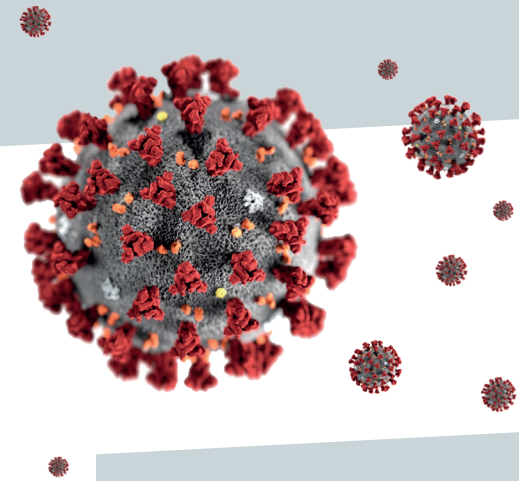
With UVC disinfection against the corona virus

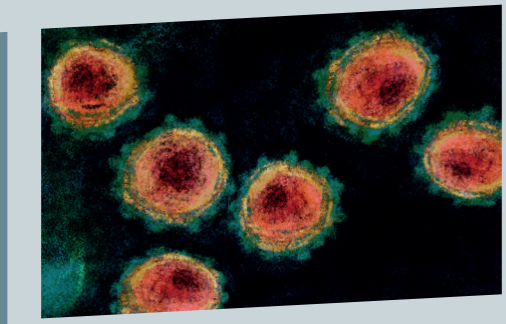


The current pandemic with the SARS-CoV-2 virus shows how important hygiene measures are to avoid its spread. But despite all the rules, not everything can be cleaned with disinfectants. The aerosols in the air, for example in waiting rooms, and the deposited viruses on surfaces of daily contact are the risks that can be reduced with UVC technology.

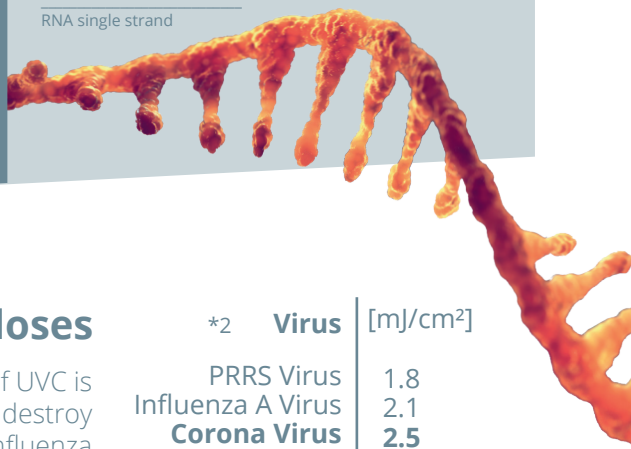
Corona viruses are infectious organic structures of only 12-160 nm in size that spread outside cells in the environment. But they can only multiply within a suitable host cell. Once billions of viruses have been thrown out, for example by coughing, they spread throughout the environment and wait for the next host. They are not viable, but only capsules with a program to reproduce them. They can neither divide nor have a metabolism and always depend on a host cell to multiply. Stability in the environment depends on many factors such as temperature, humidity and surface conditions. According to current knowledge SARS-CoV-2 can remain infectious for up to 3 hours in the air, up to 4 hours on copper surfaces, up to 24 hours on cardboard and up to 2-3 days on stainless steel and plastic. *1

The efffect of UVC on viruses

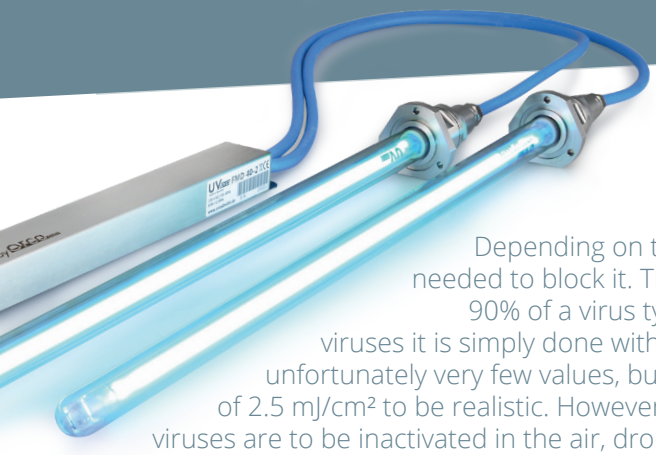
The virus information is contained in the capsid in the form of single-stranded DNA or RNA. Whether RNA or DNA, the mechanism of UVC destruction of these molecules is very effective. The radiation penetrates the viral envelope and hits the genetic material. As with DNA, RNA forms pyrimidine dimers and additional uridine hydrates. The information for reproduction is lost, the virus is no longer virulent and the infection cycle is broken.



Electron microscopic image of corona virus



RNA single strand



Typical LD90 doses

Depending on the virus, a certain dose of UVC is needed to block it. The lethal dose needed to destroy 90% of a virus type is called LD90. With influenza viruses it is simply done with 2 mJ/cm², with Corona there are unfortunately very few values, but most experts consider an LD90 of 2.5 mJ/cm² to be realistic. However, it is also important whether the viruses are to be inactivated in the air, droplets, sputum, blood or water. To disinfect a smooth surface even to 99.9 %, about three times the LD90 dose is required, i.e. between 7.5 and 10 mJ/cm² for corona viruses.

*2 Virus	[mJ/cm²]
PRRS Virus	1.8
Influenza A Virus	2.1
Corona Virus	**2.5**
Herpes Virus	4.3
Hepatitis A Virus	6.7
Rota Virus SA11	7.5

*1 https://www.zusammengegencorona.de/informieren/basiswissen-coronavirus/ - 26.03.2020 Federal Ministry of Health.

*2 Exemplary values from the literature without guarantee and claim to completeness

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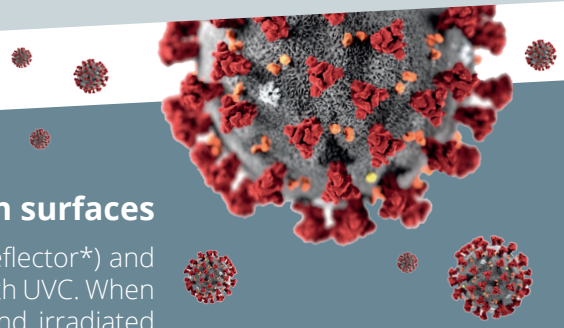
UV*pro* WDS



Inactivation of viruses on surfaces

The ceiling and wall emitter WDS (with reversible reflector*) and WDO (open) are suitable for treating surfaces and air directly with UVC. When correctly positioned, the air space is effectively disinfected and irradiated surfaces are cleaned of viruses. Since UVC radiation causes irritations to skin and eyes, these emitters are used only in vacated rooms. These can be installed permanently in treatment rooms or mobile on roll stands.

*reversibal to protect the emitters during transit

Disinfection chambers and sluices

Parcels, stethoscopes, face masks, mobile phones, tablets etc. can be effectively cleaned of viruses and germs in disinfection chambers. The EKB mirror lined disinfection chamber is irradiated with a minimum power of 4 mW/cm². After 2 minutes 500 mJ/cm² will have been delivered, a value which kills everything of viral and bacterial origin even in tissue or on rough surfaces. Sluices or entire rooms can be equipped with UVC to disinfect incoming or outgoing goods.

UV*pro* EKB 100

Circulating air disinfectors effectively reduce the viral load of the air

In waiting rooms where many people stay in confined spaces, the concentration of viruses and bacteria in the air increases significantly. Coughing and sneezing releases tiny droplets of viruses into the air. Circulating air disinfection units such as the V-Lab suck in the air and effectively irradiate it with UVC. On the outlet side, up to 100 m³ of air per hour is blown out with 99% - 99.9% fewer viruses. The V-50 offers a small solution suitable for offices with up to 50 m³/h and a 90% reduction.

On an industrial scale, the same is done by the V-series units with 300, 500 or 1000 m³ per hour. 12 mW/cm² at an irradiation time of approx. 1 second delivers a 4 log reduction of coronaviruses (99.995 %). A targeted airflow protects service staff and customers while creating areas of high air quality..

UV*pro* type	volume max. [m³/h]	dose [mJ/cm²]	Corona reduction
V50	50	3.5	95%
V-lab	100	9.0	>99.9%
V300	250	6.5	99%
V500	250/500	12.5/8.5	99.995/99%
V1000	425 - 850	12.5 - 6.5	99.995 - 99%

UV*pro* V300
UV*pro* V-lab

In many life situations, the use of UVC brings back a part of the security that allows normal business operations. Breathing air and surfaces can be effectively cleaned of viruses. Smartphones, bags, tools and aids are stored disinfected after use.

UVC concepts cannot stop a pandemic, but they can be an important building block for a significantly lower virulence of viruses and thus protect from many new infections.

Information on the equipment is available at www.**UV*pro***.com

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