella
Westminster Services
Westminster Suncoast
White Oaks Plantation
Wilson Memorial Hospital
Winchester Hospital
Yale School of Medicine

SANUVOX
FACTORY AUTHORIZED DEALER PROGRAM

Sanuvox is proud to extend to you the opportunity in becoming a Sanuvox Factory Authorized Dealer (FAD).
Sanuvox products are heralded as the benchmark to which all other UV technology is compared to.
Sanuvox sets the standard in quality, performance and support.
We are looking for dealers with that same passion & drive to become a leader in their very own Indoor Air Quality market.

The benefits in becoming a Sanuvox Factory Authorized Dealer are:

- A comprehensive support team. Your local Sanuvox Sales Manager will personally handle your account.
- You will receive regular updates from our Sanuvox Sales Coordinator who is also personally responsible for the FAD's needs.
- Customer referrals.
- Discount on FAD Starter Pack (see reverse). The starter pack includes two Sanuvox UV Purifiers. A P900GX which should be used as a demonstration model illustrating to your customer how effective the Sanuvox process can be. You also have a "dealers choice" for the second UV purifier.

The "Starter Pack" also includes:

Binder I 200 Residential Brochures I 5 x 28 page catalogues I 3 spiral Flip-Charts I 2 Truck Decals I Sanuvox Pen I Sanuvox Cap I UV Lamp Tester I

WITHIN A FEW SHORT WEEKS
>>>> YOU CAN BE A SANUVOX ELITE DEALER

Upon purchasing 25+ Sanuvox units (within 1 year) you will automatically become a Sanuvox Elite Dealer*. The Elite tier allows you to take advantage of all the FAD benefits plus:

- No charge spare part kit (6.5 & 10.5 UV "J" Lamp, vacuum sensor & ballast)
- The Sanuvox Elite bi-monthly e-newsletter
- Sanuvox exclusive pre-season specials (pre-heating / pre-cooling)
- Sanuvox year end cash-back rebate
  - 2% cash-back for 25+ units purchased (within 1 year)
  - 3.5% cash-back for 50+ units purchased (within 1 year)

* Upon purchasing 25 Sanuvox units, contact Sanuvox at 1-888-726-8869 for inclusion into the Elite Program. To maintain ELITE DEALER status a minimum purchase of 25 units/year is required purchased through your local Sanuvox Distributor.

1-888-726-8869 www.sanuvox.com

IAQ Survey
Two-Sided

Start a Conversation!

SANUVOX

DID YOU KNOW? Each year tens of thousands of Sanuvox UV Systems are installed around the world. Sanuvox UV Systems are used in residential, commercial, institutional, medical, marine & military applications.

TOP 5 REASONS TO INSTALL A SANUVOX UV AIR PURIFICATION SYSTEM

ms are designed to help you and

only drink two liters of water a day, yet
sorbed by the lungs. It is a big problem."

nd natural resources heating and cooling air, only
enough fresh outside air to lower
me. These airborne contaminants include

which are introduced into the atmosphere. Just
e UV wavelengths, bringing the

ty, Penn State University,
igious Lancet Medical Journal as well as
have shown dramatic improvements in Indoor Air

hole Home Air Purification System
al contaminants. Treats up to 4,000 sq.ft.

SANUVOX

Customer Name_____ Address_____
City_____ State / Province_____
Phone Number_____ Email Address_____

INDOOR AIR QUALITY (IAQ) HOME SURVEY

North Americans are facing many different challenges to improve INDOOR AIR QUALITY in their homes, for themselves and their families. As HVAC professionals, we would like to propose some effective solutions for those challenges. Please help us to understand your specific issues and answer a few simple questions.

1. Is INDOOR AIR QUALITY important for you and your family? Yes □ No □
2. Are you interested in ENERGY SAVINGS? Yes □ No □
3. Do you or any of your family members suffer from ALLERGIES? Yes □ No □
4. Do you or any of your family members suffer from ASTHMA? Yes □ No □
5. Do you or any of your family members wake-up in the morning with a headache or congestion? Yes □ No □
6. Do you have PETS? Yes □ No □
   a. If yes, would you be interested in ways to control pet odors / dander in your home? Yes □ No □
7. Do you or any of your family members smoke in the home? Yes □ No □
8. Are you concerned about *VOC's (Volatile Organic Compounds) in your home? Yes □ No □
   *VOCs include formaldehyde, adhesives, artificial fabric dye, etc.
9. Was your home ever subjected to a flood or water damage? Yes □ No □
10. Do you believe the INDOOR AIR QUALITY in your home can be improved? Yes □ No □

If you have answered yes to any of the questions above, our company can help in suggesting the right product to improve your home's INDOOR AIR QUALITY.

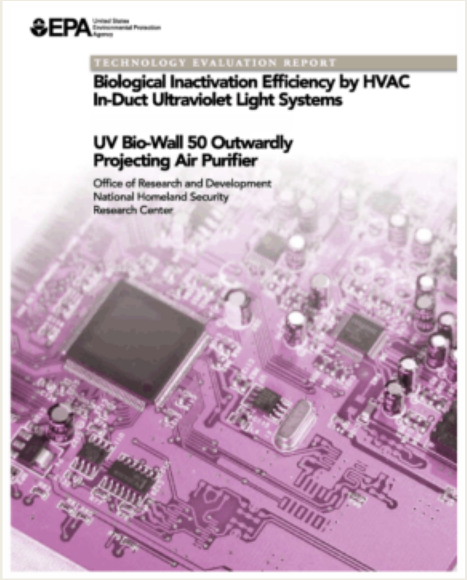
Contractor Information:

See reverse for TOP 5 REASONS to install a Sanuvox UV System

www.sanuvox.com 1-888-726-8869

Residential Brochure

Why Sanuvox?



- Tested & Published results for both Air Purification (EPA) & Coil Cleaning (McGill Lancet Study)
- Unique proprietary systems unlike anything else in the market place
- Extensive factory support
- Real-Time Simulations including Kill-Rates and Efficiencies
- Engineered Systems specifically for Coil Cleaning & Air Purification

CoilClean UV Coil Cleaners

- Improve energy efficiency & maintain a clean coil fee from mold & other microbial growth
- Reduce the need for pressure wash & chemical cleaning of the evaporator coil

McGill

THE LANCET

UV Bio-Wall In-Duct Air Purifier

- Destroy up to 99.9999% of airborne biological & chemical contaminants on a single pass
- Drastically improve IAQ while combating Sick Building Syndrome

- Sanuvox is a proud contributor to the standards and practices applied to Ultraviolet Air & Object Purification (Chapter 16) that has been adopted into the 2008 ASHRAE Handbook on HVAC Systems & Equipment

ASHRAE®

SANUVOX

Sanuvox Movie Presentation (3:23 min.)