



*“The Chlorine Dioxide People”*

## *Application Note #37 – Deli Production Facilities*

### **Introduction**

When it comes to cleaning and sanitizing a full production area with equipment, machinery, cracks, crevices, 30-foot ceilings, HVAC ducting, and myriad other obstacles, spraying or wiping chemicals onto everything can be a large task. Liquid chemicals like sprays or fogs need to have a certain concentration and contact time in order to guarantee a kill. Most importantly, and difficult, is that they need to contact every single organism in order to kill every single organism. Some liquids can also be harsh on equipment. Mists and vapors are composed of large molecules which can stick to surfaces and become blocked from getting into small openings like scratches, rather than filling the space and eliminating potential contamination. Any leftover chemicals may also need to be rinsed off.

Wipe-downs are less messy, but come with the added stress of trying to physically reach every surface in the area without missing a spot and without re-contaminating any surface during the process. This can be an extremely lengthy process requiring special equipment and plenty of extra time and energy from everyone involved. While wiping surfaces down sounds simple, contacting every area is an impossible task. Cracks, pipe and screw threads, and the interior of equipment will be impossible to completely decontaminate.

Chlorine dioxide and Ultraviolet light (UV-C) can fit into your sanitation program to help alleviate these stresses and fully eliminate pathogens from within a production facility.

### **Room Decontamination with Chlorine Dioxide Gas**

Chlorine dioxide is a true gas at room temperature, not a liquid, meaning it will follow the gas laws to evenly and completely fill its container, no matter how small or large a volume is being treated. ClorDiSys' chlorine dioxide (CD) gas process is registered with the US EPA as a sterilant, proven capable of eliminating all viruses, bacteria, fungi, and spores to a 99.9999% reduction level. With a molecule size of 0.124nm, CD gas can get inside machinery or equipment that would be difficult or impossible with liquids or vapors, simply because it is such



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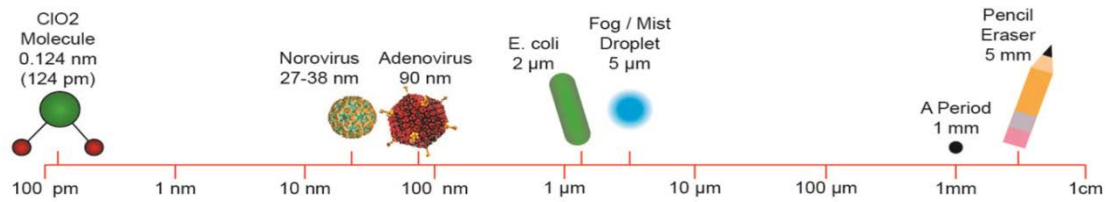


Figure 1: Size Comparison of Chlorine Dioxide to Common Micro-Organisms

a small molecule. Coupled with its gaseous state, this means it will contact every surface, penetrate into every crack, all equipment, ductwork and any other place that might harbor micro-organisms. The microscopic scratches that would normally be too small for a liquid or vapor to penetrate and kill organisms within become achievable when using CD gas. Being a completely residue free process enables CD gas to be used safely on food contact surfaces as no additional cleaning needs to be performed. In addition to the actual processing areas, a “Decon Room” can be created where portable equipment, supplies, tools, etc. can be rolled in and completely decontaminated in a smaller, controlled environment.

### **Minidox-M**

Decontaminating rooms, enclosures, and tented pieces of equipment is easy with the Minidox-M CD Gas Generator. It can connect to just about any space and provide a tightly controlled decontamination process to achieve a 6-log sterilization level kill. A continuous sample of the concentration of chlorine dioxide gas in air is taken to monitor the process and only allow it to complete when the proper dosage has been met. The Minidox-M can easily decontaminate areas up to 25,000 ft<sup>3</sup>, with a maximum capacity of 70,000 ft<sup>3</sup>. Easily portable, the Minidox-M can be moved throughout a facility due to its small footprint and easily maneuverable wheels. With a treatment cost of about \$0.06 USD per cubic foot, the Minidox-M offers an inexpensive method of providing the most effective and most reliable decontamination process available.



Figure 2: The Minidox-M™



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Figure 3: The Megadox-PTM

## **Megadox-P**

The Megadox-P CD Gas Generator expands on the Minidox-M by providing a larger capacity. With four times the capacity, the Megadox-P can easily decontaminate areas up to 100,000 ft<sup>3</sup>, with a maximum capacity of 280,000 ft<sup>3</sup>. It can connect to just about any space and provide a tightly controlled decontamination process to achieve a 6-log sterilization level kill. Continuous sampling of the concentration of chlorine dioxide gas in air can be taken at 1-5 locations in order to monitor the process. Once again, the process will only be allowed to complete once the proper dosage has been met. Easily portable on a palletized base, the Megadox-P can be moved throughout easily from facility to facility to provide decontamination at multiple facilities wherever they may be located. Offering the same treatment cost of about \$0.06 USD per cubic foot as the Minidox-M, the Megadox-P offers an inexpensive method of providing the most effective and most reliable decontamination process available.

## **Decontamination Services**

ClorDiSys offers routine preventive decontamination services where a team will come onsite and provide a turnkey service to safely decontaminate any size space. With over 1000 decontaminations performed for a variety of industries, facility types, building ages, and applications, our team has the experience to successfully accomplish any project.

### **Common applications include:**

- Spiral Freezers
- Aseptic Filling Areas
- Dry Processing Equipment and Rooms
- Trucks and Containers
- Tanks and Vessels
- Piping Systems
- RTE Processing Rooms



Figure 4: Food Processing Facility



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## Surface Disinfection with liquid Chlorine Dioxide

ClorDiSys offers CSI-3000™, a concentrated solution registered with the US EPA, that can be used to wipe, mop, or spray areas or tabletops. The solution can also be poured down floor drains which are typical trouble areas, or wiped on food preparation surfaces. CSI-3000™ can also be used as a spray or dip solution for red meat including meat parts and organs, processed, comminuted, or formed meat products to maintain longevity. Fruit and vegetables can also soak in CSI-3000™ to lengthen their shelf life. This fruit and vegetable rinse takes just one minute. CSI-3000™ is also beneficial to sanitize tools and can even be added to lube on conveyor systems to control slime.



Figure 5: CSI-3000™

## Surface Disinfection with UV-C

Daily maintenance of a clean, sanitized workspace is the most effective method to reduce the risk of contamination. Quaternary sanitizers are used in wipe-downs, but many of these sanitizers are not providing enough of a kill to prevent microbes from surviving. Most liquids require a longer contact time than a wipe-down can guarantee, meaning dangerous microbes can survive. If any of the sanitizer starts to evaporate before this time is satisfied, it can leave patches of surface contamination to remain viable after the treatment. Ultraviolet light, specifically UV-C, has been found to be a particularly useful tool in controlling surface organisms.

UV-C is a chemical-free technology which ensures a complete surface disinfection in mere minutes. It works by emitting light at the 254nm wavelength, which inactivates the DNA of cells, rendering them effectively dead. UV-C does not cause harm to most surfaces, with equipment, electronics, metals and most plastics safe for treatment over both the short and long term.



Figure 6: UV Lights, Bright Enough to Kill

UV-C light does not penetrate as well as CD gas can, but it is able to shine into crevices to a better degree than most liquid methods can reach as there is no surface tension issues to deal with. Whether the intent is to decontaminate an entire kitchen, or disinfect surfaces, or to prevent the need for a large cleanup operation, UV-C has the ability to provide an added layer of contamination control.



## **FLASHBAR™**

For a quick and easy solution to all disinfection needs, the Flashbar™ can be installed on any flat surface. Ceilings, walls, and even floors can be utilized as a permanent location for these UV-C fixtures. Mount them above work tables, slicers, conveyor belts, and any other areas that

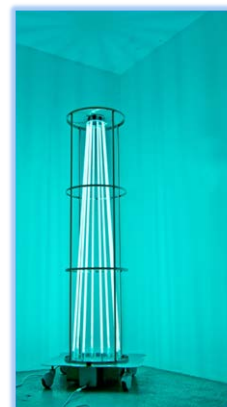


**Figure 7: UV Flashbar Disinfects rooms from Floor to Ceiling**

could become contaminated. After a physical cleaning, the Flashbar™ can then be switched on as personnel leave the room, disinfecting everything under the lights and assuring a clean, germ-free workspace upon return. For an alternative solution, install the lights in a designated disinfection room and wheel in any equipment that needs to be disinfected. UV-C does not pass through regular glass, so with a window anyone can safely observe from outside the area. The Flashbar™ is also available in varying lengths to allow for customizable options.

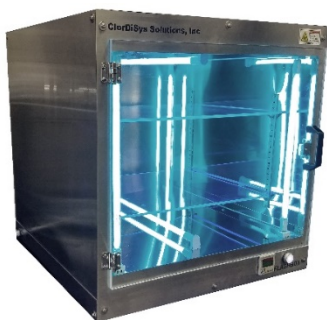
## **TORCH™**

The Torch™ is a six-foot tall tower which uses 8 UV-C bulbs to achieve a full 360-degree arc of germicidal light. Because of the full range of light, the Torch™ will disinfect walls, ceilings, floors, and any equipment the light touches. It comes fully equipped with motion sensors and remote start/stop, eliminating any safety concerns as an operator does not need to be near the Torch™ to operate it. Place it near equipment to disinfect in five minutes, then roll it away and work can continue. The Torch™ can also be used for tools and supplies. It can be placed in a closet or small room with items positioned so they can be treated.



**Figure 8: The Torch**

## **FLASHBOX™**



**Figure 9: The Flashbox**

The Flashbox™ is the perfect solution for smaller scale disinfection. With an interior space of 21.5" x 21.5" x 14" H and two adjustable shelves, the Flashbox™ can fit tools, utensils, or other small equipment for quick disinfection after washing. Operation is as simple as setting a timer and pressing the start button. The self-contained nature of the machine means no added safety protocols. Also, the close proximity to the bulbs means that disinfection is faster, requiring only one minute to eliminate harmful microbes. Pass-through options are available for bringing items into a clean area such as production, or a laboratory.



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## HVAC and Cooling Coil Disinfection

AirGlow™ is an in-duct ultraviolet light disinfection system that can be installed in any HVAC system. The AirGlow™ can help reduce and/or eliminate the growth of bacteria, mold and spores and also prevent the spread of airborne cold and flu viruses, as well as other airborne transmitted diseases. Placement of the AirGlow™ on cooling coils will also prevent any biofilms from forming or remove any preexisting biofilms. Even 0.0015 inches (1.5 thousands of an inch), can decrease energy efficiency by over 30%.

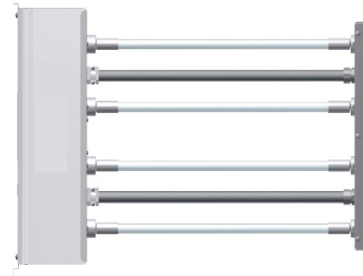


Figure 10: The Airglow

## Air Disinfection with UV-C

Torch Aire-Recessed™ is an ultraviolet light room air disinfection unit. Torch Aire-Recessed™ is designed to help eliminate airborne microbes, particularly in crowded or poorly ventilated areas, and in situations where the risk of cross contamination is high.



Figure 11: The Torch Aire-Recessed

Torch Aire-Recessed™ is easily mounted in a ceiling and fits especially well within a drop ceiling format. Torch Aire-Recessed™ pulls air inward and allows for enclosed UV-C bulbs to disinfect the air that passes over the bulbs. Torch Aire-Recessed™ is constructed of stainless steel with a reflective aluminum exposure chamber.

Torch Aire-Mega™ is a portable room air disinfection system. Since the UV-C bulbs are enclosed, the Torch Aire-Mega™ can be utilized in an occupied area. When in operation, air is drawn into the fixture through the four louvered filter panels which are located around the base of the fixture. The air passes then into the exposure chamber where it flows over twelve UV-C bulbs and is disinfected. The air then leaves the fixture through the louvered exhaust panel that is located on the top of the fixture. This design prevents UV-C exposure by restricting light from passing into the occupied room, making it safe for people to be in the room at all times.



Figure 12: The Torch Aire-Mega

Torch Aire-Mega™ is constructed of stainless steel and has a high polished interior for optimal reflectivity. The maximum treatment capacity is 120,000 cubic feet per hour, allowing for large spaces to have a sufficient amount of air exchanges to have continually disinfected air.



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## Case Study of Cutting Boards Treated with UV-C



Figure 13: Cutting Board

The University of Guelph studied the effect that the UV-C has on *Salmonella typhimurium* inoculated on plastic cutting boards (unscratched and scratched). The surfaces were incubated for 0 hours, 1 hour, and 24 hours at room temperature. After incubation, the cutting boards were then exposed for 1 minute and 5 minutes to UV-C light from our Lantern device. Current testing is being done using similar experiments for *Listeria monocytogenes*.

For *Salmonella typhimurium* inoculated on unscratched cutting boards, there was a >5-log reduction when exposed to UV-C for 5 minutes and about a 3-log reduction when exposed for 1 minute at all incubation times. For scratched plastic, there was a >5-log reduction at 0 hours and 24 hour incubation time, and a 3- log reduction at 1 hour incubation time. For a 1-minute exposure, there was a 2-log reduction for 0 hours and 1-hour incubation time and a 4-log for a 24-hour incubation time.



Figure 14: The Lantern

Unscratched Surface			
	No incubation	1-hr incubation	24-hr incubation
1 minute Exposure	3-log reduction	3-log reduction	3-log reduction
5 minute exposure	>5-log reduction	>5-log reduction	>5-log reduction
Scratched Surface			
	No incubation	1-hr incubation	24-hr incubation
1 minute Exposure	2-log reduction	2-log reduction	4-log reduction
5 minute exposure	>5-log reduction	3-log reduction	>5-log reduction

## Summary

Deli production facilities are environments that are under constant threat of contamination due to the nature of the product. ClorDiSys can help minimize the risk of contamination through the use of chlorine dioxide and/or ultraviolet light. Both have advantages to supplement existing contamination control and sanitation programs. Contact us to explore how both technologies can be implemented in order to protect your business to a greater degree.



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