Safety at the press of a button

Educational institutions

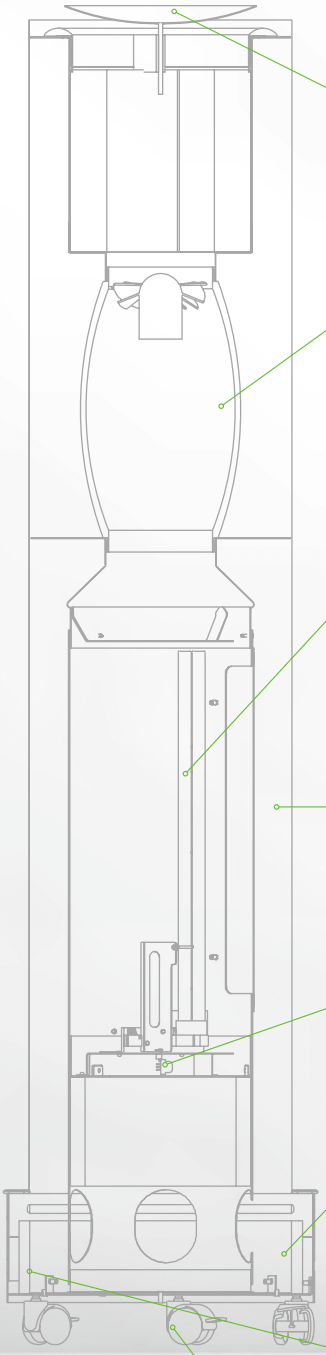
Certified infection protection and safety with UV-C technology

GoGaS
Ecothermal Engineering

www.gogas.com

GoGaS INTERsens® 250R

Our validated disinfection systems work reliably and safely against viruses, bacteria and fungi. UV-C light renders germs in the room air harmless, including SARS-CoV-2. We protect your future and strengthen your company. You enjoy the good feeling of safety.



The energy density for the destruction of SARS-CoV-2

	Number of microbes	
LOG 1	1.000.000	90 %
LOG 2	100.000	99 %
LOG 3	10.000	99,9 %
LOG 4	1.000	99,99 %
LOG 5	100	99,999 %
LOG 6	10	99,9999 %
LOG 7	1	99,99999 %

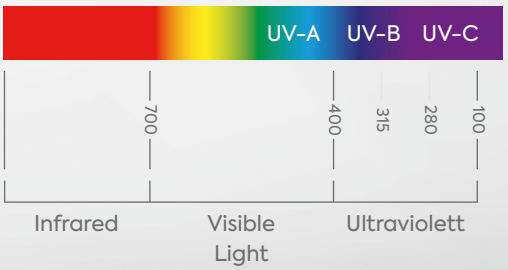
Microbial reduction rate

Inactivation of bacteria with UV-C
Example: Clostridium Difficile (bacterium)

Intensity	Disinfection level
60 J/m²	LOG 1 (90 %)
120 J/m²	LOG 2 (99 %)
180 J/m²	LOG 3 (99,9 %)
240 J/m²	LOG 4 (99,99 %)

Energy = watts x seconds
Intensity = Energy / m²

Color spectrum



Disinfect room air without chemicals using UV-C

Infection protection with certified UV-C technology.

Different approaches

Any spreading of the disinfectant by spraying is excluded from consideration due to the lack of sustainability and the risk of corrosion. In other words, it is not really a permanent alternative. In the long run, such wiping or spraying processes not only corrode the texture, structure, and color fastness of surfaces, but in order for this procedure to be effective, the disinfectant must be applied and mixed again and again depending on the persistence of the pathogen. This requires specially trained personnel, and could not be properly performed by layman. Pathogens have the ability to change their resistance properties in order to camouflage themselves better. This is also known as mutation. Another problem is how vapors and other volatile chemical compounds are able to penetrate virtually all pores and openings. If chemicals penetrate sensitive mechanical and electronic devices, this can cause corrosion and lead to dangerous system failures. The quality of application and the actual result also depend on the job performance of the staff and the time they have to complete their job Last but not least, this method cannot be used when the facility is in operation and visitors are present on-site.

Available methods

In practice, there are basically two different methods to choose from. Both have been in use for over 70 years, but they have different origins and satisfy different goals. They therefore have different overall investments, sustainability requirements, safety levels, reliability, follow-up costs, and therefore proof of effectiveness for the overall system.

Environmentally friendly disinfection. Chemical- and ozone-free.

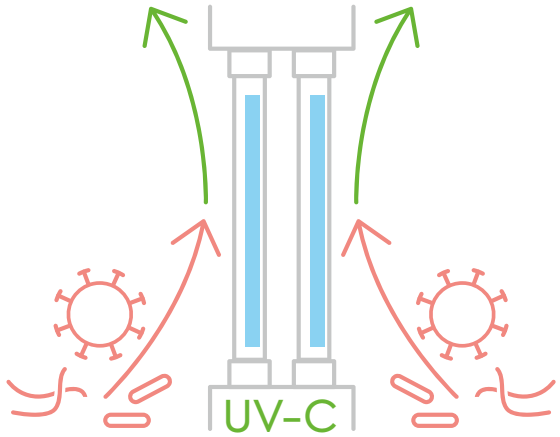
No external UV-C radiation. No toxic replaceable filters.

Digitally validated and certified.

Ambient air disinfection with the INTERsens® 250R – freely chosen design samples.

Filter technology

The more recent technology is so-called HEPA filtration. This technology was basically created in the 1940s and 1950s with the aim of filtering out dry particles, e.g., for clean rooms, but it was not intended as a precisely measurable and reproducible disinfection tool that could be validated. With the optimization of this technology and the availability of so-called H13 and H14 filters, it has been further optimized in recent decades. In the meantime, it has been refined to filter out a large number of aerosols, but it cannot filter all of them with comparable consistency and defined form. This also applies to continuous operation. Ultimately, this problem makes it extremely difficult to carry out a sound scientific and medical validation of filtration performance in accordance with medical and disinfection standards. As the term itself suggests, HEPA



> Reliable and safe protection against infectious aerosols in the ambient air. Say goodbye to viruses, bacteria and fungi. UV-C light makes germs in the ambient air harmless. Simply press the start button and experience how good it feels to be safe.

is filtering. HEPA is manufacturer-independent, and this is one of the reasons why for decades such filters have often only been used in such secure facilities as aircraft and factories that are maintained by trained specialists. Consumer applications for HEPA filters, such as in such household appliances as vacuum cleaners, may be disregarded here, since these are marginal application areas.

Another challenge posed by this method is the potentially toxic contamination posed by easily changeable filters both during operation and at the end of their useful life. Since this technology, as the term already suggests, simply filters particles as opposed to eliminating or destroying them, the residues ultimately are just collected in the filter. It is very easy even for laypersons to understand what risks of toxic pollution that could arise over a typical usage period of 6 months, during which time there will be fluctuating room temperatures and constantly changing humidity levels. Filters that are contaminated in this way are therefore, strictly speaking, hazardous waste, and they must be replaced and disposed of in a professional manner. Anyone who has ever changed a vacuum cleaner bag and filter can immediately understand the problem. Therefore, it should be absolutely clear that room air purifiers that use such filters should be monitored and serviced by trained and experienced specialists. This also means that those who change filters or perform repair and maintenance work must wear appropriate protective equipment. Particles could become liberated from the filters and penetrate the lungs, thereby posing a massive health hazard. Untrained and inappropriately protected personnel should not carry out such activities. Regardless of its functionality and effectiveness, this process raises numerous questions about its sustainability and environmental friendliness in the 21st century.

UV-C waves

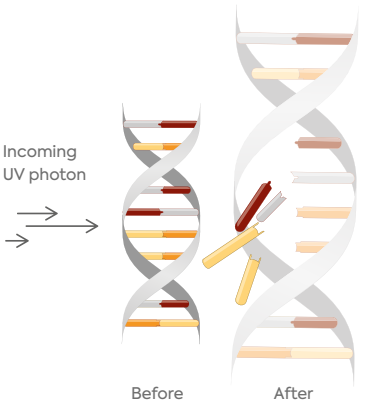
One of the most frequently considered methods around the world is known as UV-C disinfection, which uses UV light with a wavelength of 254 nm. UV-C is a completely chemical-free method that does not require any replaceable filters. This method, which was originally pioneered more than a hundred years ago to fight tuberculosis, has since become the preferred one worldwide for a large number of applications that require validated proof of disinfection and where the use of chemical substances is not permitted. Though it is not well publicized, this technology is used by water utilities, the food and pharmaceutical industries, and the electric power industry. This method has also been used very successfully in all areas of healthcare for many decades around the world, including in Germany. Experienced users of the technology are therefore always surprised to hear that the effectiveness must still be proven by commissioning new studies. We should also mention that the European Commission has also decided to use validated UV-C systems across the board.

The heart of the matter

As is so often the case, it is important to remember a few basic physical facts in order to ensure the necessary proof of effectiveness for the technology in accordance with recognized medical standards and LOG levels when using the technology. The sun radiates UV-C waves. Unlike UV-A/B waves, however, they are completely filtered out by the earth's atmosphere, so they do not penetrate down to us. What this means, to put it simply, is that pathogens have not had to develop mechanisms to defend themselves from UV-C waves over the course of evolution, and thus they have not developed any resistance to them.

In order to take advantage of this fact in order to fight pathogens, the wavelength is artificially generated using so-called UV-C lamps, which are used to irradiate the pathogens (with UV-C radiation). This permanently destroys their DNA structure. In contrast to what is the case with chemical disinfection, they can no longer reactivate or multiply themselves. In order to provide proof of disinfection that can be validated, you need a combination of certain basic factors, including in particular the ability to precisely modulate the radiation wavelength to 254 nm, the so-called sweet spot. The further you deviate from this ideal point, the greater the effort and the lower the

resulting effectiveness of the method itself. In addition, the lamps that are used must have sufficient energy density. Industrial UV-C lamps typically have the best efficiency at around 30%. We recommend at least 25%, which is based on the sweet spot. For comparison, so-called consumer lamps (which are mostly factory seconds from the manufacturer) have an efficiency of just 12–15%, while LED chips are currently around 10%. In addition, there are other important properties to look for in a lamp, such as the photon density, the maximum temperature range, and the stability when being controlled (preheating phase). If these parameters are not precisely coordinated with one another, a reliable and permanent disinfection effect cannot be achieved (validated). For practical operation, the distance and radiation duration as well as the laminar flow velocity and density of the room air must also be taken into account. These parameters already make it clear how imperative it is to have final digital validation of the actual disinfection performance of the device. Too often this is incorrectly derived 1:1 from the data sheet that is provided together with the lamp. However, the lamp values themselves have no informative value about the degree of efficiency that will be achieved in practical operation. The required energy density for the destruction of SARS-CoV-2 is shown in the attached table.



Reliable and safe protection against infectious aerosols in the ambient air. Say goodbye to viruses, bacteria and fungi. UV-C light makes germs in the ambient air harmless. Simply press the start button and experience how good it feels to be safe.

The information presented in the data sheets for the corresponding UV-C lamps, such as claims of disinfection of 99.9x percent of pathogens, must under no circumstances be blindly accepted. They only refer to the basic capabilities of the component used in the lamp. Unfortunately, such clear information is missing from almost all device information. At the same time, the information that is provided is not only misleading, but can also be extremely dangerous.

Shielding and protection for the outside world

Even after all of these parameters are taken into account, you must finally adopt further measures to prevent the UV-C waves from being radiated outwards and to prevent contamination from being fed back into the power grid. This is also called EMC (electromagnetic compatibility). The generated UV-C waves (the visible light is ultimately just a side effect) must not be allowed to leak out when people are in the immediate area.

Ultimately, the term UVC light is wrong. Humans do not have sufficient natural protection against UV-C waves. Safe shielding in accordance with applicable EMC standards and regulations can be ensured by installing certified linings within the devices themselves. In order to protect the power grid, appropriate Class B EVM filters are built into the power supply of the devices. This guarantees safe operation at all times. There is thus no danger to people, animals, and plants in the area during practical operation.

Room air disinfection with UV-C

If it is configured correctly, the UV-C technology offers excellent opportunities to disinfect the room air reliably, with digital validation, and while completely foregoing the use of chemicals. Additional sales and income opportunities thanks to the mesh cover

In addition to validating and ensuring the safe operation of the devices themselves, you can also cover them with an individual MESH cover, which is also suitable for QR codes. This cover not only allows you to generate additional income. Due to the fact that you can customize the printing on the covers and the QR codes, you can include messages such as an image statement, CI, advertising about your company, as well as important safety information and notes, which will reach the recipient with pinpoint accuracy.

This ensures validated 24/7 operation. Additional modules can be simply added for larger rooms. In this way, the flow circulations can be reliably separated and a level of disinfection performance that complies with requirements for validation can be ensured.

Summary

With the appearance of SARS-CoV-2, the need to protect and ensure the safety of customers and employees has gained new meaning. The run on UV-C as well as the easy availability of the corresponding lamps have resulted in a glut of devices and systems that are not validated. Nevertheless, UV-C technology has been considered to be reliable for many decades. It has also been hailed as a chemical-free and environmentally friendly solution. The ability to provide an overall digital validation of the devices is just as essential as obtaining knowledge of air flows in the room and industrial experience handling magnetic waves. The safe and validated use of UV-C radiation for room air disinfection must be guaranteed 24 hours a day, 7 days a week. Safety must not be compromised either by uncontrolled air currents or by interventions by personnel.

Safe & certified UV-C disinfection of ambient air, surfaces, and objects

Certified
Validated
Safe

Validated system solutions from GoGaS that are effective against viruses, bacteria, and fungi.

Safety at the press of a button.
gogas.com

We'll always be glad to help you!

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