Lux-May

UV-C ULTRAVIOLET LAMPS

GERMICIDAL AND ANTIVIRUS ACTION

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CONCEPTS OF ULTRAVIOLET LIGHT AND MEASURES TO BE CONSIDERED

INTRODUCTION

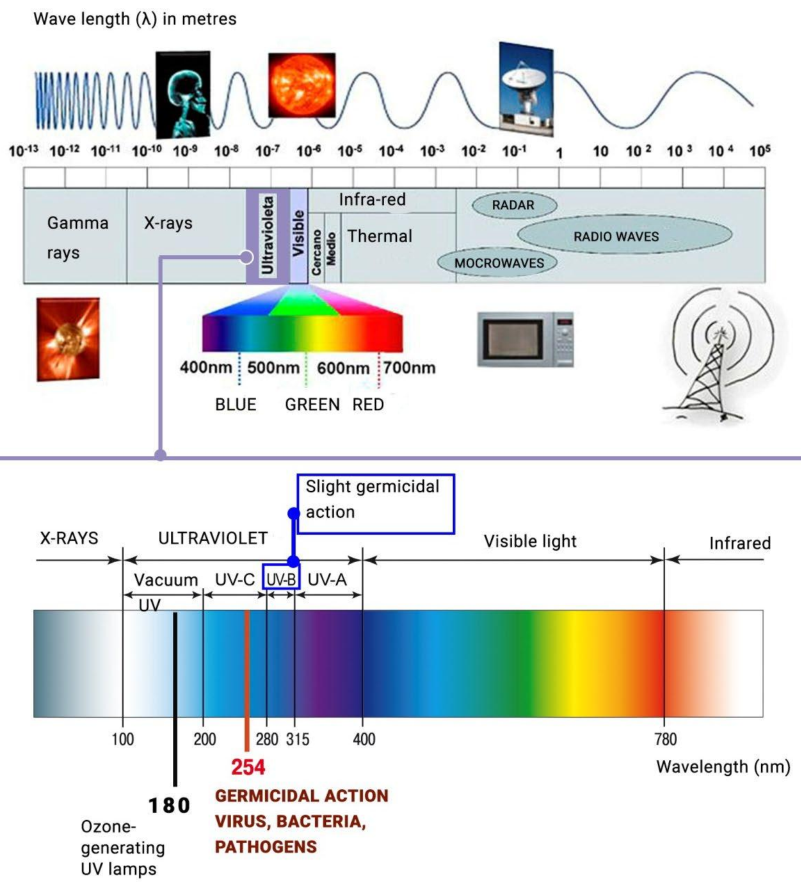
The COVID-19 coronavirus pandemic has accelerated the search for environmental controls to contain or mitigate the spread of SARS-CoV-2 severe acute respiratory syndrome responsible for the disease. SARS-CoV-2 is usually transmitted from one person to another by contact with large respiratory droplets, either directly or by touching virus-contaminated surfaces (also known as fomites) and then coming into contact with the eyes, nose, or mouth. It is important to note that there is increasing evidence of airborne transmission of the virus, as large respiratory droplets dry up and form droplet nuclei that can remain in the air for several hours. Depending on the nature of the surface and environmental factors, the fomites can remain infectious for several days (van Doremalen, 2020).

The use of germicidal UV radiation (GUV) is an important ambient intervention that can reduce both the spread by contact and the transmission of infectious agents (such as bacteria and viruses) through the air. GUV in the UV-C range (200-280 nm), mainly 254 nm, has been used successfully and safely for over 70 years. However, the GUV must be used competently and with due care in terms of dosage and safety. Inappropriate use of GUV can lead to problems for human health and safety and result in insufficient deactivation of infectious agents. Domestic use is not advisable and GUV should never be used to disinfect skin except on medical grounds.

PSB/LED + UV-C-36W-3600lm/827-865 + LAMP 36W UV-C. Source: Lux-May

WHAT IS GUV?

Ultraviolet radiation is the part of the optical radiation spectrum that has more energy (shorter wavelengths) than the visible radiation we experience as light. GUV is an ultraviolet radiation used for germicidal purposes. Based on the biological effect of ultraviolet radiation on biological materials, the ultraviolet spectrum is divided into regions: UV-A, which is defined by the ICI as radiation in the wavelength range between 315 and 400 nm; UV-B, which is radiation in the wavelength range between 280 and 315 nm; and UV-C, which covers the wavelength range between 100 and 280 nm. The UV-C part of the UV spectrum has the highest energy. While it is possible to damage some micro-organisms and viruses with most of the ultraviolet radiation spectrum, UV-C is the most effective zone. Therefore, UV-C radiation is the range most frequently used as GUV.



FACTS AND FIGURES

Up to 280 nm: Filtered by the atmosphere. These waves are generated on the earth artificially. It is necessary to protect skin and eyes. Low capacity of penetration in materials.

From 280 to 350nm: Not fully filtered by the sun, long exposures cause irreversible damage to the skin and eyes.

From 315 to 400nm: Wavelength responsible for the skin's tan.

350nm: Wavelength emitted by black light lamps, with no germicidal effect.

These lamps are designed with very little energy and are harmless to humans.

Developed for the leisure sector and industrial applications, leak detection, micro-cracks, etc.

RISKS ASSOCIATED WITH THE USE OF UV-C

Most people are not naturally exposed to UV-C radiation: UV-C radiation from the sun is mainly filtered by the atmosphere, even at high altitudes (Piazena and Häder, 2009). Human exposure to UV-C is typically caused by artificial sources. UV-C only penetrates the outermost layers of the skin, barely reaches the basal layer of the epidermis and does not penetrate deeper than the surface layer of the cornea of the eye. Exposure of the eye to UV-C rays can cause photokeratitis, an irritation that feels like sand has been rubbed into the eye. Symptoms of photokeratitis develop up to 24 hours after exposure and take another 24 hours to go away.

When skin is exposed to high concentrations of UV-C, erythema (a reddening of the skin similar to sunburn) can develop (ISO/IEC, 2019). There is evidence that repeated exposure of the skin to UV-C levels that cause erythema can affect the human body's immune system (Gläser et al., 2009).
Ultraviolet radiation is generally considered to be a carcinogen (ISO/ICI, 2016), but there is no evidence that UV-C radiation alone causes cancer in humans.

The ICI Technical Report 187:2010 (ICI, 2010) discusses this issue and concludes that UV-C radiation alone does not cause cancer: "Although UV radiation from low-pressure mercury lamps has been identified as potentially carcinogenic, the relative risk of skin cancer is significantly lower than the risk from other sources (such as the sun) to which a worker is typically exposed. Germicidal UV irradiation can be used safely and effectively to disinfect the upper air of a room with no significant risk of long-term delayed effects, such as skin cancer.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP, 2004) has published guidelines for occupational exposure to UV radiation, including UV-C radiation: Since the danger of UV radiation depends on the wavelength, the maximum exposure limit for radiation at a wavelength of 254 nm is 60 J/m2.

Typical UV-C sources often also emit radiation that includes several wavelengths outside the UV-C range. When working in a UV radiation area, workers should wear personal protective equipment such as industrial clothing (e.g. heavy fabrics) and an industrial face shield (e.g. masks) (ICNIRP, 2010). Full-face respirators (ICI, 2006) and hand protection with disposable gloves (ICI, 2007) also provide protection against UV radiation.

SUMMARY OF RECOMMENDATIONS ON UV-C RADIATION

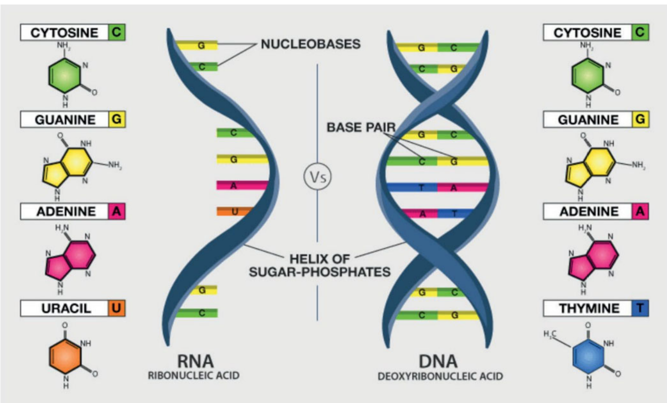
Products that emit UV-C are extremely useful for disinfecting air and surfaces and for sterilising water. The ICI and the WHO both advise against the use of UV disinfection lamps to disinfect hands or other skin areas (WHO, 2020) except on medical grounds. UV-C radiation can be very dangerous for humans and animals and can therefore be used only in properly designed products that comply with safety standards or in highly controlled circumstances where safety is the first priority, ensuring that the exposure limits set by the ICNIRP (2004) and the IEC/ICI (2006) are not exceeded.

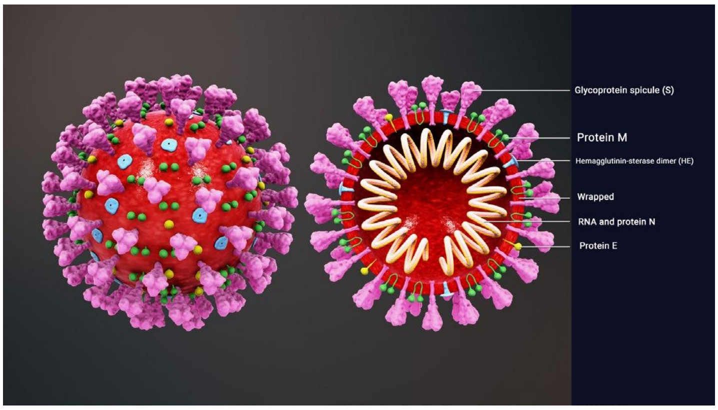
UV-C lamp, 36W PL-L. Source: Lux-May

POINTS TO NOTE ABOUT UV-C RADIATION AND COVID-19

The SARS-CoV-2 virus can be deactivated and rendered non-infectious by the application of UVC radiation. It also stops its ability to reproduce by damaging its DNA through the application of UV-C rays. The cell nuclei of micro-organisms (bacteria and viruses) contain thymine, a chemical element of DNA/RNA. This element absorbs UV-C light at a specific wavelength of 253.7 nm and modifies it to such an extent (formation of thymine dimers) that the cell is no longer able to multiply and survive.

- UV-C light (253.7 nm) penetrates the cell wall of the micro-organism. High energy photons from UV-C rays are absorbed by cellular proteins and DNA/RNA.
- UV-C light damages the structure of the protein causing a metabolic alteration. The DNA/RNA is chemically altered and organisms can no longer replicate.
- The organisms are unable to metabolise and replicate and are thus unable to cause disease or deterioration.





CORONAVIRUS (SARS-CoV-2) has a typical RNA structure.

V-UV light (185 nm) also kills micro-organisms, but causes ozone as a consequence, which is harmful to humans. It is used for more industrial applications. UV-C light is safer.

POINTS TO NOTE ABOUT UV-C RADIATION AND COVID-19

UV-A lamps, such as insect traps, are not appreciably harmful to people and are not effective in harming the SARS-CoV-2 virus. The intensity and duration of UV-C exposure are proportional when the objective is viral inactivation. If, for example, the intensity doubles, the exposure time can be halved.

Excessive irradiation in the room can cause some types of plants to wither and die. Hanging plants should be removed from these disinfection areas. In addition, as with other forms of UV, UV-C can cause paints and other materials to fade and degrade over time.

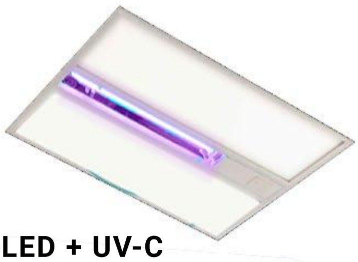
LED emitters that produce UV-C radiation available on the market emit a longer UV wavelength, which is less effective in eliminating the virus. Low-pressure mercury lamps emitting a radiation of 253.7 nm are the most common and most effective type of UV-C lamps available today. Low-pressure mercury lamps are affected greatly by low temperatures and by humidity.

For optimal disinfection with UV-C lamps, the surface of the lamp tube must be clean and free of oil and dust. The room must be kept clean and dry to reduce dust and water mist. The best room temperature is 20/40°C and the relative humidity must be <60%.

This disinfection method must be used in conjunction with other disinfection systems rather than as a substitute method. Its main application is for air and surface disinfection.

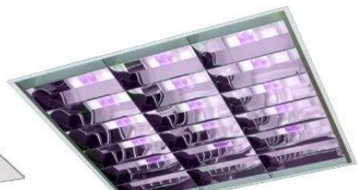
In healthcare settings, where the airborne viral load is higher than in other environments, it should take longer for UV-C lamps to be more effective in reducing viral transmission.

LUX-MAY UV-C LAMPS CATALOGUE



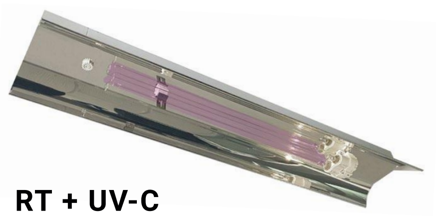
PSB/LED + UV-C

ECOAIRY+ UV-C



PCM/BR + UV-C

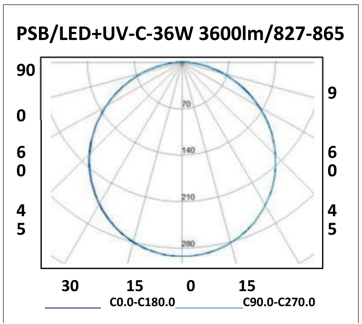
NT-5 + UV-C



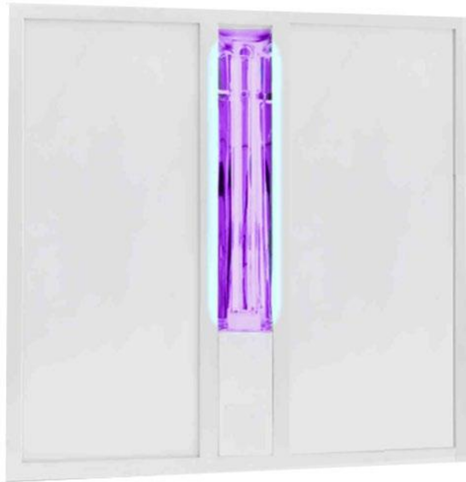
RT + UV-C

PSB/LED + UV-C

36W 3600lm/827-865
+LAMP 36W UV-C



A 36W **UV-C lamp sterilises** an area of **30 m²** over a period of **1-3 hours.**



Installation: Recessed (to order, springs for plaster ceilings, accessory for recessing in plaster, accessory for attachment).

Light source: Main: SMD LED linear modules. White **Tunable 2700-6500K**. Secondary: UV-C lamp TC-L 36W (Lamp included).

Optical system: Opal diffuser **Light distribution:** Direct.

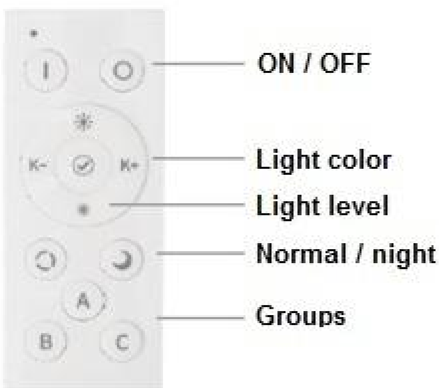
Presence sensor included. Automatic shut-down of the UV-C lamp when motion is detected.

Regulation **DALI** and **Emergency kit** (1 or 3 hours) to order.

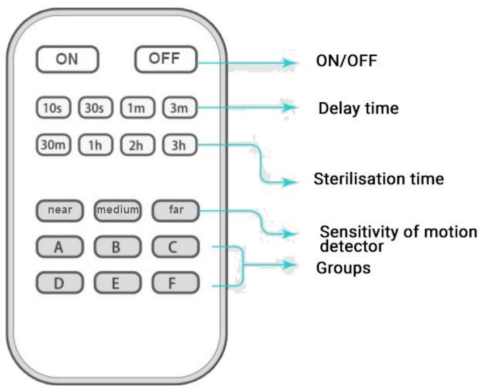
Two independent remote controls are included: one for general lighting and one for sterilisation, in order to avoid errors.

By remote control: *Change in colour temperature. Variation of the luminous flux between 10 and 100%. Delayed sterilisation. Programming of sterilisation time.*

LIGHTING CONTROL



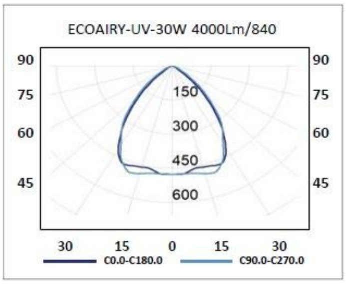
STERILISATION CONTROL



ECOAIRY + UV-C

30W 4000lm/840
+LAMP 11W UV-C

Air purification by *99,92%



*1 luminaire **ECOAIRY/UV**
sterilizes and purifies
an area of **20m²**
in a period of approx
2 hours.

Mounting: Recessed. Under request, accessory for surface, recessed in plaster or pasterboard ceilings.

Light source: Main: LED linear modules SMD.
Secondary: UV-C TC-L 11W . (Lamp included).

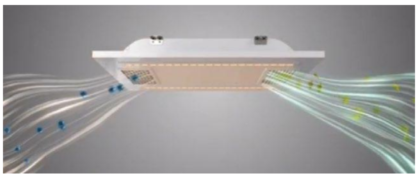
Optical system: Diffuser + reflector (Double parabolic). Beam angle 85°.

Light distribution: Direct.

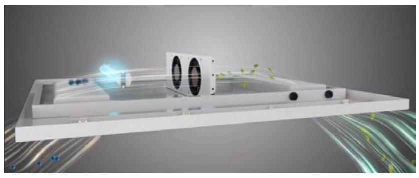
Materials: Body: sheet steel. **Reflector:** Polished polycarbonate.

WITHOUT DIRECT UVC RADIATION
CONTINUOUS GERMICIDAL ACTION IN PRESENCE OF PEOPLE

Air purification and disinfection system can be used at the same time that the lighting function.

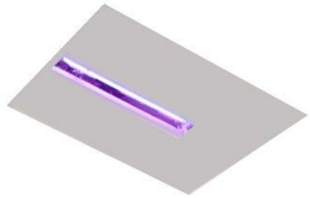


Through a silent system of fans, polluted air is purified and disinfected inside the luminaire. Purified air it´s free of ozone.



The germicidal action of the UVC lamp is carried out inside of the luminaire. the luminaire can be used at the same time that the area is occupied by people, animals or plants.

PTE/UV-1x36 HF (622x622) + Philips 36W UV-C LAMP



Option for recessing and attachment.

Screen with PLL 36w tube in the middle with polished aluminium parabolic reflector (germicidal action only).

CLICK

PCM/EXT-3x36W H.F. +3x Philips 36W UV-C LAMP

Option for recessing and attachment.

Gloss-finish aluminium parabolic longitudinal slats, grooved transverse slats.

CLICK

PCM/BR-3x36W H.F. +3x Philips 36W UV-C LAMP

Option for recessing and attachment.

Gloss-finish aluminium parabolic longitudinal and transverse slats.

CLICK

PCM/MR-3x36W H.F. +3x Philips 36W UV-C LAMP

Option for recessing and attachment.

Very high purity matt-finish aluminium longitudinal and transverse slats.

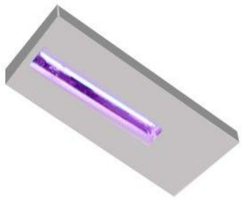
CLICK

PSB/LED + UV-C 36W 3600lm/827-865 +LAMP 36W UV-C

Attachable.

N/UV-1x36 HF (600x200) +LAMP Philips 36W UV-C

Attachable.



NT-5/GREY-2x35W H.F. +LAMP Philips 35W UV-C

Attachable.

N/EXT-2x36W H.F. +LAMP Philips 36W UV-C

Attachable.

RT-1x36W H.F.+REFLECTOR RT/PAL-1x36W +LAMP Philips 36W UV-C

RT-2x36W H.F.+REFLECTOR RT/PAL-2x36W +LAMP Philips 36W UV-C

Attachable.

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