

UV Irreversible Indicators

Product Code: UVI-001

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The UV Irreversible Indicators are process indicators of ultraviolet (UV) light exposure in UV-C disinfection systems. The indicators provide a simple visual monitoring of the available UV-C dosage. These indicator strips feature a photochromic polymer ink system. When exposed to the UV-C radiation of 254nm, there is a distinct color shift from white to purple. The indicators are adhesive backed and can be stuck on a wide variety of surfaces. These can be peeled off from these surfaces easily after each use.



The intensity of the UV light source that we had for our internal tests was 7200 $\mu\text{W}/\text{cm}^2$ at one foot, making the UV dose 432 mJ/cm^2 .

The UV-C radiation inactivates microbes by damaging their DNA. With UV technology it is possible to destroy a majority of pathogens within seconds, without addition of chemicals, without harmful side effects, inexpensively, efficiently and reliably.

The use of ultraviolet radiation to disinfect hospital rooms is well established. A novel application for a UV disinfection system includes placing the unit at a pass-through window in the Central Service departments in hospitals. The manually cleaned devices in the decontamination area would be thus sanitized at the UV disinfectors located at the pass-through window, before going to the clean side. Since manually cleaned instruments are perceived to be not very safe to handle, this no touch technology would not only supplement manual cleaning, but also provide an additional level of safety, thus rendering the devices safer to handle.

To evaluate the use of UV disinfection at the pass-through window, an internal study was conducted on cleaned instruments: comparing devices that were manually cleaned and those that were machine washed. This comparison study was designed to

evaluate if the manually cleaned instruments are safe to handle, as are the machine washed instruments.

The experimental design was to obtain a count of bacteria growing on the medical devices from both instrument sets: manually washed and machine washed.

Then pass it through the UV disinfectant and then obtain a bacterial count on both the sets, after it comes from the UV disinfectant.

The study demonstrated (Fig.1) that the microbial count on hand washed devices was much higher than those that were machine washed. The study also demonstrated that exposure to UV radiation after cleaning, reduces the microbial count drastically, thereby dramatically improving the safety of instruments!

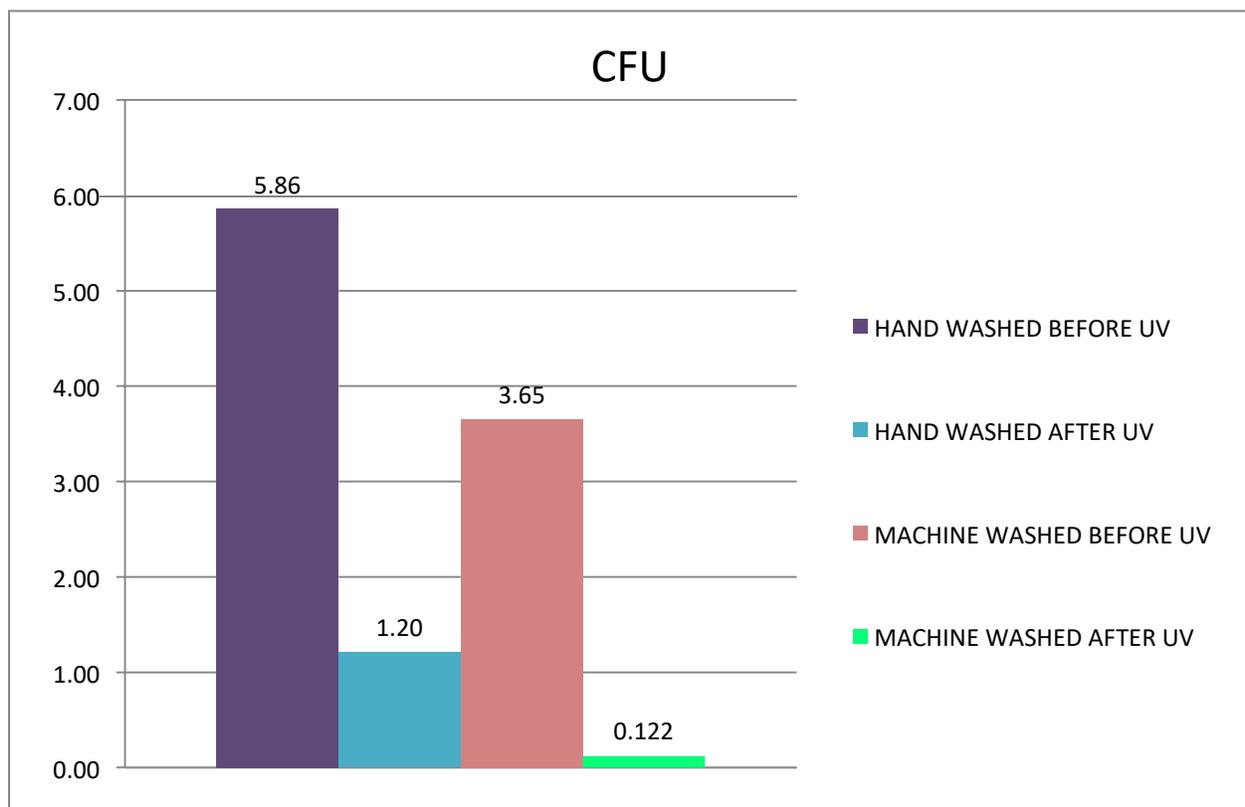


Fig. 1

A set of tests was conducted to see if the indicators showed uniform color change after every cycle (Fig.2).

Replications of the UV Indicators in ten rounds did demonstrate a uniform color change after 1 minute cycles.

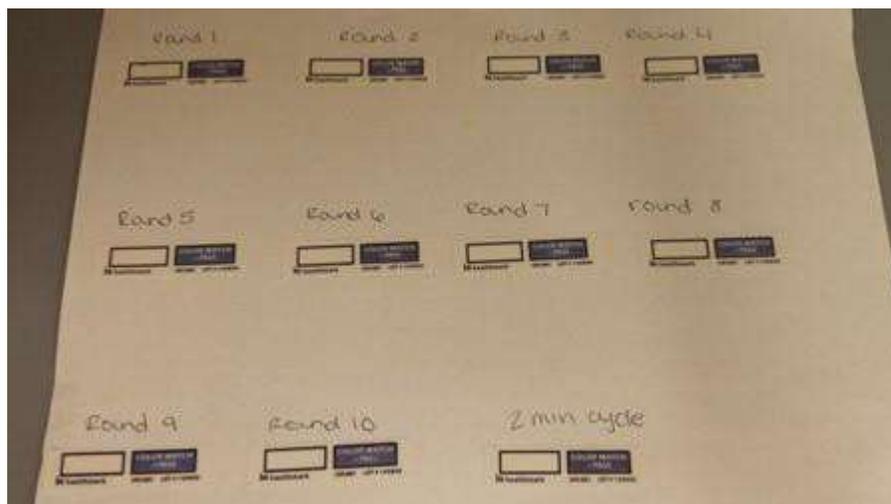


Fig.2

Indicators run for shorter time periods (Fig. 3) exhibit gradually lighter color change. The strips exposed to UV for 15 seconds, 30 seconds, and 45 seconds were gradually lighter than those exposed for 1 minute, correlating to the amount of exposure they received.

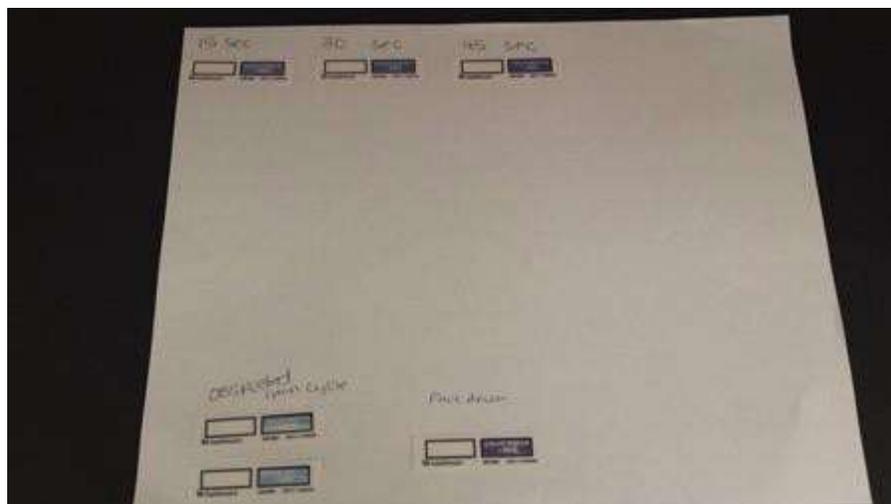


Fig. 3

To evaluate the amount of radiation exposure at different spots in a UV Flash disinfectant, the indicators were mapped in different locations at all the levels of the unit (Fig. 4). The map of the different placements demonstrated uniform color change.

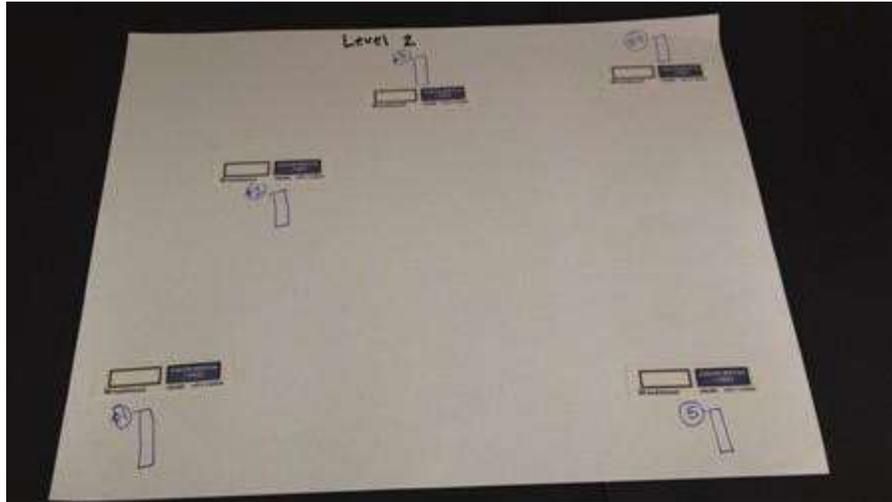


Fig. 4

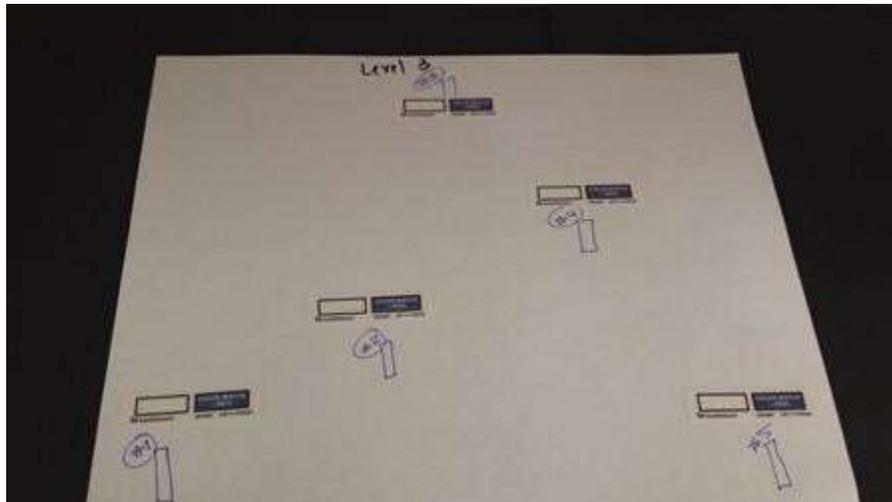


Fig. 5

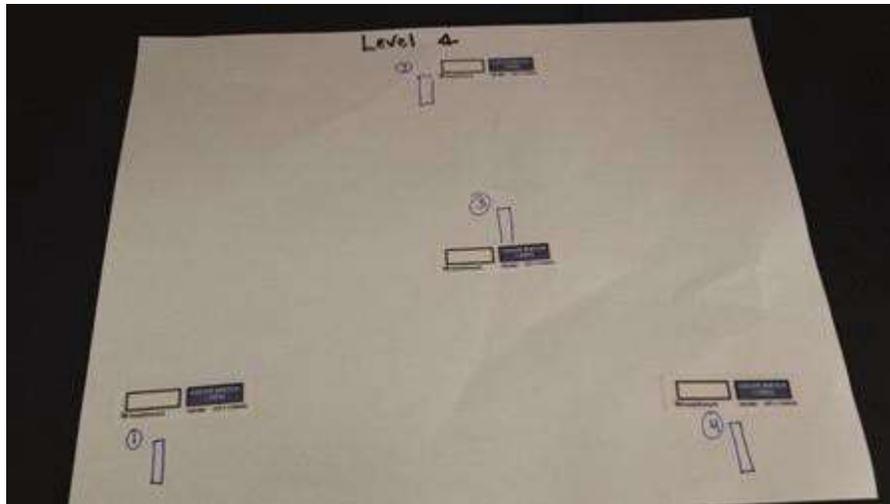


Fig. 6

The indicators were stuck on different substrates (Fig. 7): wood, plastic, stainless steel, glass, fabric, acrylic to note their performance on a variety of surfaces. The indicators showed a uniform color change after a complete cycle on all these surfaces. They also peeled off easily from all the substrates, thus demonstrating that these can be used on most surfaces in a hospital room that is being disinfected by UV radiation.



Fig. 7

To summarize, the UV indicators are a tool that provide the end-user a simple verification test to determine if the radiation inside the UV system did reach the desired wavelength.