



# Disinfection with the power of light

UV-C light has been a proven, effective way  
to disinfect air and surfaces for over 35 years

# Absolute confidence, in a world of uncertainty

We are living in unprecedented times. In the face of a global pandemic, the world is demanding a proven, fast and effective way to help protect people from harmful micro-organisms.

Bacteria and viruses can cause a wide range of common infections – everything from cholera to COVID-19. They can spread through the air and live on surfaces from hours to days without proper disinfection\*. That means any contamination left behind on the surfaces we touch and in the air we breathe can have a profound effect on our day-to-day health and well being.

ALKCO germicidal UV luminaires with UV-C lamp systems have the power to neutralize harmful micro-organisms that might be present. In schools, public restrooms, offices, retail outlets and factories, ALKCO germicidal UV luminaires can be used to disinfect the air in a room and help keep surfaces clean.



## The reason is simple

UV-C radiation is a proven disinfectant for air, surfaces and water. It has been used extensively to mitigate the risk of acquiring infections for more than 35 years<sup>1</sup>. Many hundreds of bacteria and viruses have been tested to date, including various coronaviruses, and all respond to UV-C disinfection<sup>2</sup>. In laboratory testing, Signify's UV-C light sources reduced SARS-CoV-2 virus infectivity on a surface to below detectable levels in as few as 9 seconds<sup>3</sup>. This is a clear indication that UV-C light can provide a sense of security in your disinfection strategy.

**“Our test results show that above a specific dose of UV-C radiation, viruses were completely inactivated: in a matter of seconds we could no longer detect any virus.”**

– Dr. Anthony Griffiths,  
Associate Professor of Microbiology  
Boston University School of Medicine.

1. EPA Report, "Building Retrofits for Increased Protection Against Airborne Chemical and Biological Releases" Pg. 56.
2. Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae Revised, updated and expanded by Adel Haji Malayeri, Madjid Mohseni, Bill Cairns and James R. Bolton. With earlier contributions by Gabriel Chevretils (2006) and Eric Caron (2006) With peer review by Benoit Barbeau, Harold Wright (1999) and Karl G. Linden.
3. Nadia Storm et al., Rapid and complete inactivation of SARS-CoV-2 by ultraviolet-C irradiation, 2020. Subject to peer review and available only as a pre-print at <https://www.researchsquare.com/article/rs-65742/v2>. The UV-C irradiance used in this study was 0.849 mW/cm<sup>2</sup>



# Shining a light on UV technology

UV technology deactivates  
bacteria, viruses and fungal spores.<sup>1</sup>

It's Versatile.  
It's Proven.  
It's Safe.  
It's Fast.







## Benefits at a glance...

- ✓ UVC effectively inactivates many viruses and germs on directly irradiated surfaces.<sup>1</sup>
- ✓ Proven, effective disinfection over the useful lifetime of lamp and luminaire.
- ✓ Standard and timer options to delay power on for extra protection.
- ✓ Sensor option with automatic power off in case of occupancy detection.
- ✓ Environmentally friendly with no chemical residue.
- ✓ Complies with all applicable regulations and standards.

1. Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae Revised, updated and expanded by Adel Haji Malayeri, Madjid Mohseni, Bill Cairns and James R. Bolton. With earlier contributions by Gabriel Chevretils (2006) and Eric Caron (2006) With peer review by Benoit Barbeau, Harold Wright (1999) and Karl G. Linden.



# ALKCO Germicidal UV

## The power to protect

Signify has decades of experience and expertise in developing and manufacturing UV-C products. We're confident that our ALKCO germicidal UV luminaires with UV-C lamps deliver on all the promises of UV technology.

### What is UV lighting?

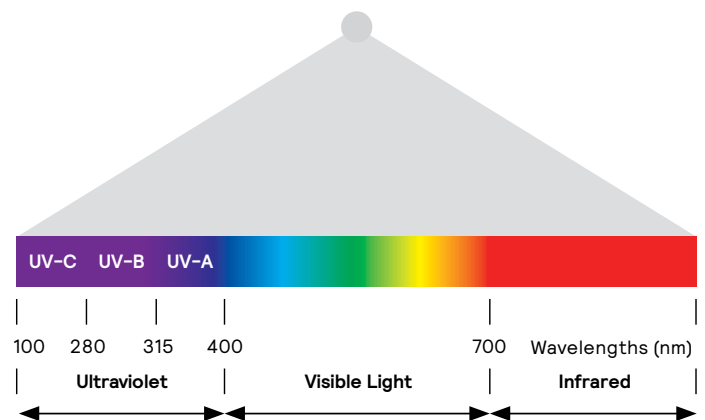
Ultraviolet (UV) is that part of electromagnetic light bounded by the lower wavelength extreme of the visible spectrum and the X-ray radiation band. The spectral range of UV light is, by definition between 100 and 400 nm

(1 nm=10<sup>-9</sup>m) and is invisible to human eyes. Using the CIE classification the UV spectrum is subdivided into three bands:

**UVA** (long-wave) from 315 to 400 nm

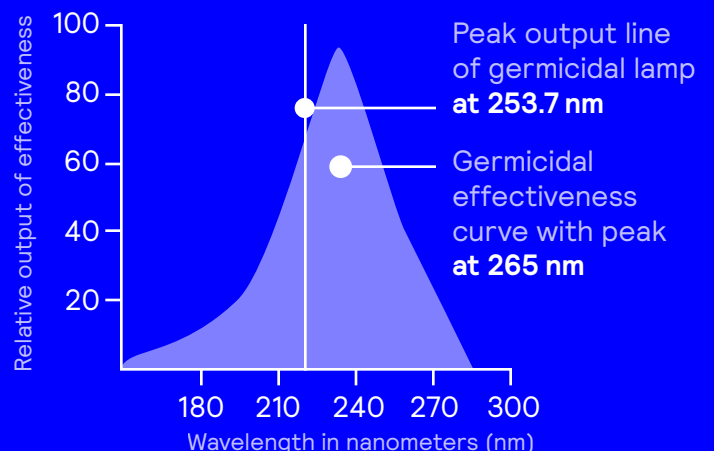
**UVB** (medium-wave) from 280 to 315 nm

**UVC** (short-wave) from 100 to 280 nm



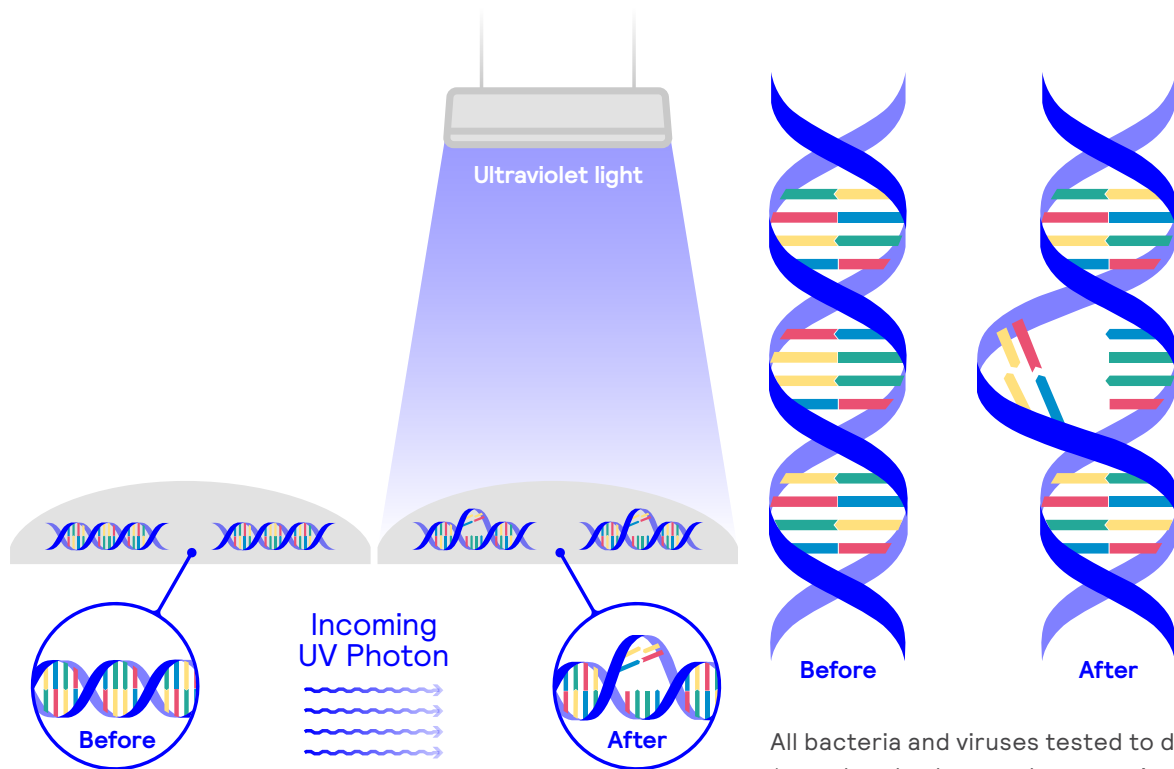
### Lamp output vs. effectiveness

Wavelengths in the photobiological ultraviolet spectral band known as UV-C have been shown to inactivate bacteria and spores and to inactivate viruses. The peak output of Philips germicidal lamps (253.7nm) is close (80-85 %) to the maximum effectiveness of UV-C (265 nm).



# How it works...

In the light spectrum, UV-C is found within the 100 to 280 nanometer (nm) range. At a wavelength of 253.7 nm, the UV-C light breaks down the DNA of bacteria, viruses and spores. This renders them harmless so they cannot replicate<sup>1</sup>.



All bacteria and viruses tested to date (many hundreds over the years, including various coronaviruses) respond to UV-C disinfection\*. A clear indication that UV-C light should play a valuable part in the protection strategy against harmful viruses, bacteria, molds and spores.

\* Darnell, M.E.R. et al. Inactivation of the coronavirus that induces severe acute respiratory syndrome, SARS-CoV. *J Virol Methods* 121, 85–91, <https://doi.org/10.1016/j.jviromet.2004.06.00> (2004).

McDevitt, J.J. et al. Aerosol susceptibility of influenza virus to UV-C light. *Appl Environ Microbiol* 78, 1666–1669, <https://doi.org/10.1128/AEM.06960-11> (2012).

Buonanno, M., et al. Far-UVC light (222 nm) efficiently and safely inactivates airborne human coronaviruses. *Sci Rep* 10, 10285, <https://doi.org/10.1038/s41598-020-67211-2> (2020).

Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae Revised, updated and expanded by Adel Haji Malayeri, Madjid Mohseni, Bill Cairns and James R. Bolton. With earlier contributions by Gabriel Chevrefils (2006) and Eric Caron (2006) With peer review by Benoit Barbeau, Harold Wright (1999) and Karl G. Linden



## ALKCO Germicidal UV

# How to determine UV-C dose calculations

Signify's (previously Philips Lighting) team of experts have been closely associated with progress in UV technology by developing, manufacturing and marketing lamps to combat against harmful viruses, bacteria, molds and spores. As a result a dosage formula has been developed against a wide range of pathogens for direct surface disinfection applications based on guidelines from UL, OSHA, ASHRAE and other proven research studies.

$$\text{Irradiance} \left[ \frac{\text{W}}{\text{m}^2} \right] \times \text{Time} \left[ \text{S} \right] = \text{UV dose} \left[ \frac{\text{J}}{\text{m}^2} \right]$$

Confidently define the dose & time required to eliminate the targeted pathogens

The correct dose is based on intensity and time (W = Watt, m<sup>2</sup> = Meter Square, S = Seconds, J = Joule).

## UV-C solutions have been tested to neutralize the following pathogens:\*

- Adenovirus type 15
- Bacillus anthracis spores (Anthrax spores)
- Candida
- Clostridium tetani
- Salmonella typhimurium
- Calicivirus feline
- Giardia lamblia
- Porcine Epidemic Diarrhea
- Porcine Respiratory and Reproductive Syndrome
- Influenza
- Staphylococcus aureus
- Salmonella enteritidis
- Cryptosporidium parvum
- Legionella pneumophila
- Rabies virus
- Escherichia coli (O157:H7)
- Campylobacter jejuni
- Canine Parvovirus
- Bovine Coronavirus (BCV)
- COVID-19

\* Brickner, PW; Vincent R.L., First, M, Nardell E., Murray M., Kaufman W. The application of ultraviolet Germicidal radiation to Control Transmission of Airborne Disease, Public Health Reports / March-April 2003, VH118.

Biological Effects of ultraviolet Radiation. W. Harm, Cambridge University Press, 1980.

Jagger, J. Introduction to Research in ultraviolet Photobiology, Prentice Hall, 1967.

Nadia Storm et al., Rapid and complete inactivation of SARS-CoV-2 by ultraviolet-C irradiation, 2020.

Subject to peer review and available only as a pre-print at <https://www.researchsquare.com/article/rs-65742/v2>.

The UV-C irradiance used in this study was 0.849 mW/cm<sup>2</sup>.

# UV-C Services, End-to-end Services

The effectiveness and safe application of a UV-C solution starts with the right application design. Our application and design professionals will assist with layout support and dosage calculations.



## Plan & design

Our team will assess your facility to identify potential areas for UV-C, customizing a solution with the right light output, optimum installation position, mounting height, angle and system functionality.



## Build

For total peace of mind we can support and provide end-to-end project management so you can enjoy a smooth, and seamless experience.



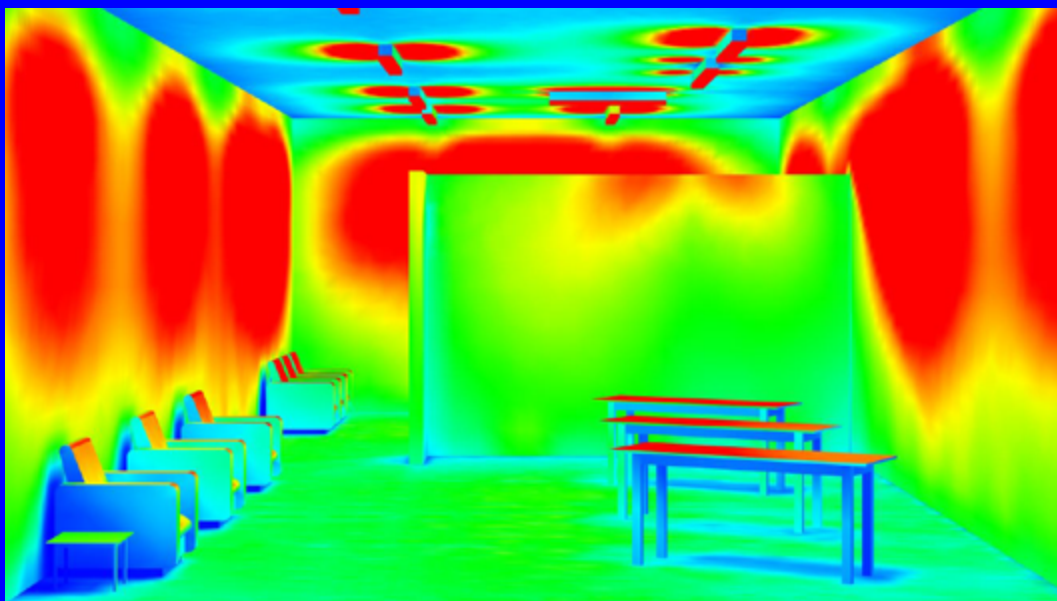
## Operate

We'll check to make sure your UV-C system is operating correctly on a regular basis, performing irradiation measurements, checking for faults and carrying out preventative checks.



## Upkeep

We can also guide you on your maintenance and repairs to optimize your installation, verifying performance and providing fast replacements at the end of your UV-C light's useful life.



Simulated layout example with Germicidal UV 4' Strip product line

# UV-C lighting for commercial applications

Bacteria and viruses are transmitted through the air and via surfaces. We recommend to consider two main types of Ultraviolet Germicidal Irradiation (UVGI) using UV-C lighting for:



## Air applications

Viruses, bacteria, or fungi can be airborne, spreading through breathing, talking, coughing, sneezing, raising of dust or any activities which generate aerosol particles or bacteria and viruses. ALKCO germicidal UV solutions can be used to help disinfect the air in a room.



## Surface applications

When someone coughs or exhales, they release droplets of fluid. Most of these droplets fall on nearby surfaces and objects – such as desks, tables or telephones. If they are carrying a virus, someone could become infected by touching contaminated surfaces or objects, then touching their eyes, nose or mouth.





# Professional UV-C luminaires & chambers

Disinfection designed for efficacy, effectiveness and safety

ALKCO germicidal UV products offer an innovative, high-quality solution that is suitable for a wide range of applications. Designed for the disinfection and purification of radiated surfaces and air, they can provide UV-C irradiance with homogeneous distribution. Other elements like the use of aluminum housings combined with a host of reflector options provides the utmost efficacy while directing the UV-C light to exactly where it is needed.



## Air

Disinfection  
solutions

ALKCO UV-C disinfection upper air luminaires



## Surface

Disinfection  
solutions

ALKCO UV-C disinfection direct luminaires



## Controls

Management  
solutions

ALKCO UV-C control



# Germicidal UV

## Indirect Industrial



Designed for the disinfection of upper air spaces in offices, schools, retail/grocery and industrial facilities. Provides the look and germicidal power for a variety of applications.



1 or 2 lamp T5  
Philips TUV  
UIN120-UNV-1/1-EB



### Key Features

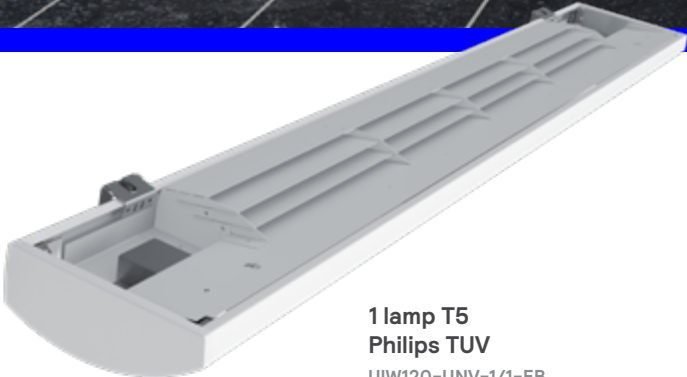
- Available 2' & 4' lengths
- 1 or 2 lamp versions with 20W T5 Philips TUV
- Can be installed suspended at a minimum mounting height of 15' for a minimum 20' ceiling
- **Applications:** Offices, Education, Retail, Industrial



# Germicidal UV Indirect Wall



Disinfect upper air spaces in places like offices and schools. Provides the look and germicidal power necessary for the most challenging commercial applications.



**1 lamp T5  
Philips TUV**  
UIW120-UNV-1/1-EB



### Key Features

- Available 4' length
- 1 lamp with 20W T5 Philips TUV
- 18 gauge steel housing with specular aluminum reflector
- High quality powder coat finish in matte white
- On/Off switch on housing for safety measures
- **Applications:** Offices, Education, Retail



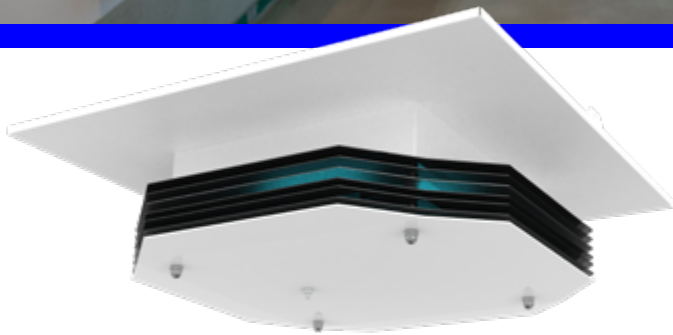


Germicidal UV

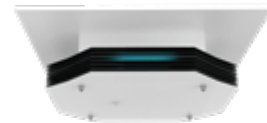
# 2x2 Grid Ceiling Mount



Used to disinfect upper air spaces with ceiling heights ranging from 9' to 12'. Provides germicidal disinfection for commercial office and education applications.



4 lamp PL-S  
Philips TUV  
U2C409-UNV-1/4-EB



## Key Features

- 2x2 Grid ceiling mount housing
- 4 lamp 9W PL-S Philips TUV
- White or black polyester powder coated steel housing
- **Applications:** Offices, Education, Retail



# Germicidal UV Louvered Wall Mount



Developed to provide upper air disinfection to a variety of spaces. Provides germicidal disinfection for classrooms, offices and other commercial spaces.



**1 lamp T5  
Philips TUV**  
UWL120-UNV-1/1-EB



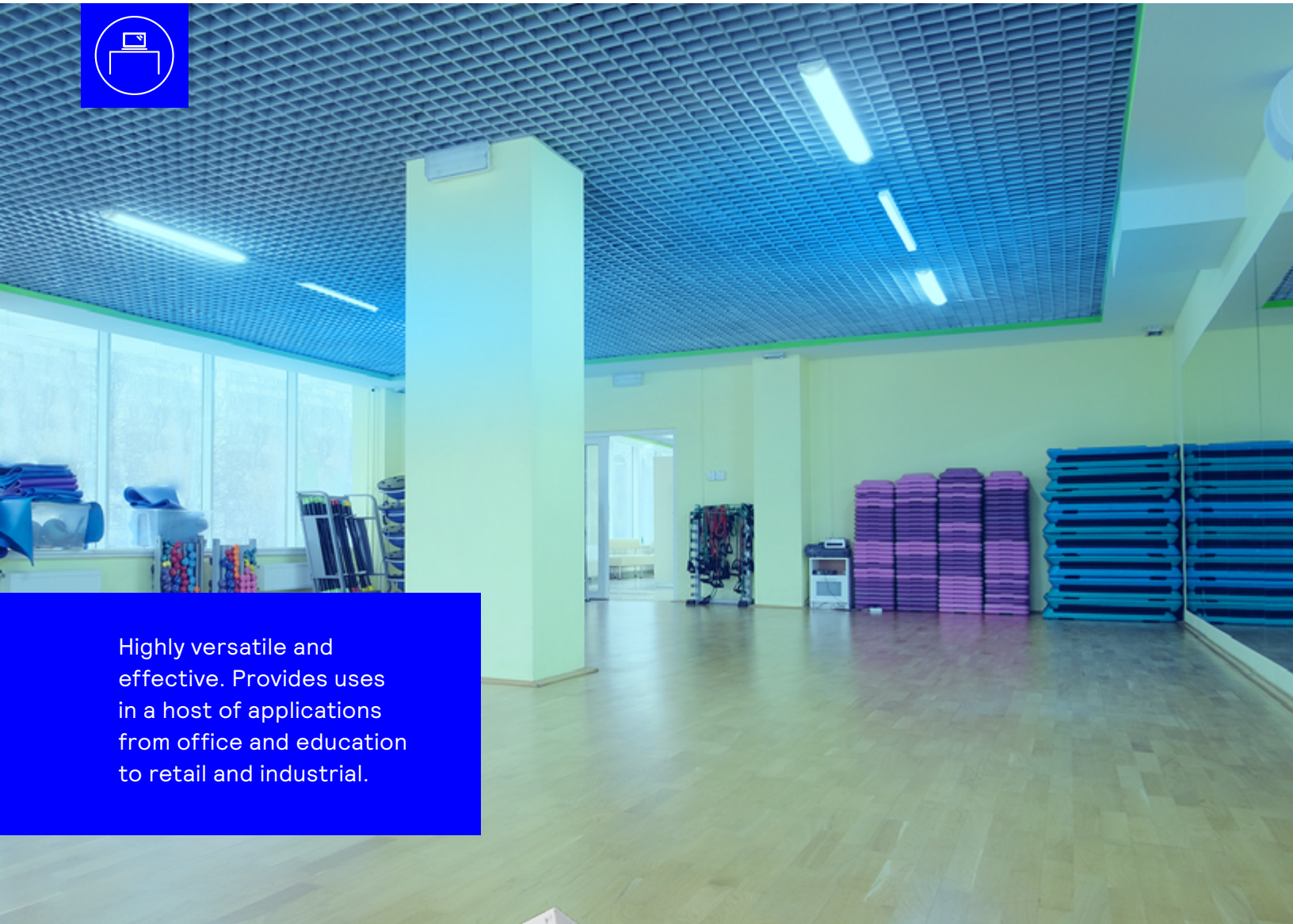
## Key Features

- 22" white polyester powder coated housing (black optional)
- 1 lamp 20W T5 Philips TUV
- Specular aluminum reflector
- Wall mounting plate provided
- **Applications:** Offices, Education, Retail

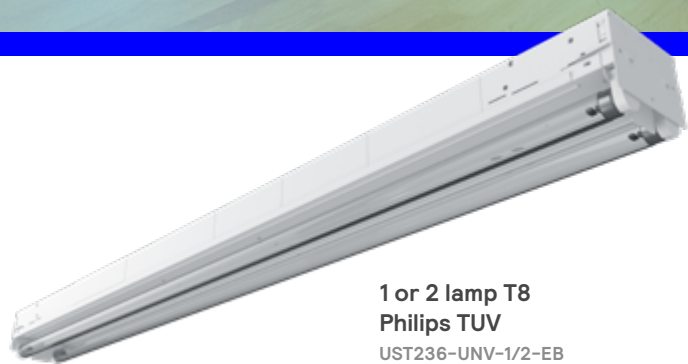




# Germicidal UV Strip



Highly versatile and effective. Provides uses in a host of applications from office and education to retail and industrial.



1 or 2 lamp T8  
Philips TUV  
UST236-UNV-1/2-EB



## Key Features

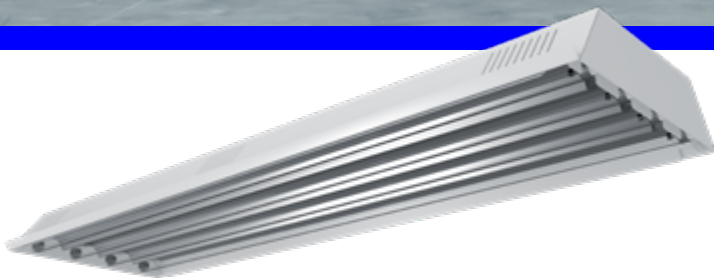
- Available 4' lengths
- 1 & 2 lamp versions available with 36W T8 Philips TUVs
- Can be surface or suspended mounted
- Available directional reflectors, wireguard, and mounting brackets
- **Applications:** Offices, Education, Retail, Industrial



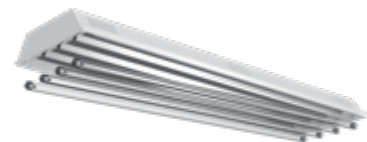
# Germicidal UV High Bay



Offers enough germicidal power to disinfect a host of low and high bay areas from educational facilities and gyms to large retail and industrial spaces including distribution centers.



4 or 6 lamp T8  
Philips TUV  
UHB436-UNV-2/2-EB



## Key Features

- Available 4 & 6 lamp versions for low bay and high bay applications ranging from 10' to 25' ceiling heights
- 36W T8 Philips TUVs produce a peak output of 253.7nm
- Wireguard and 5' mounting cables with V-hooks
- **Applications:** Education, Retail, Industrial





# UL Certification Compliance

## Ensuring safe application

Underwriters Laboratories (UL) has developed a set of standards solely for the purpose of establishing requirements for the safe and effective installation and operation of Upper-Air UV-C luminaires and solutions. To coincide with the launch of these important products, Signify is committed to producing a series of fixtures which meet all UL established requirements for UV-C luminaires and solutions.

- ✓ Measurement in accordance with IEC 62471
- ✓ Defining the risk group as per IEC TR 62471-2
- ✓ Guidance on minimum mounting height
- ✓ Requisite labeling and installation instructions
- ✓ Specify installer site planning responsibilities
- ✓ Peak emission value irradiance measurement to assist installers with site planning
- ✓ Guidance instructions on installation, operation, maintenance, and personal protective equipment for service personal in line with UL regulations

**CAUTION: IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT PERSONS WILL NOT BE EXPOSED TO EXCESSIVE UV OR OPTICAL RADIATION DURING EQUIPMENT OPERATION. THIS WILL REQUIRE THE INSTALLER TO CONDUCT AN ASSESSMENT OF IRRADIANCE OR ILLUMINANCE LEVELS IN THE SURROUNDING OCCUPIED SPACES PRIOR TO OCCUPANCY.**



## Luminaires & Solutions

# Applicable UL Standards

- ✓ Must comply with the electrical/mechanical requirements of UL1598 (fire, electrical & mechanical safety)
- ✓ Subject to IEC 62471 photobiological assessment in order to determine risk group at general use distance (IEC 62471 threshold limits apply)
- ✓ Must be RG 0 at “general use distance” based on minimum of 2.1m (7 ft) high occupied space
- ✓ 500 mm IEC 62471 measurement must be provided with installation instructions and label
- ✓ Markings per CRD (caution on UV personal injury risk, do not install in dwellings, re-lamping)
- ✓ Ozone < 250nm (UL867 method)

### Instructions, including

- Measurement in accordance with IEC 62471 to determine risk group in accordance with IEC TR 62471-2.
- Prescribed mounting height of 2.1m (7 ft) min.
- Peak emission value irradiance measurement be made at 500mm (18.3 in) to assist installers with site planning.
- Ozone test for equipment radiating at wavelengths less than 250nm.
- Requisite labeling/installation instructions.
- Installation instructions shall indicate that install and servicing should be performed by qualified persons. The instructions shall include installation, operation, maintenance, and personal protective equipment details for service personal.
- Specify installer site planning responsibilities.



# Philips Dynalite Control system



When using UV-C direct lighting, the safety of people is always the priority. That's why the Philips Dynalite UV-C automated control system is designed to help ensure safe and risk-free management and correct operation of UV-C for surface disinfection.



UV-C lamps



Warm light



Audible alarm



Motion sensor



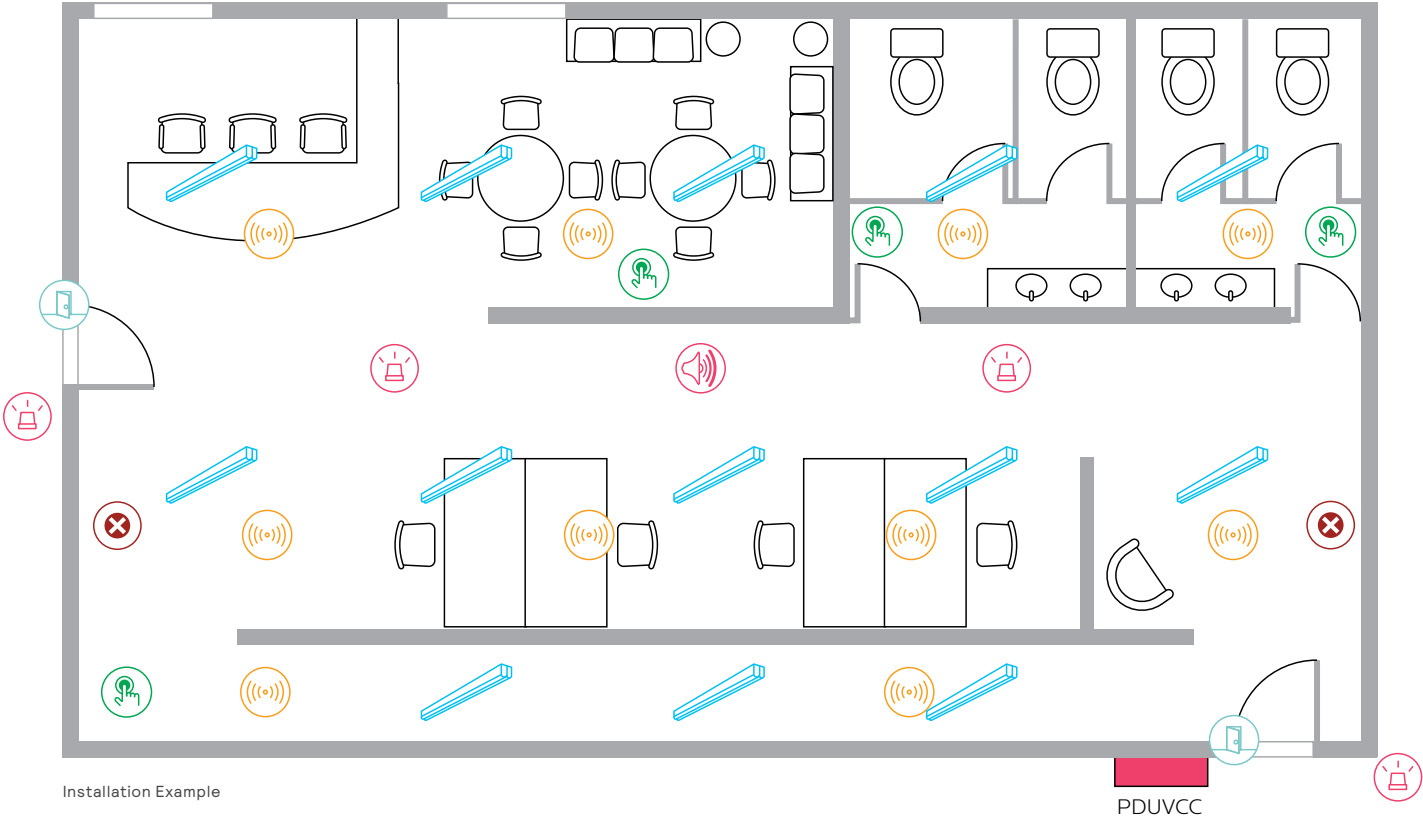
Door Switch



Checkpoint



Area emergency stop



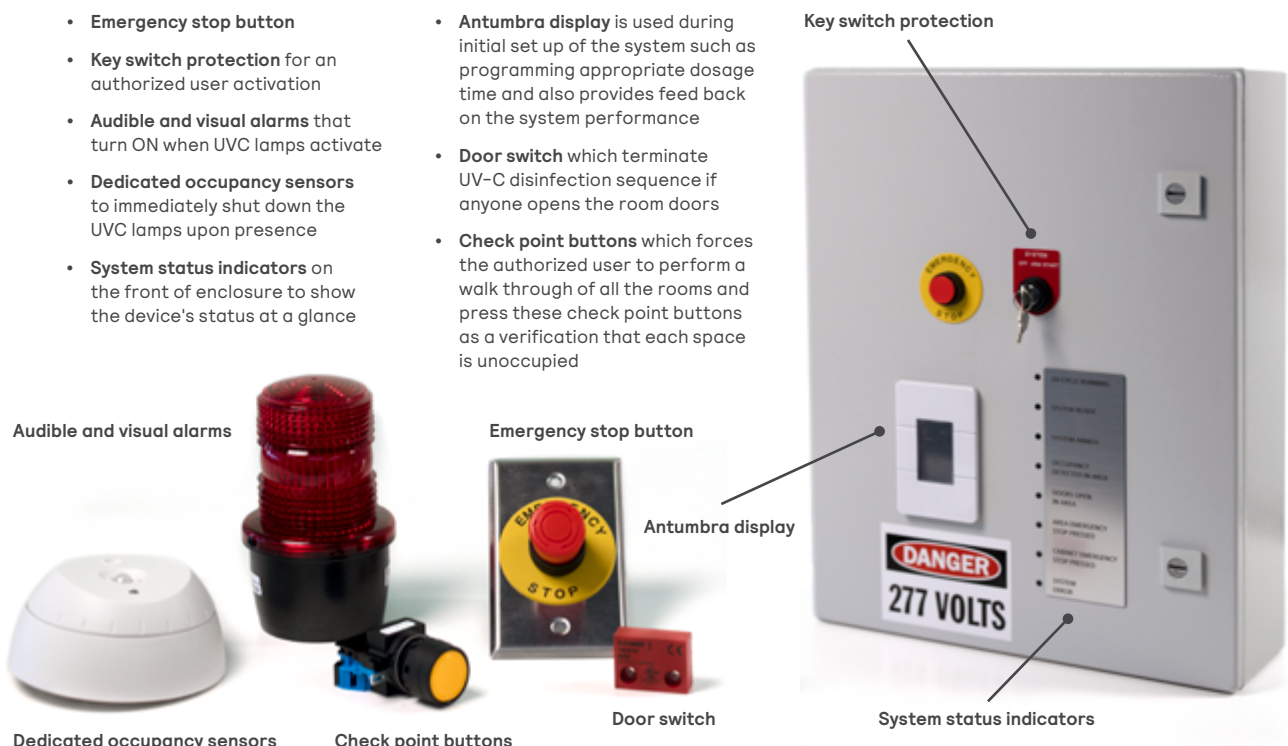
# UV-C Controls

## Safety first, no exceptions

- ✓ **Safety:** The control system is constantly monitoring the area to ensure that no occupant will be directly exposed to the UV-C lamps
- ✓ **Redundancy:** The system uses a combination of mechanically isolated switches to ensure that the automated system cannot self trigger a cycle and that if required an emergency stop button will cut power to the UV-C lamps
- ✓ **Ease of use:** The control cabinet gives a clear indication to an authorized user the status of the different input conditions so they can self manage the system without being dependent on network devices stop button will cut power to the UV-C lamps
- ✓ **Simple to deploy:** A single box solution that is pre-packaged so no-onsite commissioning is required other than recommended UV-C cycle initiation process
- ✓ **Monitor and Manage:** Access to system status and ability to track and store messages.
- ✓ **Correct Use:** The UV-C lamps must be run for enough of a pre prescribed time to ensure that full sterilization of an area can take place so that the customers know the area has been disinfected. An automated system can ensure that this has truly taken place and report back if there has been any issues in performing the full duty cycle

### Component features

- **Emergency stop button**
- **Key switch protection** for an authorized user activation
- **Audible and visual alarms** that turn ON when UVC lamps activate
- **Dedicated occupancy sensors** to immediately shut down the UVC lamps upon presence
- **System status indicators** on the front of enclosure to show the device's status at a glance
- **Antumbra display** is used during initial set up of the system such as programming appropriate dosage time and also provides feed back on the system performance
- **Door switch** which terminate UV-C disinfection sequence if anyone opens the room doors
- **Check point buttons** which forces the authorized user to perform a walk through of all the rooms and press these check point buttons as a verification that each space is unoccupied



DISCLAIMER: Installation example shown is for illustrative purposes only. Actual number and configuration of all system components including UV-C luminaries and safeguards shall follow the application specific system design and safety protocol requirements.



Professional air and  
surface disinfection

# Everywhere it's needed

ALKCO germicidal UV luminaires with UV-C lamps can be used to disinfect surfaces and objects in a wide range of applications. These include schools, public restrooms, offices, retail outlets, factories as well as the food and beverage industry.



# The power to protect in **Real-world applications**



## **Retail**

Keep shelves and counters free from contamination



## **Schools**

Disinfect classroom walls, floors, desks and surfaces



## **Offices**

Neutralize work rooms, meeting spaces and corridors



## **Banking**

Disinfect counters, cash machines and work surfaces



## **Hospitality**

Protect guest rooms, health facilities and reception areas



## **Restrooms**

Sterilize vanity units, basins and mirrors



## **Food outlets**

Eliminate bacteria on preparation surfaces and equipment

For more information on the benefits of **ALKCO germicidal UV** in your chosen application, please contact your local Signify representative and visit [signify.com/uv-c](https://www.signify.com/uv-c)



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