

UVGI

Ultra-Violet Germicidal Irradiations - Facts & Falaise

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Fact :

*UVGI prevents
Bacterial & Biofilm
growth in AHU
cooling coil fins &
Pans.*

Falaise :

*1. UVGI can disinfect
fast moving AHU air
in ahu or Duct.*

*2. UVGI is a full
proof solution for
indoor air & indoor
surface disinfection.*

**“Ask IAQ expert,
Chemtronics for
best solution”**

Ultra-violet Germicidal Irradiation commonly called as UVGI is a short wavelength of 253.7 nm UV-C germicidal light radiation system, which kills microorganisms.

Light Spectrum:

Light spectrum (refer fig.01) is broadly divided as X-rays having wavelength less than 100 nm, Ultraviolet having wavelength from 100 to 400 nm, visible light from 400 to 780 nm & infrared above 780 nm. Ultraviolet is further divided in UV-A, UV-B & UV-C.

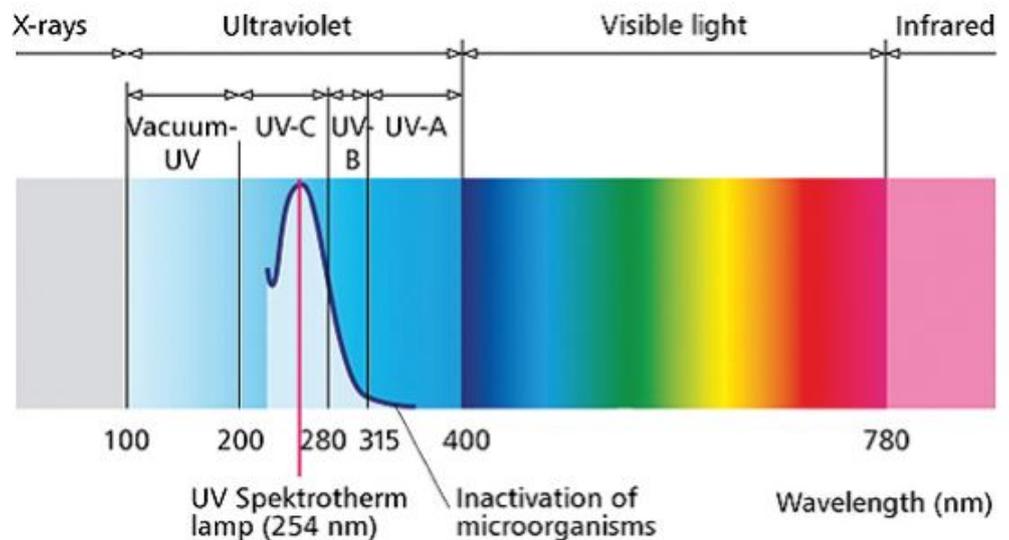


Fig. 01 Light Spectrum, germicidal UV-C bandwidth 230 – 280 nm.

Application of UVGI in Air & Surface Disinfection:

UVGI systems are used for disinfection of air, Water & Wastewater. Here we are only discussing its application in air & surface disinfection. In air treatment there are two major applications one is in HVAC system for preventing formation of bacteria & biofilm in cooling coil fins & drain pans & other is application areas where air & surface needs to be disinfected.

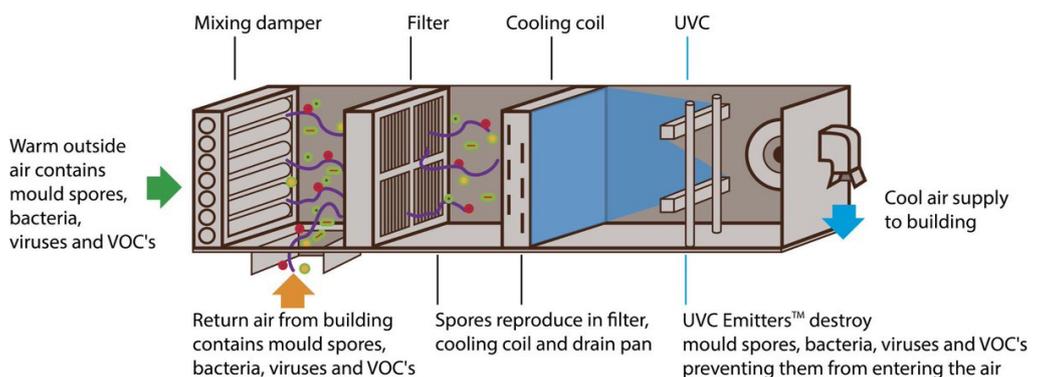


Fig. 02 General arrangement of Air Handling Unit (AHU) & area coverage of UV-C irradiation.

“It is not only important to treat indoor air but to enhance it and reduce Sick Building Syndromes [SBS]”

Penetrate & Treat

“Electrochemical Oxidation [ECO] & Bipolar Oxygen Ionisation [BOI] are the killers of Any Virus”

Solution :

- 1. Point Of Source Disinfection**
- 2. Disinfectant mixed Air**
- 3. Air as a medium of Disinfectant Carrier**

Smart Answer :

Air Disinfection with ECO+BOI

Fact # 01: The bacteria & biofilm grows on cooling coil fins & drain pan (refer fig.02). Subsequently dirt gets accumulated in slimy biofilm, reducing free flow of air, increasing resistance & pressure drop and energy consumed by fan. At the same time reducing heat exchange efficiency. Continuous irradiation of 253.7 nm UV-C light can prevent formation of bio growth on cooling coil fins.

Fact # 02: UVGI is a line of site irradiation (refer fig.02), the surface or an air which is not exposed to direct UVGI, can have zero effect. This means entire atmosphere & surfaces of the application area, entire duct work & the places bacteria & viruses can hide cannot have any effect of UVGI.

Biofilm: Biofilm is the root cause, microbiological contamination. This is the tough protective layer bacteria themselves can build & multiplies in dangerous numbers & keep spreading in all directions. First single planktonic cell rests on the surface of the application area i.e. furniture, equipment, walls, ceiling etc. and also, within long duct work. Bacteria starts to multiply & forms single layer of biofilm. Biofilm is an Extracellular Polymeric Substances (EPS) thick protective layer, which protects microorganisms from antimicrobials, shear forces, weak disinfectant, irradiation. In next stage, multilayer microcolonies are formed & subsequently biofilm reaches maturity stage. Now this matured biofilm detaches & planktonic bacteria are released in all direction. Again the attachment of planktonic settlement & new colony & biofilm formation cycle repeats.

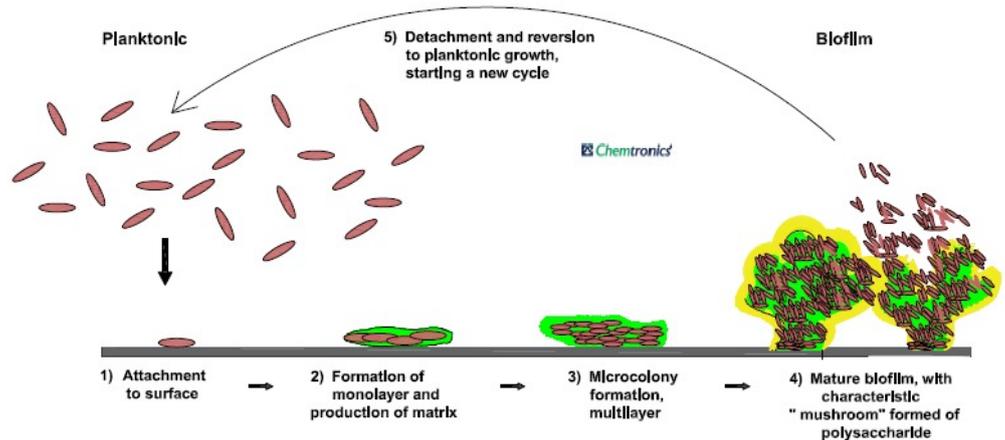


Fig. 03 Life cycle of biofilm from Planktonic & from Planktonic to Biofilm.

Falaise # 01: UVGI installed in AHU or supply air duct (refer fig.04), can disinfect recirculation air & can disinfect occupied indoor air.

Falaise # 02 : UVGI treatment effectiveness is 99.9 % (log 3) of 100 % of the indoor spaces & air travelling in supply air ducts.

Falaise # 03: UVGI irradiation can be effective on surfaces which are not directly exposed.

Falaise # 04: UVGI can effectively pass through clear glass.

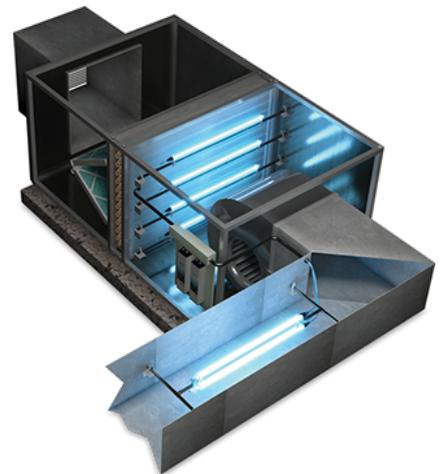


Fig. 04 AHU & Ductwork

“Biofilm is the Root Cause of Microbial Contaminations”

ECO + BOI Effectiveness On Reduction or Control of :

PM 1.0 | 2.5 | 10

YES

Odor Reduction

YES

Total Volatile

Organic Compounds

YES

Formaldehyde

YES

Bacteria & Viruses

YES

Toxic Chemicals

YES

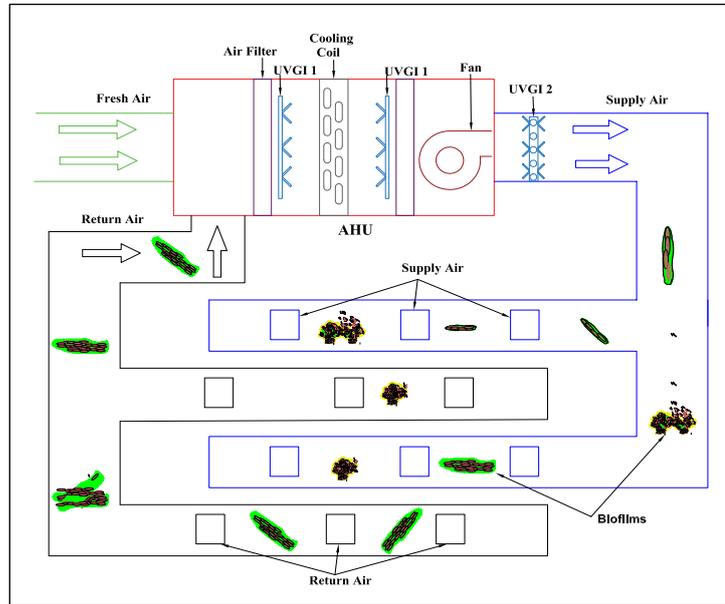


Fig. 05 Biofilm growth in HVAC Ductwork, where UVGI cannot reach.

UVGI Towers & Robots for IAQ Treatment:

UVGI towers & robots are used in indoor spaces like hotels, hospitals, offices, schools, ATM centers & many more places. Unfortunately, the irradiation reach of UVGI is limited only on air & surfaces within 1 m of direct exposure for long duration. UVGI, cannot be operated in presence of humans even under controlled irradiations.



Bipolar Oxygen Ions (BOI) :

When Oxygen orbital is broken electrically, millions of positive protons & negative electrons are released in indoor air. This gives a charge to suspended colloidal particulate matter (PM) making them agglomerate & settle on the ground. In cases of AHU & ductwork, their bigger size effectively traps them in mechanical filters. Any other chemical and biological pollutant associated with particulate matter also settles down on ground, thereby offering limited efficiency. This can be strategically installed in the AHU ductwork and in local area.

Electro Chemical Oxidation (ECO):

An advanced version of air treatment uses oxidation technology to oxidize all free floating planktonic microorganisms & Biofilms with height efficiency. The technology uses electricity to produce oxidant on site from ambient air. This oxidant works on point of source where any virus & bacteria can hide & biofilms are formed.

Chemtronics Innovative ECO + BOI:

Chemtronics R & D team has developed unique blend of ECO + BOI to cover the most of the pollutants which can be physical, biological and chemical. In this integration, oxidation is extended to produce advance oxidation to offer high degree of spectrum coverage with better reach & depth of the treatment for optimum performance. The greatest advantage is the disinfectant does not need any consumable, as it is produced from ambient air, using electricity. The treatment is at the point of source, where air can reach. Low operation & maintenance cost without any consumables.

Falaise # 05: UVGI can effectively remove the biofilm in HVAC ductwork (refer fig. 05), occupied area surfaces, all cracks & crevices, where bacteria and viruses can hide & grow.

Falaise # 06: UVGI treated air can disinfect other places & surfaces, where irradiation cannot reach.