

Advantages of disinfection with UVC radiation compared to chemical disinfection

UVC disinfection is a non-invasive, resource-saving, environmentally friendly and very effective supplement to conventional disinfection methods for the following reasons:

- Safe disinfection of the air can only be carried out as such with UVC radiation. Other filter systems are incapable of achieving the same degree of disinfection of the air. Chemicals are not an acceptable option for disinfecting the air.
- Disinfection with UV light is generally less expensive than costly, time-consuming and often inadequate disinfection with chemical disinfectants. For example, there is no need for the process of acquiring and storing chemicals; this lowers the costs and reduces the dependency on chemical producers (delivery bottlenecks for disinfectants during the coronavirus pandemic).
- Unlike chemical disinfectants, no resistance is generated in the case of physical disinfection with UVC light
- When using UVC radiation, no discolouration of surfaces occurs, no residue is left and there is no impairment of odour.
- Surface contact is avoided with this method. This makes the whole disinfecting process much safer than handling aggressive chemical agents.
- Downtimes are lower with UVC disinfection compared to chemical disinfectants: Equipment or rooms can still be used during the procedure (UltraAIR active) or immediately after disinfection.

AS-Series devices for active ambient air disinfection

- The systems are low-maintenance, robust and extremely long-lasting.
- The devices are installed permanently (hung from the ceiling with wire suspension or fixed with mounting rack to a wall). The air to be disinfected is actively conducted into the housing using a fan. The air flow is safely and verifiably disinfected by the UVC lamps inside the housing, i.e. the UVC rays prevent viruses, bacteria, germs and other pathogens from reproducing and thus render them harmless
- The UVC lamps last at least 10,000 hours and need to be replaced once a year
- The devices can be used in permanent operation (long-lasting, safe for people, low energy consumption)
- Maximum disinfection performance at low noise levels
- Compact design, easy to assemble, discreet appearance
- Overdosing is impossible (in contrast to chemical or thermal disinfection methods)

Effectiveness of UVC light

Ultraviolet light is a form of light that is invisible to the human eye, which exists in the electromagnetic spectrum between X-rays and visible light. We are exposed to a limited amount of UV light from the sun's rays every day, although much of it is absorbed by the ozone layer. Ultraviolet radiation is divided into three wavelength ranges:

UV-A: Wavelength range 400-315 nm

UV-B: Wavelength range 315-280 nm

UV-C: Wavelength range 280-100 nm

The light used for disinfection is part of UV-C radiation, is short-wave and very rich in energy. With its wavelength of approx. 265 nm, it is particularly damaging to bacteria, viruses and other microorganisms. UV-C radiation causes irreparable destruction of the DNA, so the pathogen is incapable of replicating and therefore reproducing.

*Sources:

Bedell, K., Buchaklian, A.H., Perlman, S., 2016. Efficacy of an Automated Multiple Emitter Whole-Room Ultraviolet-C Disinfection System Against Coronaviruses MHV and MERS-CoV. *Infect. Control Hosp. Epidemiol.* 37, 598–599. <https://doi.org/10.1017/ice.2015.348>

Rutala, W.A., Gergen, M.F., Weber, D.J., 2010. Room Decontamination with UV Radiation. *Infect. Control Hosp. Epidemiol.* 31, 1025–1029. <https://doi.org/10.1086/656244>

SARS-CoV-2

- How the infection takes place: Like all viruses, the corona pathogen SARS-CoV-2 can only multiply with the aid of a host. Cells infected by the virus are “reprogrammed” by its RNA in such a way that they produce new viruses. These are then released in the body and infect other cells. The host cells are destroyed by the reproductive process, which causes diseases in the host body (source: https://de.wikipedia.org/wiki/Viren#Vermehrung_und_Verbreitung2)
- Almost half of all infections occur via aerosols (i.e. through the air), just as many via droplets and only around 10% via contact with infected surfaces (*Christian Drosten, Charité Berlin*)
- It can be proven that UVC light is capable of fighting other coronaviruses such as SARS-CoV or Mers-CoV. It has now become clear that a much lower UV dose (mJ/cm²) is required than for regular influenza viruses, for example, in order to render the SARS-CoV-2 ineffective:



Microbe	Dose	
	mJ/cm ²	Type
Campylobacter Jejuni	5	Bacteria
Helicobacter Pylori	7,5	Bacteria
Staphylococcus Aureus	10	Bacteria
Streptococcus Faecalis	11	Bacteria
Escherichi Coli	13	Bacteria
Enterococcus Faecalis	13	Bacteria
SARS Coronavirus CoV-P9	16	Virus
Murine Coronavirus	26	Virus
Murine Norovirus	27	Virus
Calicivirus Feline	30	Virus
Clostridium Pasteurianum	10	Spore
Streptomyces Griseus	26	Spore
Penicillium Expansum	65	Spore
Saccharomyces cerevisiae (yeast)	130	Fungi
Tetraselmis suecica	1000	Algae

[5] Data of UV dose required for a 99.99% reduction of different microbes. Malayeri, Adel & Mohseni, Madjid & Cairns, Bill & Bolton, James. (2016). Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae. *IUVA News.* 18. 4-6.