Germicidal Ultraviolet-C (GUV) Sterilization with UVC

Hospital-grade, Ultraviolet-C germicidal light sterilization can provide your business with a <u>chemical-free</u> way to disinfect and sterilize air and surfaces in order to protect your clients, customers, and employees. There are many product options to fit any application and many of the products are made in the USA.

Promotional financing is available!

IDEAL FOR:	BENEFITS:
* Medical facilities	* Kills viruses, germs, mold, bacteria, and
* Fitness facilities	allergens
* Restaurants/hotels	* Increases peace of mind of customers and
* Day care centers	employees
* Hair/nail salons	* Low maintenance, cost effective, fast, and
* Schools/dorms	safe
* Jails/prisons	* Better health of employees
* Offices, gas stations, stores, & more	* Get customers back into your business

GUV is used in a multi-barrier disinfection approach along with cleaning and disinfection with chemicals to optimize cleanliness, resulting in decreased pathogens (viruses, bacteria, and mold) that could potentially cause infection and allergy symptoms.

The technology: Commonly used Germicidal Ultraviolet-C (GUV) lamps generate predominantly 254-nm UV radiant energy, which is close to the peak germicidal wavelengths of 265 to 270 nm – both in the UV-C range, compared to the longer-wavelength ultraviolet (UV-A and UV-B) in sunlight. In most GUV applications, an electrical charge is passed through low pressure mercury vapor that has been enclosed in selected glass tubes that transmit only certain UV wavelengths in the 200 – 280 nanometer (nm) range. This creates a light in a range outside the visual range of violet.



How it works: GUV radiant energy damages nucleic acids (DNA and RNA) by causing mutations that prevent replication, thus leading to the death of virtually all bacteria and inactivation of all viruses--both DNA and RNA types. Bacteria and viruses vary somewhat in UV susceptibility, with environmental organisms, fungal spores, and mycobacteria being relatively harder to kill than more rapidly replicating and non-environmental microbes and most bacteria. But even fungi are effectively killed with high-dose UV, which is used, for example, to treat fungal contamination of air conditioning systems. GUV can play a key role in reducing the transmission of SARS-CoV-2, the virus that causes COVID-19. SARS-CoV-2 is an "enveloped virus" and thankfully, enveloped viruses are the least difficult subtype of viruses to inactivate. GUV can be most effectively used to disinfect air in the upper room where ceiling height permits, but it can also be used in ventilation ducts and room air cleaners. As explained below, "upper-room GUV" is considered the most effective application for room air disinfection, where feasible.

To treat airborne transmission, utilize GUV units:

- **Upper-room GUV:** It is considered the most effective and safest application for room air disinfection, where feasible. The units may be suspended from the ceiling or attached to the walls. This environmental control can supplement ventilation (natural, mechanical, or hybrid systems).
- **GUV in HVAC air handling unit**: It is used to treat recirculated air in an air handler and to reduce mold growth on cooling coils. The UVC light in the HVAC system degrades HVAC system filter material over time, requiring more frequent filter replacement.
- **High-quality room air cleaner with GUV:** This should only be considered if room geometry prohibits the use of upper-room GUV.
- **Open fixture:** Only considered in a pandemic medical situation only where an open unit exposes UVC light throughout the room. It can only be used with unit at a height greater than 12 meters. This would cover both air and surface but would require personal protection of the eyes and skin of patients and health workers.
- Whole-room GUV: The fixture shines the UVC light down from suspended fixtures can only be used in special locations, where viral transmission is highly likely, provided strict precautions can be followed. Any persons remaining in the space being disinfected from overhead and side UV-C lamps must wear protective clothing and eye protection, or exposure to harmful UV will occur. Whole-room GUV has been safely applied in unoccupied rooms where entry is forbidden during the UVGI.

To treat surface-borne transmission, utilize UVGI units:

- Autonomous mobile UVGI devices ("robots"): Unit on wheels, used in unoccupied spaces in conjunction with manual cleaning of patient rooms. It would be the primary approach for surface cleaning in a hospital setting.
- **Mobile UVGI units**: Unit on wheels that can be used to disinfect high-touch surfaces. Proper eye and body shielding must be done if this is used. Rooms must be surface cleaned of debris prior to use because UVGI is an does not penetrate surfaces and cannot disinfect soiled surfaces. It is typically used as a supplemental control measure for disinfection in surface-born areas.
- Upper-room wall mounted UVGI units: Upper-room wall mounted fixtures have an upward component for air
 disinfecting as well as a downward component, with the lamp controlled by an occupancy sensor. The unit is
 mounted on an upper wall.
- Hand-held, compact UVGI products: Hand-held units to sterilize surfaces. have been marketed for more than a decade for disinfecting small objects such as cell phones. There are now more options. Care should be taken to ensure that the devices are used for the correct time period to disinfect and that the operator follows all safety measures.

Glass windows block potentially hazardous UV-B and UV-C transmission if they are normal 254-nm UV-C lamps. However, glass windows **should** be covered if pulsed xenon lamps are in use

UVGI lamp emissions can pose a workplace safety and health hazard to the eyes and skin if the lamps are improperly used or installed. However, these lamps can be used safely if workers are informed regarding the hazards and follow appropriate precautions.

Lamp technologies include continuously emitting low- and medium-pressure mercury lamps, as well as pulsed xenon arc lamps. Studies have shown that these technologies—continuously emitting or pulsed—are comparably effective for disinfection. Pulsed sources may be more practical if rapid disinfection is required. Light emitting diodes (LEDs) and krypton-chlorine excimer lamps, which emit in narrow bands in the germicidal range (UV-C), are emerging technologies. There are reports of companies developing LEDs that emit in the longer-wavelength UV-C region, generally at 265 to 270 nm (more effective range than current UV-C lamps). So far, complete upper-air systems are not on the market, but with the focus of the SARS-CoV-2 novel coronavirus pandemic upon us, these may become a reality in the future.

In summary, germicidal ultraviolet (GUV) applications can be used to reduce the spread of airborne infectious diseases such as tuberculosis, influenza virus, measles, SARS, and, presumably, SARS-CoV-2 (responsible for COVID-19).

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