



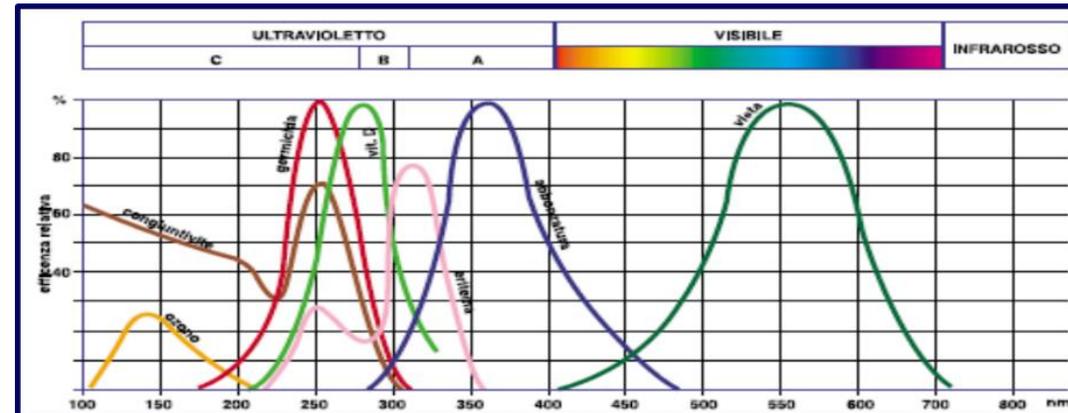
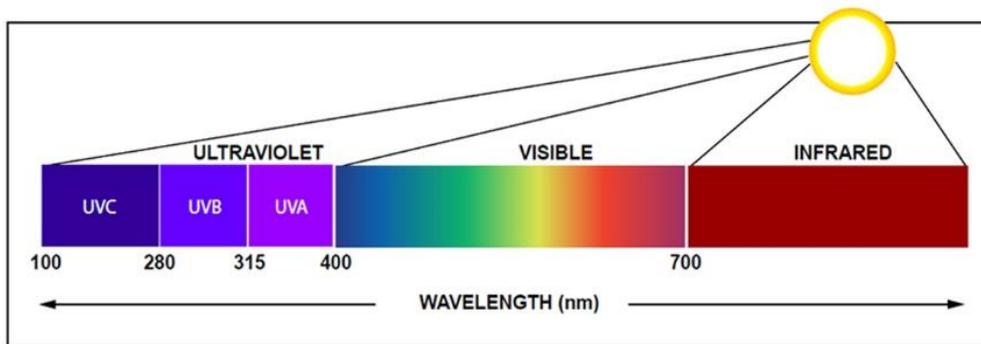
food

 UltraViolet Germicidal Irradiation (UVGI)



Ultraviolet Germicidal Irradiation is known from the 60s as a good physical method to control growth and distribution of microbial organisms, pathogens, spores, moulds, etc.

What does UVGI mean ?



Light in a broad sense can be divided in visible, infra-red and ultraviolet rays.

Ultra-violet rays (invisible) can be classified in :

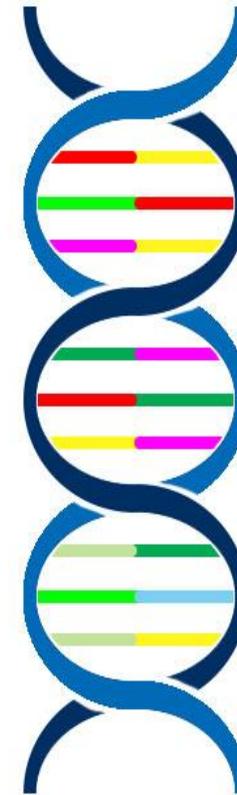
- UV - A (with tanning properties),
- UV - B (with therapeutic properties)
- UV - C (with germicidal properties).

What does UVGI mean?

The absorption of a UV photon by the DNA of microorganisms causes a destruction of a link in the DNA chain, and consequently the inhibition of DNA replication.

The germicidal effects of the UV-C radiation destroy DNA of Bacteria, Viruses, Spores, Fungi, Molds and Mites avoiding their growth and proliferation.

UVGI technology is a physic disinfection method with a great costs/benefits ratio, it's ecological, and, unlike chemicals, it works against every microorganisms without creating any resistance.



Micro-organism DNA
(before UV-C exposure)



Micro-organism DNA
(broken by UV-C exposure)

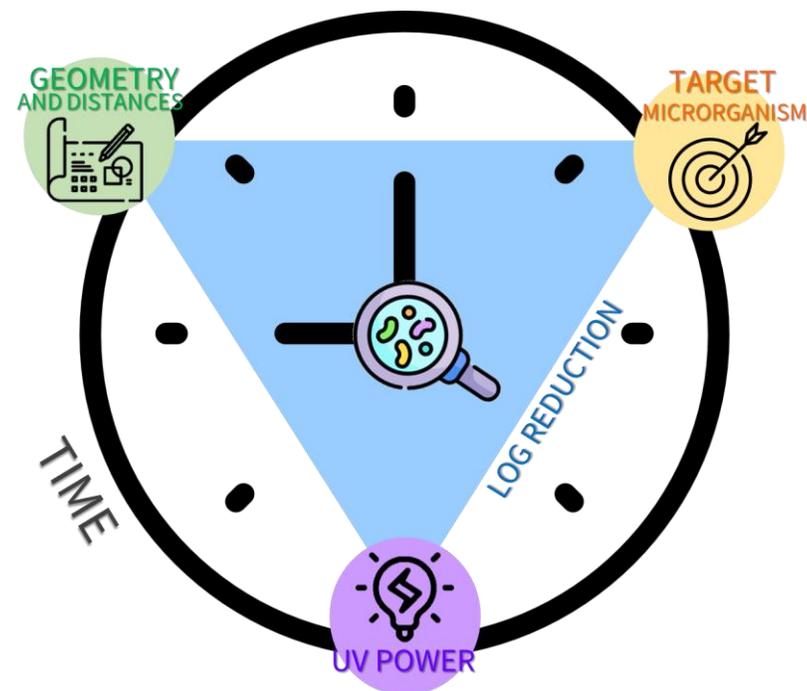
UV Disinfection Key Factors

Each microorganism has a specific UV-resistance threshold, called DOSE. The specific dose need to be delivered to get a proper disinfection level, which is expressed in LOG REDUCTION (1 Log=90%, 2 Logs=99%, 3 Logs=99,9%, etc).

Therefore, for some microorganisms a low level of UV POWER is sufficient to be eliminated, while for others it takes more power to get same elimination level...or alternatively a longer exposure TIME.

These factors are essential to understand UV technology:

- Disinfection level that needs to be achieved (Log Reduction);
- Target pathogen (and its dose);
- UV power in play;
- Exposure time / geometry and distance balance;



UV DOSE needed to eliminate 99% (2 Logs) value in ($\mu\text{W}/\text{cm}^2 \text{ SEC}$)

BACTERIA		Virus (generic, DNA e RNA)	
Mycobacterium tuberculosis (TBC)	4300	Virus dell' influenza A	4558
Escherichia coli ATCC 11229	4800	Hepatitis A HM175	8000
Legionella pneumophila ATCC 33152	3200	Corona Virus (SARS-CoV1 – MERS-Cov)	1200-1500
Pseudomonas aeruginosa ATCC 9027	6500	Rotavirus	15000
Salmonella ATCC 6539	4500	Molds	
Staphylococcus aureus	3200	Aspergillus Amstelodami	66700
Streptococcus hemolyticus	4400	Aspergillus Brasiliensis (Niger)	226000
Vibrio cholerae	4100	Yeasts	
MRSA	6550	Comuni lieviti dolciari	12000
Clostridium Difficile	10000	Lievito di birra	20000

SANITATION means bringing the microbial load into acceptable and optimal hygiene standards that depend on the intended use of the environments concerned. Sanitation is often used to mean “clean” and must however be preceded by cleaning.

SANITATION

DISINFECT means to reduce the microbial load deeply, that is to eliminate at least 1 log (90%) of the bacteria present. Microbial load reduction is a basic value in disinfection and it is expressed in Log Reduction.

A good disinfection level is around 2Logs (99%) a very good disinfection is 3Logs (99,9%), and 4Logs (99,99%) is considered a pretty high standard.

DISINFECTION

STERILITY is the closest level anyone can get to achieve complete reduction of microbial load, we can talk about sterilization only if reduction is proved to be not less than 6Logs, meaning 99,9999%.

To declare sterility test has to be proved and certified by third parts by law.

STERILIZATION

 our Company



Light Progress

studies, develops, projects and manufactures

Ultraviolet Germicidal Irradiation devices

Toscana, our Region



 LIGHT PROGRESS



Anghiari, our hometown



2019 -

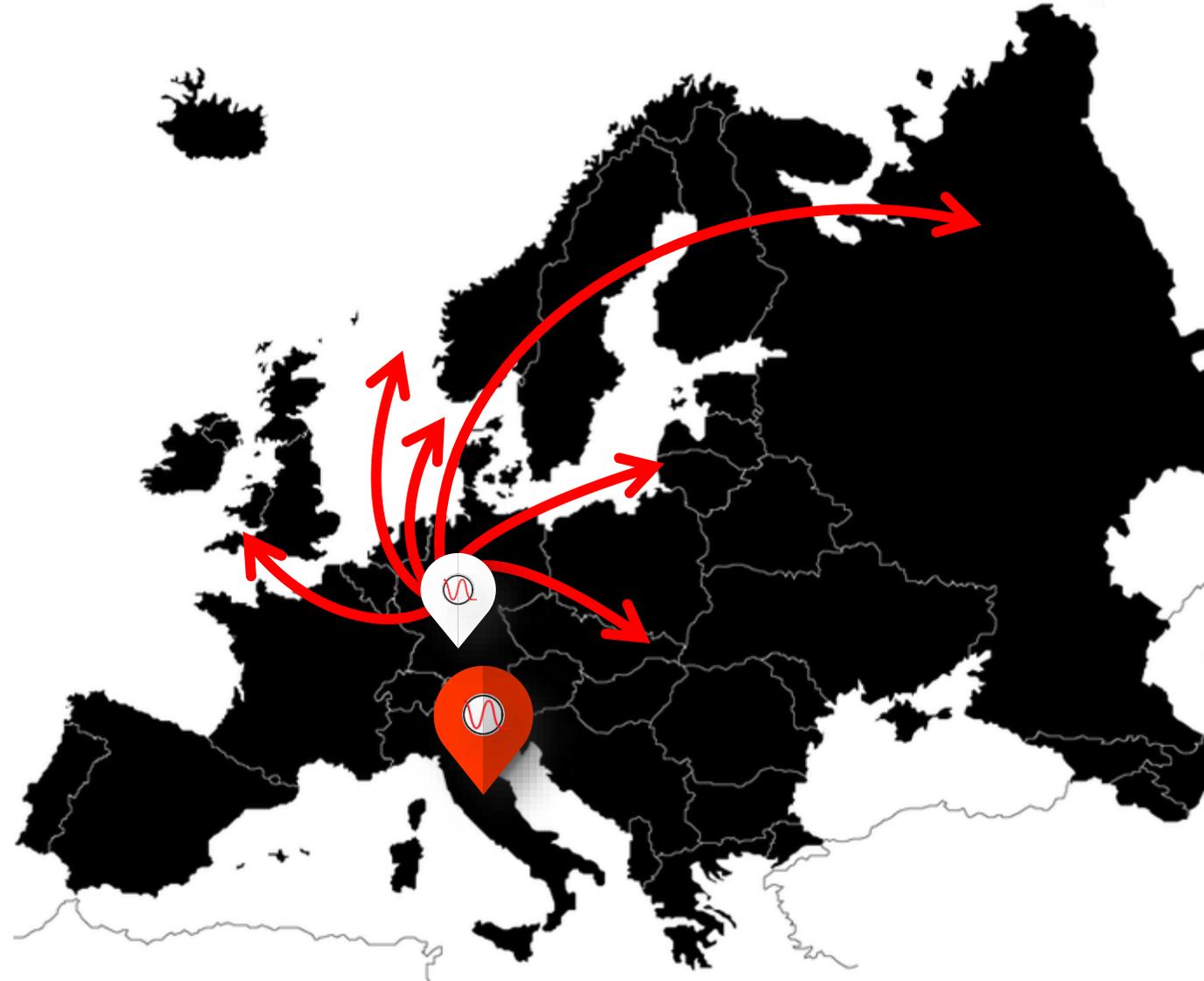


New German Branch Office, Frankfurt.

Light Progress has a brand-new office to follow clients from Germany, Austria, Switzerland, UK, and East and North EU in general. Russian market is also a one of our future target.

Main goal is to increase our presence in these countries and be able to offer better assistance to Key Accounts.

One new Business Development Manager has been employed to strength our Brand Identity and offer a better service for old and new clients.



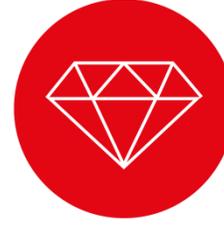
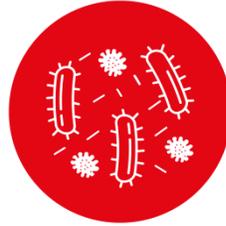


Standards



Benefits

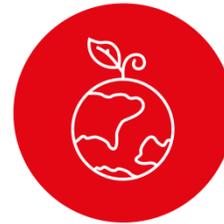
We eliminate every harmful microorganism, up to 99,999%



We improve your product Quality



We ensure you safety



We support sustainability



We make you save money



Our team is there to support you



why **LIGHT** PROGRESS ?

- } We offer the **widest product range** of UVGI Devices on the market, providing different solutions, great quality, 100% Made in Italy.
- } Our Team sizes and projects every application designing a **custom solution** for each specific case, we invest in R&D e work together with Universities and big companies, leaders in their field.
- } Our products **fit in different application fields**, such as Healthcare, Food Industries, Water Treatment, Odour reduction, HVAC, Public Trasports, etc. with thousand clients in Italy and abroad.



operates in different fields and turns
Ultraviolet Technology into real
Solutions, providing a Specific Device for
every application needed.



HVAC



Water



Health



Food



Smell reduction



LIGHT PROGRESS

CE

DECLARATION OF COMPLIANCE

We, LIGHT PROGRESS S.r.l., hereby declare under our own responsibility that the following units of own production:

⇒ are in accordance with EEC directive 2014/30/EU (Electromagnetic Compatibility)
 ⇒ are in accordance with EEC Machinery Directive dispositions 2006/42/EU
 ⇒ are in accordance with EEC Low Voltage Directive 2014/35/EU
 ⇒ are in accordance with EEC (RoHS) directive 2002/95/EU and 2011/65/EU

TECHNICAL STANDARDS APPLIED

UNI EN ISO 12100:2010 Safety of Machinery - Basic Concepts, General Principles for Design - Risk assessment and risk reduction
UNI EN ISO 13857:2008 Safety of Machinery - Safety Distances to prevent danger zones being reached by the upper and lower limbs (2008)
ISO 14120:2015 Safety of Machinery - Guards - General Requirements for the Design and construction of fixed and movable guards
UNI EN ISO 13849-1:2016 Safety of Machinery - Parts of the Control System related to the Safety - Part 1: General Design Principles
UNI EN ISO 14119:2013 Safety of Machinery - Interlocking devices associated with guards - Principles for design and selection
CEI EN 60204-1:EC Safety of Machinery - Electrical Equipment of Machines. Part 1: General Rules (2010)
EN 61439-1:2011 Low-voltage Switchgear and Control Gear Assemblies. Part 1: General rules

FURTHER TECHNICAL STANDARDS APPLIED:

IEC EN 60335-1 "Safety of household electrical appliances and similar"
 Electronic Ballasts for the control of the lamps in accordance with the standard EN 60928.
 Germicidal UV-C Lamps in accordance with EN 61199.
 Electrical Protective Measures in accordance with IEC 70-1, EN 60229.

Anghiari, 05 January 2017

LIGHT PROGRESS

Responsible for Standards: Dr. Aldo Santi

LIGHT PROGRESS S.r.l. Via G. Marconi, 81 - 53031 ANGIARI (AR) - ITALY - <http://www.lightprogress.com>

Jan-2017 Pag. 22/24

CERTIFICATE

Reg. Number	6950 - A	Valid From	2019-07-28
First issue date	2007-12-21	Last change date	2019-07-28
Valid Until	2022-07-29	IAF Sector	19

Quality Management System Certificate
ISO 9001:2015

We certify that the Quality Management System of the Organization:

LIGHT PROGRESS S.r.l.

Is in compliance with the standard UNI EN ISO 9001:2015 for the following products/services:

Design and production of UVC rays disinfection systems.

Chief Operating Officer
 Giampiero Belcredi

The maintaining of the certification is subject to annual surveillance and dependent on the observance of Kiwa Cermet Italia contractual requirements.
 This certificate is composed of 1 page.

LIGHT PROGRESS S.r.l.
 Registered Headquarters
 - Località San Lorenzo, 40 52031 Anghiari (AR) Italy

Certified Sites
 - Località San Lorenzo, 40 52031 Anghiari (AR) Italy

502 BP 007A

CERTIFICATE OF COMPLIANCE*

Certificate Number	20130702-E362672
Report Reference	E362672-20130628
Issue Date	2013-JULY-02

Issued to: LIGHT PROGRESS SRL
 VIA G. MARCONI 81
 52031 ANGIARI AR ITALY

This is to certify that representative samples of ACCESSORIES, AIR-DUCT MOUNTED Duct-Mounted UV Lamp Assembly, Models UV-RACK, followed by 3/, 4/ or 6/, followed by 40H, 60H or 90H.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Bi-National Standard for Heating and Cooling Equipment, ANSI/UL 1995-2011 and CAN-CSA C22.2 No. 236-11

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Classification Mark for the U.S. and Canada should be considered as being covered by UL's Classification and Follow-Up Service and meeting the appropriate U.S. and Canadian requirements.

The UL Classification Mark includes: the UL in a circle symbol: with the word "CLASSIFIED" (as shown), a control number (may be alphanumeric) assigned by UL, a statement to indicate the extent of UL's evaluation of the product, and the product category name (product identity) as indicated in the appropriate UL Directory. The UL Classification Mark for Canada includes: the UL Classification Mark for Canada: with the word "CLASSIFIED" (as shown), a control number (may be alphanumeric) assigned by UL, a statement to indicate the extent of UL's evaluation of the product, and the product category name (product identity) in English, French, or English/French as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product.

William R. Casey
 William R. Casey, Director, North American Certification Programs
 UL LLC

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1240

University Tests - Air Treatment



Dpt of Physiopathology, Experimental Medicine and Public Health University of Siena Via Aldo Moro 3, 53100 - SIENA - ITALY Tel +39 0577 234134 - Fax +39 0577 234090 e-mail: epidmol@unisi.it	MOLECULAR EPIDEMIOLOGY Research Division 
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Valutazione dell'effetto che purificatori d'aria a raggi UV-C prodotti da **LIGHT PROGRESS®** hanno sulla carica microbica e fungina presente nell'aria.

University of Siena
Department of Physiopathology,
Exp. Medicine and Public Health
Lab. Molecular Epidemiology
Prof. Emanuele Montomali

Emanuele Montomali
Nando Biondi

Grafico 1

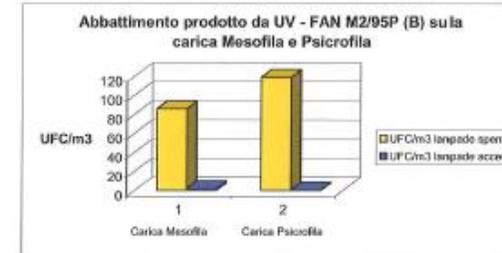
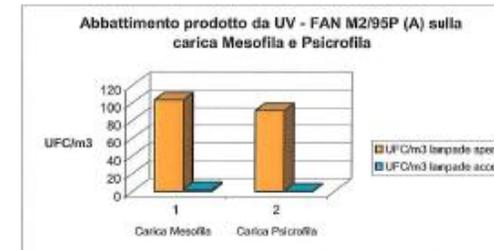


Grafico 2



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University Tests - Microbial Load Reduction



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MOLECULAR EPIDEMIOLOGY
Research Division
EpidMol

**Valutazione dell'effetto battericida, sporicida e fungicida
dei raggi UV-C emessi da apparecchi LIGHT PROGRESS®**

University of Siena
Department of Physopathology,
Exp Medicine and Public Health
Lab. Molecular Epidemiology
Prof. Emanuele Montomali

Emanuele Montomali
Antonio Pozzi

Aspergillus niger

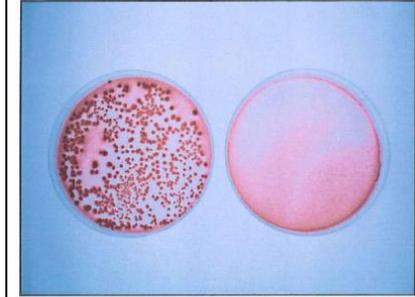


Aspergillus niger su Sabouraud dextrose Agar, a sinistra la piastra non irradiata, a destra la piastra irradiata con UVC

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EM

Escherichia coli

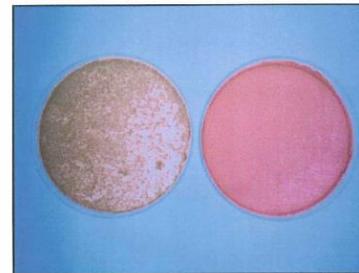


Escherichia coli su MacConkey Agar n.3, a sinistra la piastra non irradiata, a destra la piastra irradiata con UVC

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Staphylococcus aureus



Staphylococcus aureus su Mannitol salt agar, a sinistra la piastra non irradiata, a destra la piastra irradiata con UVC

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Gráfico 1

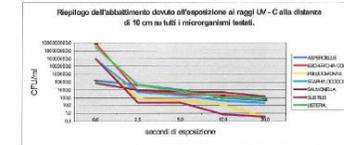
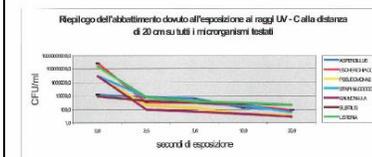


Gráfico 2



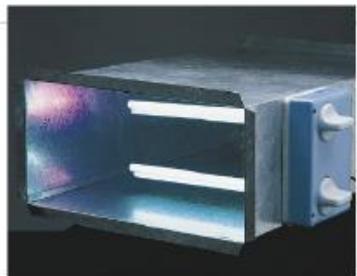
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EM

UVGI Design Basics

for Air and Surface Disinfection

Ultraviolet germicidal irradiation lamps can help clean coils and improve indoor air quality



promise that the elimination of airborne disease seemed possible. In 1936, Hart used UVGI to sterilize air in a surgical operating room.¹ In 1937, the first application of UVGI for a school ventilation system dramatically reduced

By W. W. WILLIAMS, P.E., Director, The P. Williams & Associates, Inc.

UVGI for Hospital Applications

Dr. Wladylaw Kowalski

Vice President, Immune Building Systems, Inc., New York, NY, dkowalski@ibsi.com
IUA Air Treatment Symposium, Los Angeles, 2007

INTRODUCTION

Health care facilities are subject to microbiological airborne hazards that can cause infections in both patients and health care workers. Hospital-acquired, or nosocomial, infections have been a persistent problem in hospitals and they can have complex multifaceted etiologies. It is possible that as much as a third or more of all nosocomial infections may be the result of airborne transmission at some point and, if so, air disinfection technologies may be able to reduce the nosocomial infection rate.

If the direct contact route predominates, as many experts believe, then surface disinfection technologies could also have a major impact. Combining air and surface disinfection may be an optimum approach to reduce infection rates and may very well be economical to implement. Existing health care guidelines for ventilation system design, pressurization, filtration, and disinfection procedures have historically had the problem at face, but emerging nosocomial hazards and increasingly complicated etiologies are creating a demand for new control technologies.

This evolving and growing problem has spawned interest in both existing and developmental technologies, especially among engineers and health care professionals. This presentation summarizes applicable codes and standards, examines the epidemiology of airborne nosocomial infections and their aerobiological pathways, and reviews air and surface disinfection technologies such as ultraviolet germicidal irradiation (UVGI), which may offer more effective solutions. A summary of results from implementation of UVGI systems in hospitals is provided which demonstrates average nosocomial infection rate reductions of over 65%.

Guidelines, Codes, and Standards

Various guidelines, codes, and standards exist that offer details for designing health care facility ventilation systems (ASHRAE 2001, ASHRAE 2001a & 2001b, CDC 1994 & 2003). Some guidelines specifically address problems like TB, nosocomial infections, and surgical site infections (CDC 2003, Wenzel 1991, Mangram et al. 1999, Tacke et al. 1994). While these guidelines provide adequate design information relating to airflow, air exchange rates, and filtration, they do not contain any specific guidelines for UVGI applications and are not reviewed here. In fact, the only current guidelines that provide any detailed

information relating to UVGI air and surface disinfection are the draft IUA guidelines (IUA 2005).

The IUA Guidelines include a description of the operating parameters of UVGI systems intended for effective air treatment, and these are equally applicable to health care facilities. The operating characteristics for successful UVGI system implementation do not differ (i.e. are not more stringent) for hospitals since performance criteria are already near a maximum for any UVGI system that meets the suggested guidelines. Included in the operating parameters are a recommended minimum of 0.25 seconds of UV exposure, an air velocity within the range of 500 fpm to 1,000 fpm, and a recommended rating of UVGI 10 or higher, which corresponds to a minimum UV dose of 5 J/m². Coupled with the requisite filters for hospital applications (per ASHRAE) such combined UVGI/ultrafiltration air cleaning systems will provide high removal rates for all nosocomial bacteria, fungi, and viruses.

Airborne levels in hospitals are not routinely monitored or regulated. For hospital air, WHO recommends relatively exposed levels of 100 cfu/m³ for bacteria and 50 cfu/m³ for fungi, but many facilities would fail to meet these (WHO 1988). Environmental fungal spores should be completely removed per filtration guidelines, and so the presence of any fungal spores in an OI should warrant investigation. According to the criteria of Federal Standard 209E (FD 209E) on cleanrooms, conventionally ventilated operating rooms rank less than class 3.5 (Durrant et al. 2005). A level of 10 cfu/m³, based on the ISO Class 7 cleanroom limit (EU Grade B) used in the pharmaceutical industry and as a target for ultra clean ventilation (UCV) systems, would probably be a more appropriate criterion for hospital OIs and ICU.

Airborne Nosocomial Epidemiology

Airborne nosocomial infections are those that transmit directly or indirectly by the airborne route, and they may cause respiratory (primarily pneumonia) and surgical site infections (SSI). The cost of nosocomial infections in the U.S. is estimated to be about \$4.5 billion annually and various sources estimate that they cause between 2 and 4 million nosocomial infections with some 20-80 thousand fatalities annually (Kowalski 2006). It is not known what fraction of these infections are due specifically to airborne microbes, but since many of these microbes are potentially airborne it could be assumed that a large fraction, perhaps 25% or more, involve airborne transmission at some point in the nosocomial etiology.

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Ultraviolet Germicidal Irradiation

The U.S. General Services Administration requires that UVC be included in cooling coil air-handling units for all new facilities and alteration projects to maintain coil cleanliness

Ultraviolet Lamp Systems

Table 3 Advantages and Disadvantages of UVC Fixture Location Relative to Coil

Location	Advantages	Disadvantages
Downstream	More space to install fixtures. Allows fixtures to better irradiate surface where contamination is highest. Allows fixtures to irradiate generally most contaminated part of coil and drain pan.	Lamp and fixture must be sized for damp location. Lamp coating often may reduce UV output, or require vented coil connection or more lamps and fixtures for a given result.
Upstream	Lamp and fixture may be subjected to less moisture. May be the only location to apply fixtures. Fixed lamps and fixtures may be needed that are downstream side.	May not allow enough space to install fixtures. May initially take longer to clean coil and may not disinfect drain pan.

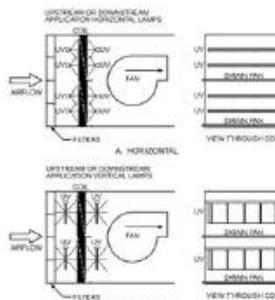


Fig. 7 UV Lamps Upstream or Downstream of Coil and Drain Pan

note to ensure that electrical interlocks are included to deenergize the UV system when it is accessed. UV systems should operate continuously to maximize UV's benefits and to increase lamp life, and to combat mold and bacteria growth that occurs when an HVAC system is not operating.

UVGI systems can be installed upstream or downstream of the cooling coil (Figure 3). Both locations have advantages and disadvantages, as shown in Table 3. Figure 2 shows an actual installation at a coil.

Upper-Air UVGI Systems

Upper-air irradiation systems are designed to irradiate only air in the upper part of the room. Their narrow, focused beams is placed parallel to the plane of the ceiling and prevents any ultraviolet rays from engaging an occupant below. Upper-air systems rely on air convection and mixing to move air from the lower to the upper portion of the room, where it can be irradiated and airborne microorganisms inactivated (Koffly and Busch 1972). Many fixtures



Fig. 8 Horizontal Lamp Placement for Coil Surface Disinfection

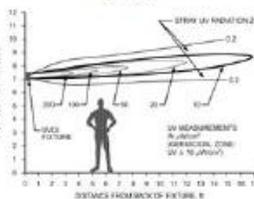


Fig. 9 Typical Elevation View

incorporate a safety switch that breaks the circuit when fixtures are opened for servicing, and should contain baffles or louvers appropriately positioned to direct UV irradiation to the upper air space. Baffles and louvers must never be bent or deformed.

Upper-room UVGI fixtures typically are low-pressure UVC lamps in tubular and compact shapes, and require a variety of electrical wattages. Beyond lamp size, shape, and ballast, fixtures are designed to be open or restricted in distribution, depending on the physical space to be treated.

Ceiling heights above 10 ft allow more for more open fixtures, which are more efficient. For occupied spaces with lower ceilings (less than 10 ft), various suspended upper-room UVGI fixtures (wall, pendant, and ceiling) are available to be mounted in combinations at least 7 ft from the floor to the bottom of the fixture. Figure 3 shows some typical elevations and corresponding UV levels, and Figure 10 illustrates distribution in a room.

Indoor Air Quality Guide

Best Practices for Design, Construction, and Commissioning



Developed by:

American Society of Heating, Refrigerating and Air-Conditioning Engineers
The American Institute of Architects
Building Owners and Managers Association International
Sheet Metal and Air Conditioning Contractors' National Association
U.S. Environmental Protection Agency
U.S. Green Building Council

These guidelines deal primarily with issues related to placement of UVC systems in air handling units in the proximity of the cooling coil.

How important is indoor air quality?

Evidence strongly suggests that poor environments in schools, primarily due to the effects of indoor pollutants, adversely influence the health, performance and attendance of students and teachers. This evidence links high concentrations of several air pollutants to reduced school attendance. There is also persuasive evidence that microbiological pollutants are associated with increases in asthma effects and respiratory infections, both of which are related to lower school performance and attendance.² UVC lights offer a potentially effective means of both reducing energy use and delivering fresh air to improve classroom air quality.

UVC lamps are designed to clean both the coil and drain pan surfaces in a few hours or a few days³ and to progressively penetrate between the coil rows and fins with time. Indoor air quality may be improved since the coils that are continuously cleaned by UVC are thus no longer an incubation site for microorganisms. Air flowing through the coils is therefore not contaminated, resulting in cleaner air being delivered to the classroom.

What are the maintenance issues with UVC?

An effective traditional coil cleaning program cleans the coils three to four times per year. Use of UVC lamps can eliminate the need for these costly, tedious cleaning treatments that create system downtime and use chemicals, biocides or pressure washing. Mechanical or chemical washing may also damage coils. Maintenance benefits may accrue from use of UVC lights to keep coils continuously clean, avoiding these laborious coil cleaning actions that will otherwise be required to return coils to a clean condition. UVC lamps should be inspected to see if they are dirty and then cleaned on a regular basis, as needed. Some installations have a view port to permit visual observation of the

... for Coil Cleaning

ly used in buildings; in fact, de a high level of ultraviolet past the lamps. Upper room spaces to create currents that rooms with low air turnover activates microorganisms that This irradiation of stationary intensity requirements than moving air stream.

to provide radiation at the microorganisms. The lamps present lamp but differing in another difference is that UVC transmits UVC, rather than

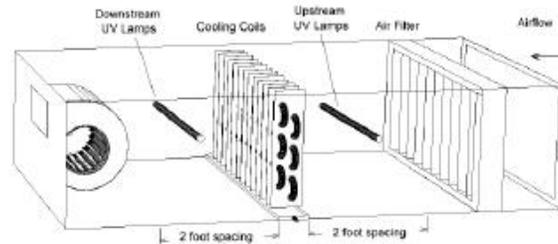


Figure 2.1: Location and spacing for UVGI system in an air handling unit.

2.2 Location of UV Lamp Ballasts

UV lamp ballasts should preferably be located external to the ventilation system although this is not currently a strict requirement due to so many systems that have integral lamp ballasts that must be located wherever the lamp is located. One of the problems with lamp ballasts being located inside air handling units is that they may be exposed to temperature and humidity extremes.

If lamp ballasts are located in an internal lamp housing, the housing should be of drip-proof construction or other approved housing method. If lamp ballasts are located external to the air handling unit or ductwork, the wiring must be run through conduit such that there is no exposed wiring inside the air handling unit. Exposed wiring may be subject to deterioration inside and air handling unit and may also be exposed to UV irradiation, which may cause photodegradation over time and thus pose a fire hazard.

2.3 Operating Conditions

Both the UV lamp and the ballast should be located such that the ambient operating conditions (i.e. temperature and relative humidity) are within the component design or operating limits. Refer to manufacturer's information for design operating conditions. In general, both UVGI and filters are designed to operate at an air velocity of 500 fpm, although some lamps may be suitable for operation at higher velocities. Variations in air velocity (i.e. +/- 100 fpm) may be acceptable depending on the manufacturer's lamp but such variations should be evaluated to include or assess the impact on UV output. See IJVA-G01A-2005, "General Guideline for UVGI Air and Surface Disinfection Systems," for

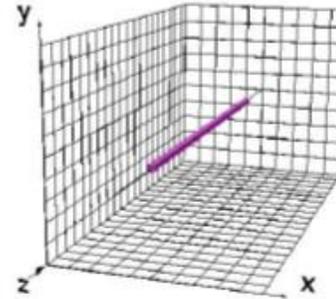


Figure 5.1: Grid for a 10x10x20 Matrix and Coordinate System, shown with a lamp in an axial configuration.

5.2 Operation of the Program

The program takes the input data from an input text file, performs the analysis and outputs results in a text file. Intermediate results can be extracted and graphed in spreadsheets.

Input data requires definition of the coordinate system. The lamp coordinates are based on the lower left front corner of the matrix being at (0, 0, 0). The indices for both the large and small matrices are also based on this (0, 0, 0) point.

Using the input the enclosure intensity field is determined by evaluating the direct intensity field of the lamp, the first reflection intensity field, and the total inter-reflected intensity field. These are summed to produce the total intensity field of the enclosure. This process is shown by the flow chart in Figure 5.2.

As mentioned previously, the inter-reflections are only computed for three iterations, after which the total bulk average intensity is determined mathematically for the remaining inter-reflections. Each of the first three inter-reflection calculations involves computing the exchange of radiative energy from each of the blocks on the other three sides, for all four walls. The summed result produces the wall intensity contours for the next set of inter-reflection calculations. This is the most calculation-intensive portion of the program and takes up the most operating time. In comparison, the direct and first reflection calculations proceed relatively rapidly.

Because two different size matrices are used for the computations, it is necessary to scale up the smaller matrix to match the size of the larger matrix prior to adding them. This is

Effective UVGI System Design Through Improved Modeling

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ABSTRACT

This paper summarizes an improved methodology for predicting the rate of air stream disinfection for UVGI systems that will enable effective designs and lower energy costs. This approach uses radiative view factors to define the three-dimensional intensity field for lamps and reflective surfaces inside enclosures. Lamp photometric data for a variety of lamps are shown to agree more closely with the view factor model than with models using the Inverse Square Law. The intensity field due to reflection from internal surfaces is determined by assuming diffuse reflectivity. An analytical method is used to determine the inter-reflection component of intensity due to multiple internal reflections. The superposition of these components yields a three-dimensional intensity field matrix that can be used to calculate disinfection rates for any given microbial rate constant. Results from laboratory bioassays using 5. aureus in various duct configurations have corroborated model predictions within ±15% in most cases.

using newly available UVGI lamps, these systems were sized without the benefit of positioning criteria. Facts, either air sampling or epidemiological, were used to determine their efficacy. Some of these systems were highly successful, such as those used to control measles in schools, and one used by Riley to eliminate TB bacilli from hospital ward exhaust air (Riley and O'Grady 1961).

Other designs appeared to be ineffective, with the result that the initial glowing reviews of this technology became tempered. Guidelines were issued that sanctioned the use of UVGI only in combination with HEPA filters (Luciano 1977; ASHRAE 1994). No studies were ever undertaken to determine the root cause for any UVGI system failures. Apart from improvements in lamp designs, applications technology for air stream disinfection has remained almost stagnant for decades.

The first design guidelines for UVGI air stream disinfection systems were developed in the 1940s (Luckock and Holladay 1942; Luckock 1946). Versions appeared in catalogs that continue to be reproduced and used today (Philips 1995). These guidelines offer procedures, charts, and tables to size lamps and reflective surfaces so as to obtain a desired disinfection rate. These sizing methods, though admirably detailed for the period, suffer from a number of deficiencies:

1. They fail to define the intensity field, instead merely using the lamp rating or else relying on photometric data for lamp output.
2. Lamps are specified without regard to lamp location or type.
3. The correction factor for rectangular ducts ignores the intensity field variations due to surface reflectivity.

W.J. Kowalski is a doctoral candidate and William P. Bahnfleth is an associate professor in the Department of Architectural Engineering, Pennsylvania State University, University Park, Pa.

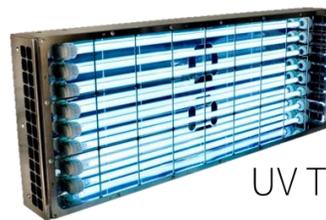
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 our Product Range

DIRECT IRRADIATION



TEAM OF LAMPS



AIR PURIFIERS



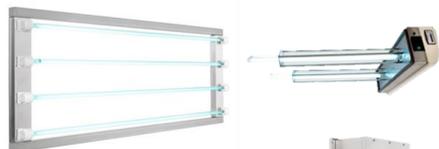
WATER TREATMENT

UV WATER



AIR CONDITIONING

UV DUCT



FAT AND SMELL

UV SMELL



BOX AND CABINETS

UV CABINET



UV BOX



UV STYLO



UV RACK



UV STYLO S



UV STICK-SCR



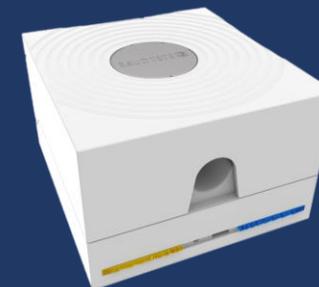
UV STLO X

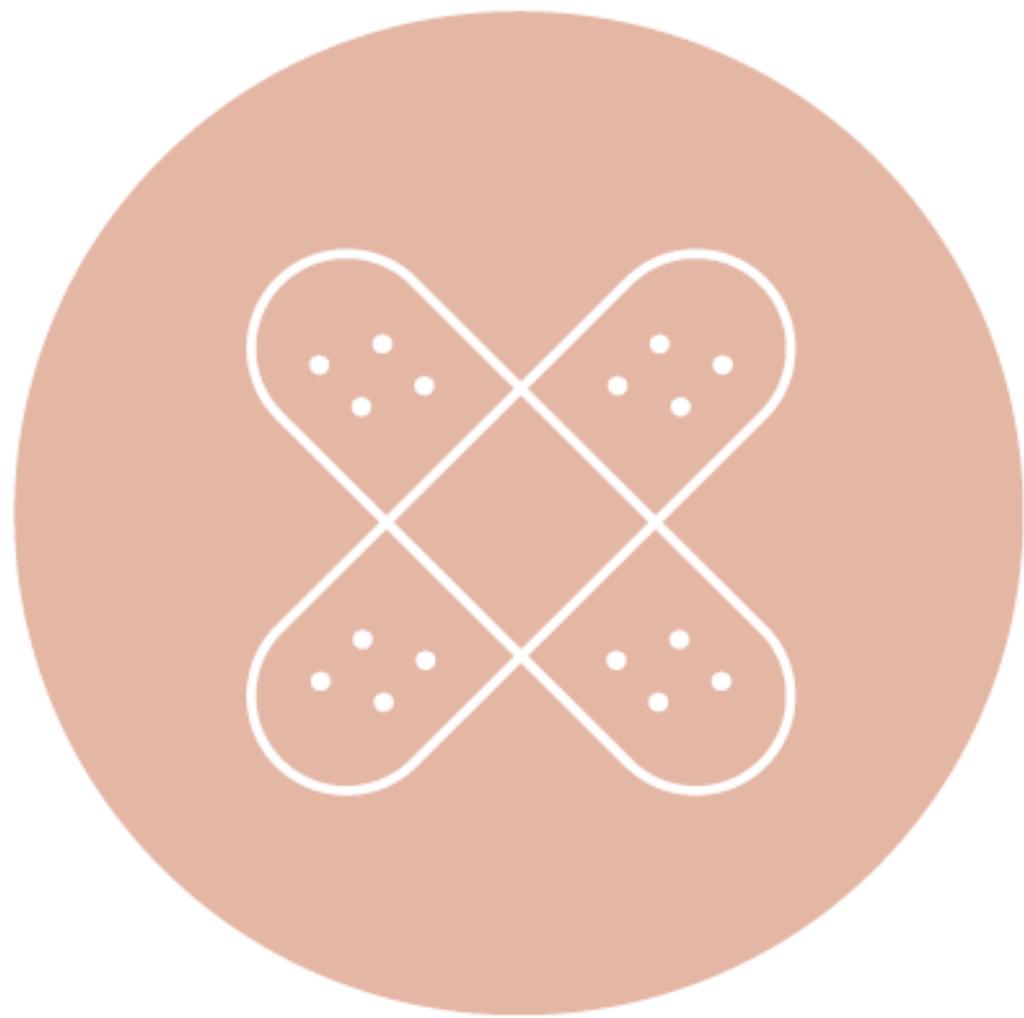


 STETCLEAN



 STETCUBE





What are most common issues in healthcare?

Healthcare environment is for sure the most sensitive about hygiene levels control. However it is also the **most fertile ground** on which to develop issues regarding the **spread of viruses, bacteria, molds, spores and mites**. There usually a great consciousness regarding the proper procedures that have to be followed to avoid the spreading of harmful microorganisms. But often they are not enough.



What are most common issues in healthcare ?



Disinfection is the base for good hygiene praxis in healthcare environments.

A good sanitization procedures enables the elimination of **pathogenic microorganism**.

Microorganisms arrive through the air, employees, and, obviously, patients.

They spread through the air, by sedimentation or by vectors (animated) or vehicle (inanimate).

Microorganisms settle in areas that offer a favorable environment for proliferation.

These areas become potential sources of **contamination for the whole environment**.

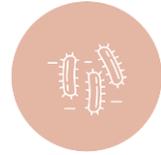
Chemical method is used massively, but not without a lot of bad consequences.

What is important in healthcare ?

-  To set **ideal hygienic** conditions in every environment.
-  To **avoid Risks**, increasing controls.
-  To have a **programmable** and possibly automated **cleaning process**.
-  To **cut the consumption of chemicals**, which create resistant pathogens.
-  **Maintain the hygiene** level achieved **easily**.



devices



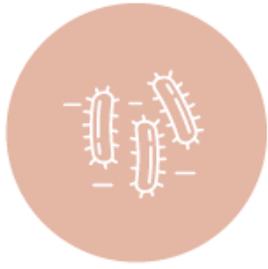
are EASY to APPLY



create NO RESISTANCE



make you SAVE TIME



IT ELIMINATES COMPLETELY ALL PATHOGENS

UVGI eliminates bacteria, viruses, spores, fungi, molds and mites, without creating microbial resistant forms as chemical disinfectants and antibiotics do usually.



GOOD COSTS/BENEFIT RATIO

HAIs have a cost in health, as well from an economic point of view. UVGI devices interact with cleaning operations improving their effectiveness. UVGI systems do not require special maintenance, they just need periodic lamp replacement.



IT IS A PHYSICAL PROCESS, SAFE AND ECO - FRIENDLY

It requires little time to achieve microbial reduction of over 99%. UVGI treatment prevents the onset of such conditions, which are the base of cross-contamination development.



IT IS A DEEP, CONTINUOUS, PROGRAMMABLE DISINFECTION

UVGI method maintains ideal hygienic conditions in healthcare environments, both in presence that in absence of patients and employees.



IT'S EASY TO APPLY, YOU CAN TRUST ON US!

Our expert team work with both big and small healthcare facilities, obtaining always great results. We will help you to choose the best product between our complete range of over 300 different models offering you the perfect solution that will satisfy your needs.

What are  **LIGHT** *PROGRESS* devices

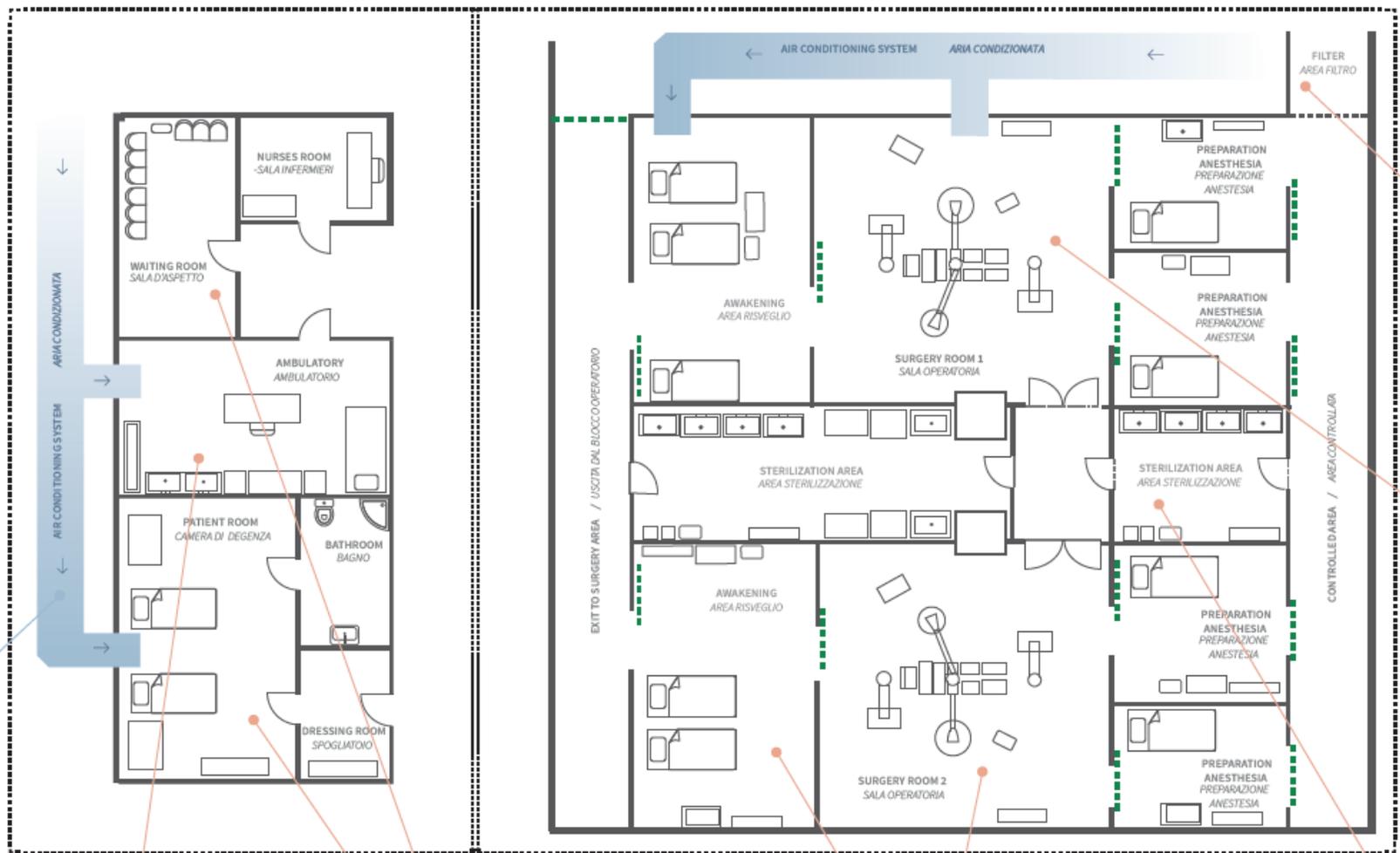
designed to improve

Hygiene and Safety

in Healthcare ?



Application Scheme



6. UV-BOX



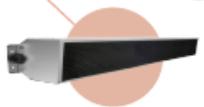
5. UV-FAN



3. UV-STICK (-ST)



4. UV-CABINET



2. UV-FLOW



1. UV-DIRECT

Environmental Disinfection

- Direct Irradiation (absence of people)
- Air Purifiers (presence of people)



It can be easily applied as a common ceiling light fixture.

Special mirror bright reflector to increase UVGI power.

Switched ON during work breaks, it treats both air and surfaces

Made in high quality SS.

Control board available to set up programmable disinfections.

External Grid to protect the lamp.



UV-STICK-NX



Made in high quality SS.

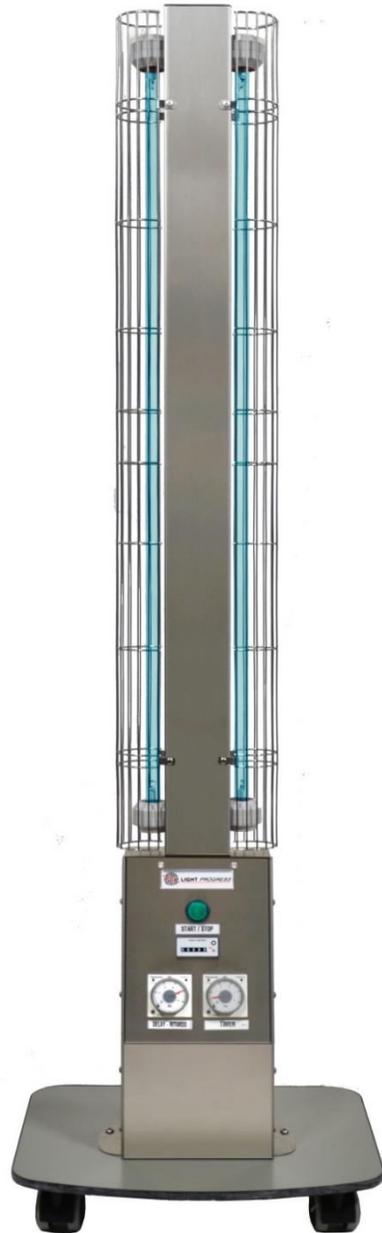
Special mirror bright reflector to increase UVGI power.

Control board available to set up programmable disinfections.

External Grid to protect the lamp.

It can be easily applied as a common ceiling light fixture, but smallest models could be also used inside processing and packaging machines (pharma industries).

Switched ON during work breaks, it treats both air and surfaces.



-ST model with double lamp and a four-wheels stand is available to treat surfaces all around in different environments.



Its compact sizes and the wide range of models allow endless applications' solutions.

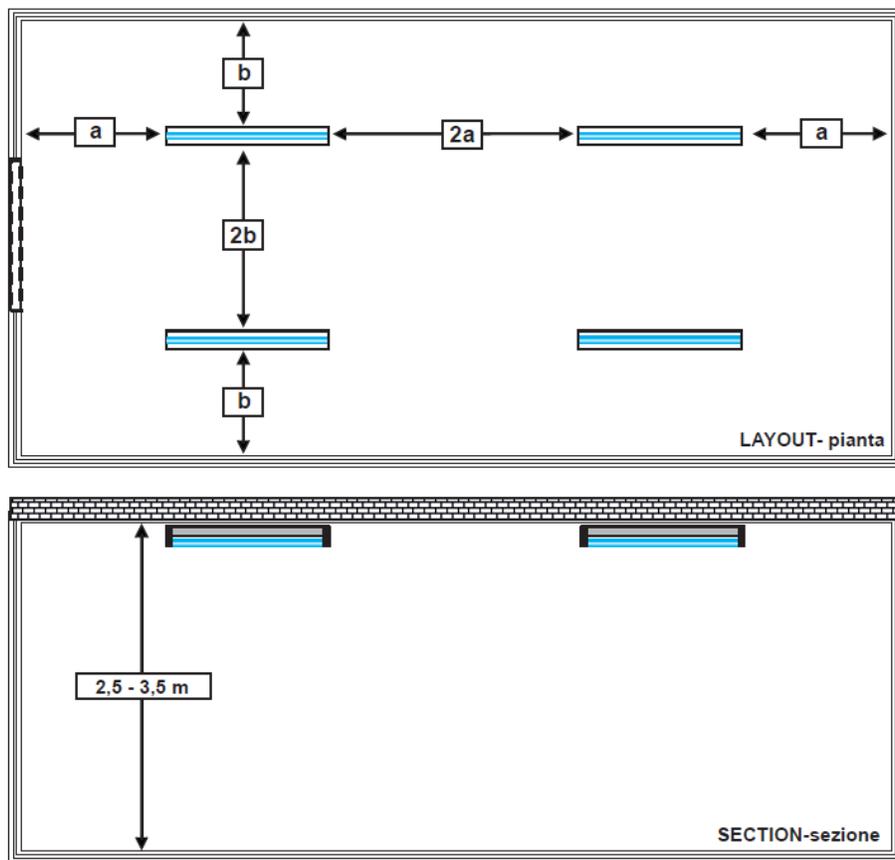
UV-DIRECT UV-STICK-NX



When staff leaves during work breaks, direct irradiation of surfaces allow a deep disinfection treatment.

The natural recirculation of air currents allows air disinfections as well.

The combination of surface + air disinfection creates the ideal hygiene level in healthcare environments.



We help you designing the **application layouts** to fit the specific area that has to be treated.

The solution provided will fit exactly clients' need, according to our know-how in UV-C employment methods and our 30 years experience specific in food industries applications, as well as several tests made with a University Research center;



UV-FAN



Air Purifier, it treats the air 24 hours a day, without any contraindications for the people present.

A silent built-in fan conveys the air to pass inside its germicidal chamber.

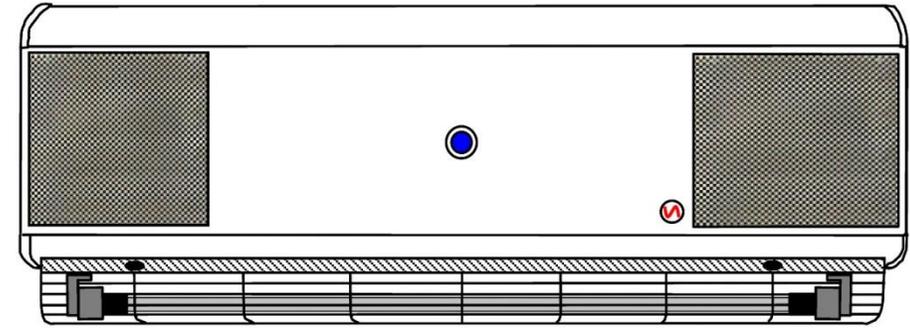
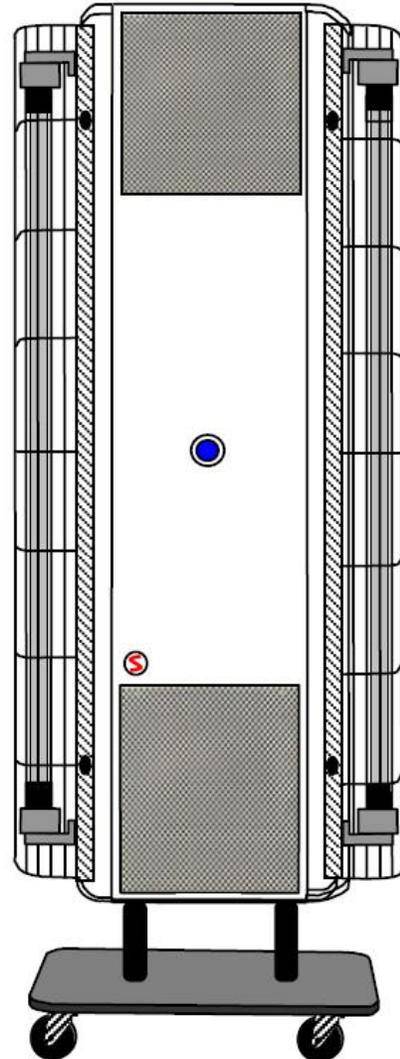
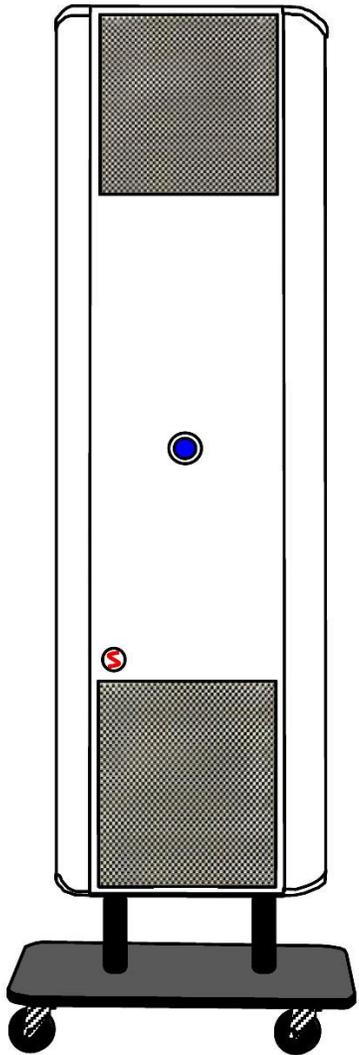
External body in extruded Aluminum, coated with epoxy-powders.



TiOX Filter included.

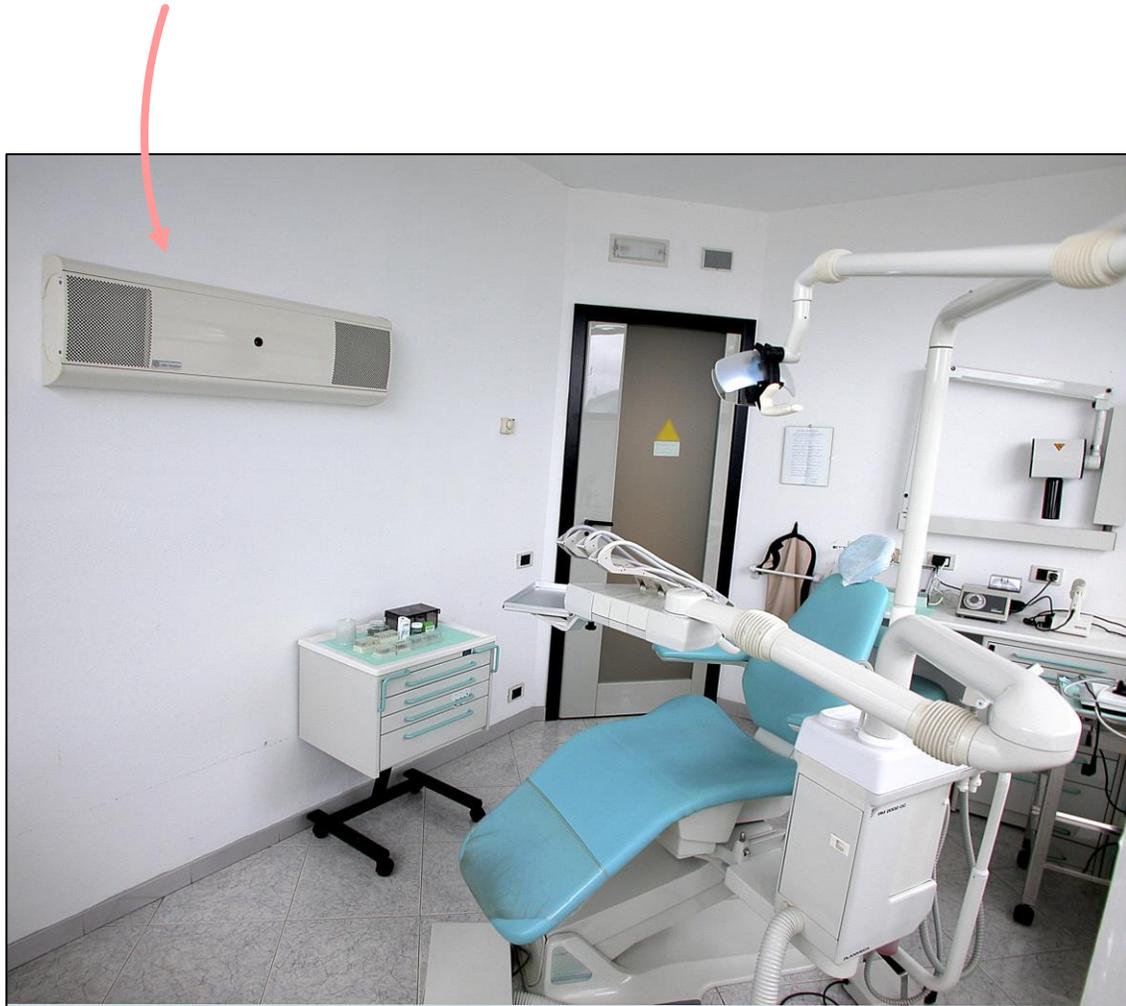
Titan Dioxide Nanoparticles with silver salts enhance the germicidal effect of UV-C light; Its photocatalyzation allows the elimination of VOCs and NOXs, too.

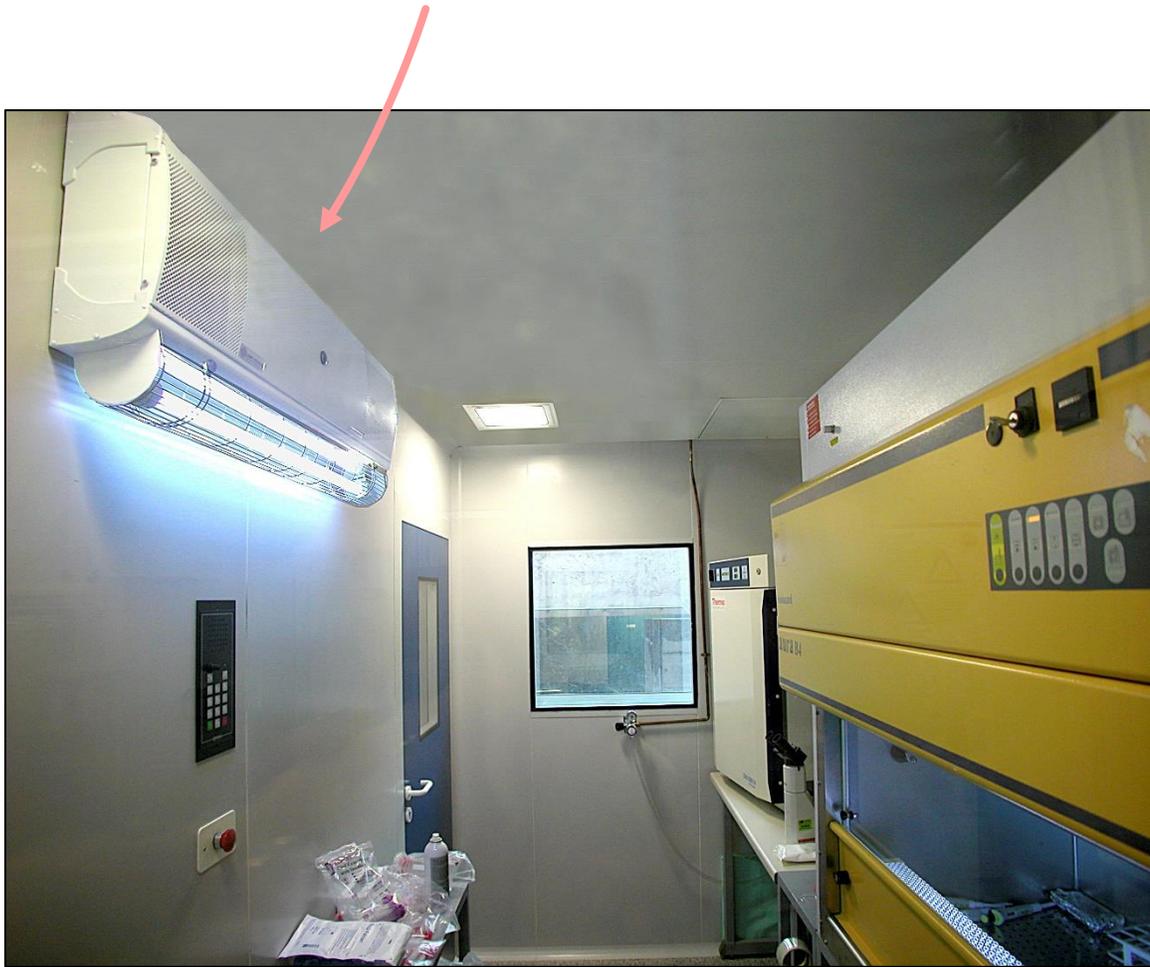




-BD model with integrated external lamp. Besides the normal purifying action, it provides the possibility of having a deeper disinfection treatment during non operational hours (i.e. night).

-ST model with four wheels stand available.





Special Areas Environments

- Controlled Areas (clean rooms, filter passages, etc)



UV-FLOW

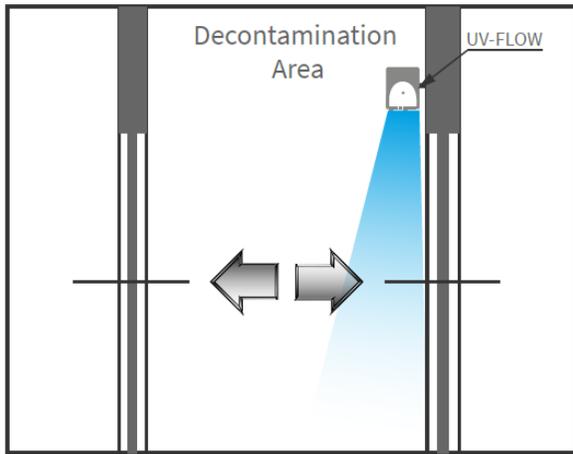


Monodirectional UV-C flow device;

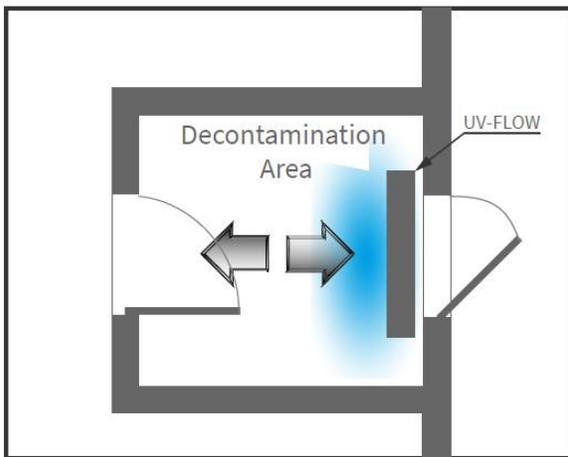
it creates a UV-C barrier if placed above an opening (door) and/or it treats the upper air layers when installed pointing

Made in high quality SS.

Directional honeycomb filter to create a «UV blade»

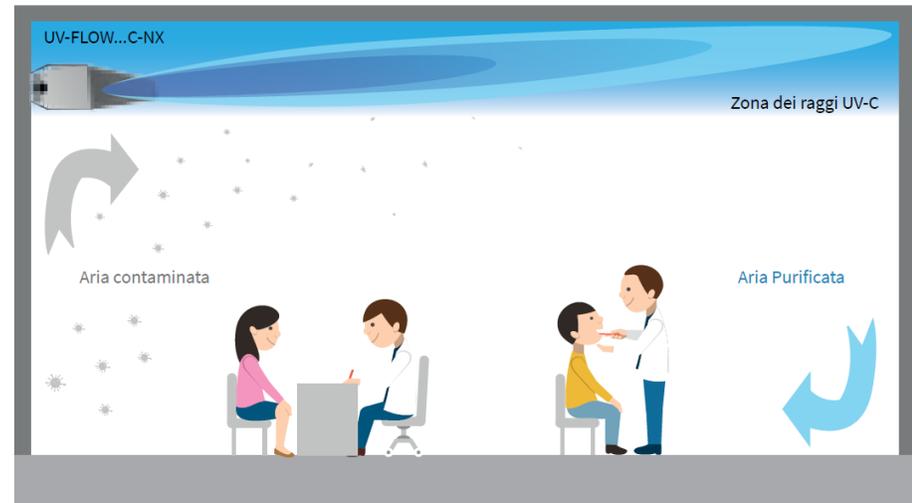


SECTION / SEZIONE



Filter Room are very important to separate areas with a different grade of microbiological control (i.e. Clean Rooms, separated sectors).

Treating upper air layers enables a general enhancement of air decontamination, thanks to air natural convective motions.



Tools Sterility Maintenance

- Germicidal Box
- Germicidal Cabinet

UV-CABINET



Cabinet to preserve sterility maintenance, for any type of equipments, tools, containers.

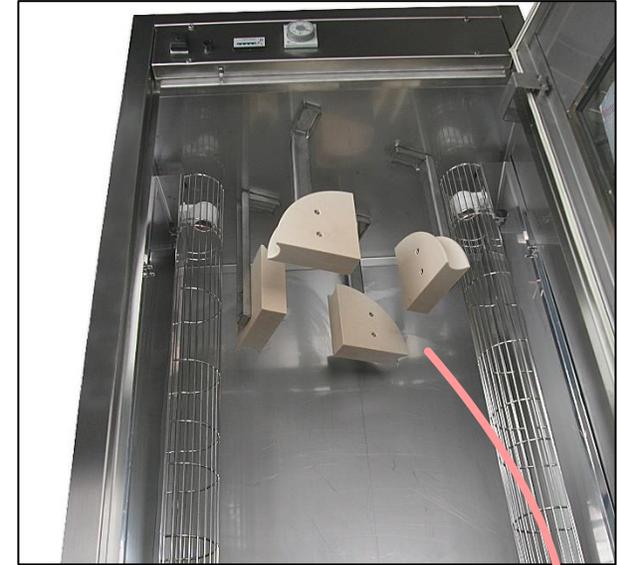
Automatic switching ON-OFF to set disinfection cycles with a settable timer.

Available with multiple doors, wall-mounted or floor standing.

High quality Stainless Steel AISI 304.



Wall mounted model is also available



-E model includes a special endoscopic probes holder (just for floor standing structure).

UV-BOX



Box to preserve sterility maintenance, for any type of equipments, tools, containers.

Automatic switching ON-OFF to set disinfection cycles with a settable timer.

Table model available (UV-BOX-E2/40H).

High quality Stainless Steel AISI 304.





The transparent door with the anti-UV LEXAN® window allow you to check the proper operation at any time.

Why LIGHT PROGRESS ?

We offer the **widest product range** of UVGI Devices on the market, providing different solutions, specifically designed for HEALTHCARE ENVIRONMENTS application.

Our Team sizes and projects every application designing a **custom solution** for each specific case.

Our products are born solving **real market issues coming from Healthcare field**, our first mission is to fit UV-C technology in already existing environments and habits, satisfying exactly the clients requests.

Why LIGHT PROGRESS ?

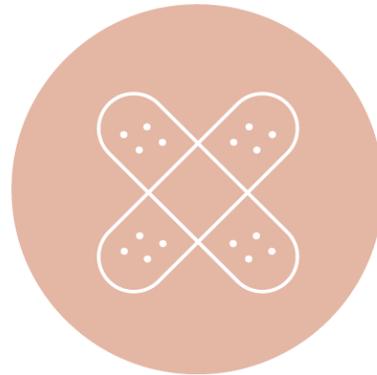
30 years of Health Quality improvements, **30 years of happy customers.**

Air, Surfaces, Water disinfection. Over 200 products within the same catalogue, 360° solutions.

Good **value for money**, great Quality level, devices are 100% Made in Italy and CE marked.



References





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...and many more all over the world

Thank you