

# COVID-19: How LAF Technologies UVGI disinfection solutions can be helpful in this time of great crisis



## UV-C EFFICACY AGAINST CORONA VIRUSES (SARS – MERS)

LAF Technologies Pty Ltd has always been committed to preventing contamination and increasing safety by controlling cross transmissions in all areas: surface treatment and air quality.

UVGI is an established and reliable technology, however a solid understanding is required for effective and safe use. UVGI uses ultraviolet light to inactivate microorganisms, mainly by cross-linking thymidine nucleotides in DNA and uracil nucleotides in RNA, which block replication. UVGI systems are relatively fast and easy to use, leave no chemical residues and do not expose workers to harmful substances.

At this time there are no specific tests available on UV resistance of the **Coronavirus SARS-Cov-2**, but there are examples of scientific literature about the UV-C treatment of very similar viruses, such as SARS or MERS.

There is also evidence of the effectiveness of ultraviolet rays in disinfecting air and surfaces from microorganisms that are much more complex and difficult to treat than this virus in healthcare environments, such as C. Difficile, MRSA, or even more deadly threats such as Ebola and Legionella. (Kowalski 2009)

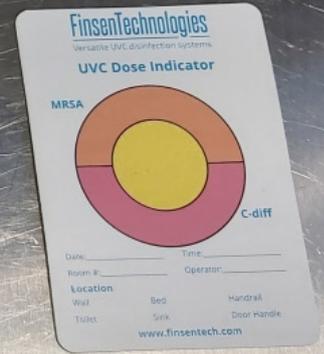
It is estimated that the SARS-CoV-2 virus can survive on surfaces for up to nine days, based on its similarity to SARS and MERS.

**Standard disinfectants** are effective against SARS-CoV-2, but to provide additional protection and defence against errors in the manual disinfection process, UVGI can be used to disinfect surfaces and equipment following manual chemical disinfection.

Use of UV irradiation in air conditioning and air treatment systems has also been recommended for many years.

Our Light Progress Europe UV systems for air conditioning are available for many sectors: hospitals, industry, transport networks and residential centres.





## SANITIZE MASKS WITH UVGI

UVGI has been successfully tested in laboratories as a way to decontaminate N95 (P2) masks exposed to MS2 bacteriophage and influenza virus.

In recent weeks our international suppliers have seen that our Medical professionals have indicated that not enough PPE has been allotted or been able to obtain to cover the need to safely be able to treat infected citizens.

Two studies on the UV-C treatment of the masks were published in leading scientific journals in 2015 and 2018, respectively, well before the recent release of Covid-19.

- National Institutes of Health: Effects of Ultraviolet Germicidal Irradiation (UVGI) on N95 Respirator Filtration Performance and Structural Integrity
- American Journal of Infection Control: Ultraviolet germicidal irradiation of influenza-contaminated N95 filtering facepiece respirators

The problem of **finding masks** is a constant in the analysis of possible “apocalyptic” scenarios regarding the management of a global pandemic. One of the texts reports:

“The possibility of a global pandemic of an infectious respiratory disease is of tremendous concern to the occupational health community, because healthcare workers would face the greatest risk of exposure.

For pandemic diseases that may be transmitted by airborne particles, the isolation precaution guidelines from the Centres for Disease Control and Prevention (CDC) call for healthcare workers to wear respiratory protection while treating patients. Because of their loose fit and low filtration capacity, surgical masks do not provide respiratory protection from small airborne particles.

For this reason, the most common respiratory protection device used in healthcare settings is the disposable N95 (P2) filtering face-piece respirator (FFR). However, infection control procedures typically call for disposable FFRs to be discarded after a single use to avoid cross-contamination.

This means that a pandemic of a disease such as influenza would require a tremendous number of FFRs to protect healthcare workers from airborne transmission. The Institute of Medicine (IOM) projected that a 6-week influenza pandemic would require 90 million FFRs. The Occupational Safety and Health Administration (OSHA) has predicted that an influenza pandemic would likely last 24 weeks, which suggests that up to 360 million FFRs could be needed in the United States alone.

A surge in demand of this magnitude would greatly exceed current stockpiles and production capabilities, and would almost certainly result in a shortage.”

One way to meet the growing need for masks during a pandemic would be to reuse them, as even a small number of reuses of each mask would greatly expand the available stock of disposable respirators. During the 2009 **H1N1 pandemic**, the CDC (“Centres for Disease Control and Prevention” USA) recommended that healthcare facilities consider extending the use and reuse of N95 respirators in cases of extreme need.

However, a significant concern for **reuse** is the possibility that the external surfaces of the respirator may become contaminated with infectious material and lead to disease transmission. To avoid this risk, masks should be decontaminated after each use.

Several techniques have been tested for the decontamination of **N95 FFR**. These include autoclaves, steam generated by heat or microwaves, ethylene oxide, vaporized hydrogen peroxide and bleach. All the methods described have advantages and disadvantages. Heat and steam, for example, may dissolve or degrade the respirator and require the device to dry after treatment.

Chemical disinfectants require rinsing and drying and may leave an unpleasant odour or residue that irritates the skin. Gaseous systems using ethylene oxide or vaporized hydrogen peroxide require specialized equipment and ventilation controls.

# MASKS' DECONTAMINATION WITH UVGI: RISKS AND OPPORTUNITIES

N95 systems cannot be disinfected with alcohols such as isopropanol, because the alcohols remove the electrostatic charge from the filtration medium and substantially degrade its filtration capacity.

An important consideration for all decontamination methods, including UVGI, is the risk that they degrade the respirator material and reduce the ability of the mask to filter out infectious bioaerosols.

Some studies have examined the effects of UVGI on the respirator's appearance, fit, airflow resistance and filtration efficiency after one or three decontamination cycles and found no significant effects. However, the effects of prolonged UVGI exposure after multiple decontamination cycles are not known and it is unclear how much a cumulative dose of UVGI respirators can withstand, what damage will occur at the end or how many times disposable masks can potentially be decontaminated and reused.

This suggests that the upper limit for UVGI exposure during repeated disinfection cycles should be set by physical degradation of the respirator material and not by loss of filtration capacity. For some FFRs models, this could potentially be used as a useful warning: if the respirator material is significantly degraded after UVGI disinfection, the mask should obviously be discarded.



CDC information on optimizing PPE supply during COVID19:

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html>

NOTE: LAF Technologies Pty Ltd takes no responsibility in masks degradation using our UVGI systems and all the products must be used consciously.

## UV-BOX AND MORE: LIGHT PROGRESS SOLUTIONS TO SANITIZE MASKS AND TOOLS IN HEALTHCARE



The applications for UV-BOX for contamination control have proven to be an effective response to treat masks and all material contained in an ambulance under heavy use during the current Covid-19 emergency.

An indicator that changes colour when sufficient UV radiation is achieved to inactivate the surface pathogens was used to confirm the correctness of the treatment.

Besides masks, our UV-BOX can be used for the treatment of **any other tool**, such as instruments commonly used in any hospital, clinics, ambulances, etc.

LAF Technologies UVGI products for health care environments have been always represent a simple solution to protect from exposition to possible contamination.

Everybody should be aware as we are that at this time of absolute global crisis UVGI technology can make the difference in how we control contamination spread, safeguarding patients and workers health.

UVGI technology creates no resistance on any microorganisms so we can ensure a constant efficacy and a great effectiveness proven by science.

Many applications are possible and not only in healthcare environments, visit our website [www.laftech.com.au](http://www.laftech.com.au) for more information.

**The COVID-19 emergency requires the commitment of everyone**

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