



ClorDiSys

US-EPA Registered Sterilant




MICROBIAL DECONTAMINATION

Chlorine Dioxide Gas Equipment & Services

 Safest Fumigant Method

Minimal Production Downtime 

 True Gas at Room Temperature

Guaranteed Dosage with
Concentration Monitoring 

 Effective Against all Viruses, Bacteria,
Fungi, Mold, and Spores

Decontaminate Pieces of Equipment
up to Entire Buildings 

 No Residues or Additional Cleanup

Safe for the Treatment of
Food Contact Surfaces 

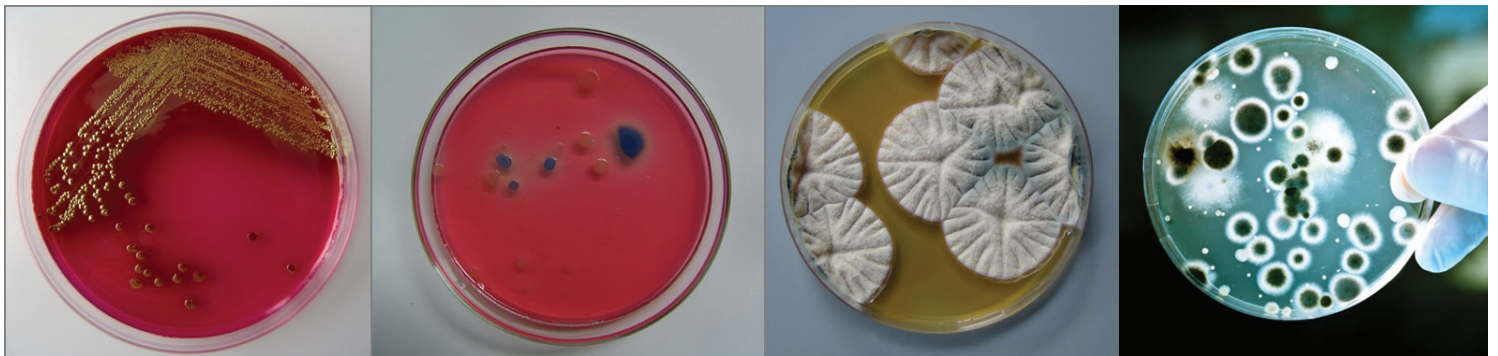
 Complete Decontamination of all
Surfaces and Niches

FOOD SAFETY

A clean food production environment is more important than ever

Food production facilities are facing greater scrutiny from both the public and the government to provide safe foods. The FDA has become more aggressive in its environmental monitoring and sampling under the food safety guidelines and regulations required by FSMA. Facilities will be closely monitored and tracked using the national laboratory network PulseNet, allowing foodborne illness cases to be traced back to the contaminated production facility or field of origin.

Advances in environmental monitoring and microbial sampling have brought to light the shortcomings of traditional sanitation methods. Recurring contaminations are caused by microorganisms that were never fully eradicated from the facility. While there are many reasons for recurring contamination by a persistent pathogen, insufficient cleaning and decontamination is the most common. Traditional cleaning methods, such as isopropyl alcohol, peracetic acids, quaternary compounds, bleach and ozone, are incapable of reaching all surfaces and crevices. Liquids, fogs and mists all have difficulty achieving an even distribution throughout an area, with surfaces closer or easier to reach receiving a higher dosage than those further away or in hard-to-reach areas, like the bottom, back or insides of equipment. These methods are able to reduce the organisms present, but have difficulty reaching crevices, pipe threads, screws, and other harbor locations, which allow the pathogens time to reproduce and recontaminate. Chlorine dioxide gas is able to overcome the inherent difficulties of other sanitation methods.



HOW CHLORINE DIOXIDE GAS BENEFITS FOOD MANUFACTURERS

- Elimination of pathogens within harbor areas that traditional sanitation cannot reach
- Reliable decontamination due to superior process control
- Used for both contamination response and prevention to ensure sterility
- Routine use provides better contamination control and recall prevention
- Does not leave residues, making it safe for the treatment of food contact surfaces
- Rapid decontamination to limit downtime in production
- Can provide a “clean break” in production batches

DECONTAMINATION SERVICES

We come onsite and decontaminate an area of your facility

Decontamination Services can be utilized for a variety of applications within the food industry from tented pieces of equipment and small chambers up to entire facilities. ClorDiSys has the capability to decontaminate areas over 4,000,000 ft³ (113,267 m³). **Services can be arranged for contamination response or preventive control needs.** They can be scheduled as needed or contracted for routine prevention in accordance with Environmental Monitoring Data, scheduled maintenance, and shutdown periods. If you have contamination issues or are interested in a complete facility decontamination prior to move-in, ClorDiSys can help you.

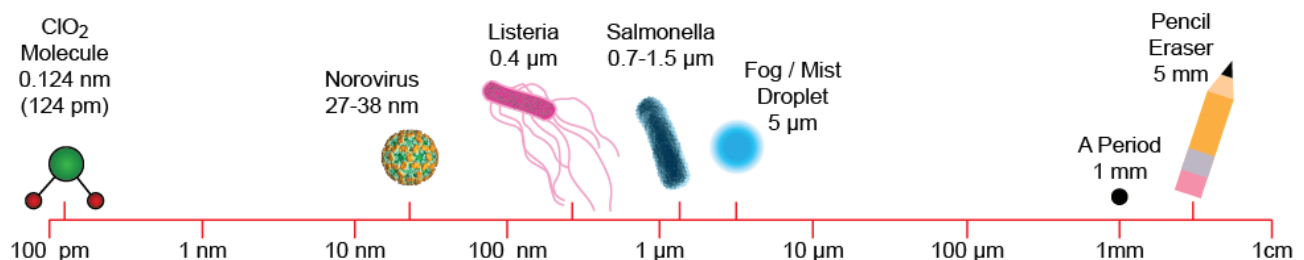
Chlorine dioxide (CD) gas is able to reach and kill all organisms wherever they are hiding. **CD gas naturally fills the area it is introduced into evenly and completely, and penetrates deeper into crevices than pathogens can hide because its molecule size is smaller than the smallest viruses, resulting in complete kill.** This allows a better decontamination than traditional sanitation methods such as sprays, mists, fogs, foams, and vapors. The treatment of harbor locations, which evade traditional sanitation, makes CD gas highly suitable for both contamination remediation as well as routine preventative decontamination. **Only gaseous decontaminating agents are truly effective in areas that are difficult to reach such as floor drains, HVAC grills, beneath furniture and equipment, inside of cabinets, hinges, instruments and components.**

The chlorine dioxide gas process allows for fast decontamination of all surfaces within the area being treated. Spaces are decontaminated all at once in order to limit transition areas where cross-contamination can occur. **Small volumes can be completed within a few hours, and entire facilities can be treated in 1-3 days which limits production downtime.** HVAC systems can be included in most cases as well to provide an even more thorough decontamination. The process leaves no residue, so there is no need to rinse, wipe down, or clean surfaces afterward.

SERVICE CONTRACTS ARE AVAILABLE FOR MONTHLY, BI-MONTHLY, QUARTERLY, OR YEARLY OCCURRENCES.

WHAT
Rooms
Pieces of Equipment
Entire Facilities
Transport Trucks/Shipping Containers
Processing/Holding Tanks
HVAC Ductwork

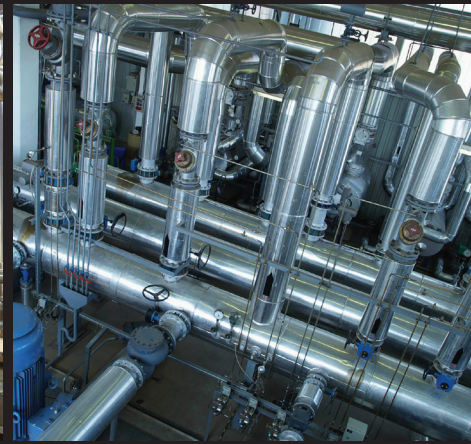
WHEN
New Construction
Renovations
Contaminations
Decommissioning
Routine Prevention
Between Batches



CHLORINE DIOXIDE GAS APPLICATIONS

Chlorine dioxide gas can be utilized for a multitude of applications because it is not affected by temperature, condensation, room size, density of equipment and many other factors that limit the effectiveness of other sanitation methods. Chlorine dioxide gas penetrates the hard-to-reach areas to remove harborage locations and growth niches.





DECONTAMINATION SERVICE CASE STUDIES

GRAIN REFINING & PACKAGING FACILITY

Flooded Facility

A 230,000 ft³ production facility was flooded by a nearby river during a season of heavy rains. The floodwaters completely submerged the first floor and most of the second floor, carrying a variety of organisms. A mildew odor was prevalent. Microbial remediation was required prior to production being resumed. The facility consisted of a large warehouse, a loading dock, a few processing areas, a packaging area, a break room, maintenance shops, and an office. The floodwater damaged some of the sheetrock walls beyond repair and contaminated the equipment with a number of different organisms. The sheetrock was removed, and the facility was physically cleaned of soil and debris prior to the fumigation using gaseous chlorine dioxide. ClorDiSys was able to successfully decontaminate utilizing chlorine dioxide gas, eliminating the organisms while providing sporicidal kill of Biological Indicators placed throughout the facility. All mildew odors were also eliminated.

ASEPTIC JUICE BOTTLING FACILITY

Post-Maintenance



A 25,000 ft³ aseptic juice bottling facility routinely utilizes chlorine dioxide gas to decontaminate after maintenance work and during scheduled plant shutdowns. This process allows the workers more flexibility in performing maintenance knowing that it will undergo complete decontamination before production is resumed. The plant also conducts chlorine dioxide gas decontaminations during its scheduled shutdowns to act as a preventative measure without causing production delays.

DAIRY POWDER PROCESSING FACILITY

Salmonella Remediation + Yearly Preventive Decon

In 2015, a 580,000 ft³ processing and packaging area contaminated with salmonella was decontaminated. ClorDiSys was able to eliminate the salmonella from the facility by treating the area (dryer, production floor, bin room, and packaging room) all at once. Since the initial remediation, the facility has undergone a preventive decontamination every fall during its yearly shutdown period. The decontamination occurs over the course of 2-2.5 days depending on other coinciding maintenance activities.



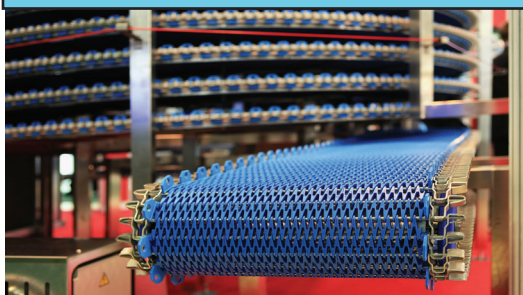
ASEPTIC JUICE DISTRIBUTION FACILITY

Between Batches

An empty 625,000 gallon aseptic juice holding tank has been routinely decontaminated prior to the delivery and introduction of the next batch of juice. This facility switched to chlorine dioxide gas for the decontamination of the holding tanks to reduce the downtime. Previously, they would fill the tank with an iodophor where it would reside for upwards of a week, but by changing to chlorine dioxide gas, the downtime was reduced to hours.

SPIRAL FREEZER

Listeria Remediation + Quarterly Preventive Decon



A 25,000 ft³ spiral freezer used at a frozen sausage production facility had a consistent listeria problem, producing positive environmental swabs time and again. After one treatment with chlorine dioxide gas, the facility reached 16 weeks without a single positive swab for listeria after swabbing 2-3 times per day. Upon achieving these results, the facility purchased a generator and instituted the use of chlorine dioxide gas on a quarterly basis for preventive decontamination.

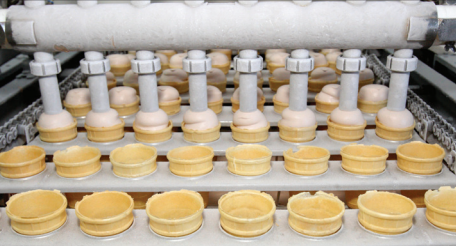
SPICE FACILITY

Salmonella Remediation

A 60,000 ft³ processing room at a spice facility had a salmonella contamination that they were unable to eliminate through traditional sanitation methods. The room and the piping system connecting the room to the adjoining space were decontaminated simultaneously using chlorine dioxide gas. The decontamination was accomplished within one day, and the salmonella was completely eliminated.

ICE CREAM FACILITY

Listeria Remediation



A 260,000 ft³ ice cream production facility was contaminated with listeria and traditional sanitation was unable to eliminate it. Once the facility performed maintenance and repairs to eradicate some harborage sites and update the sanitary design, ClorDiSys was brought in. The entire facility was setup and decontaminated over the course of two days and production started back up the following day.

BEVERAGE PROCESSING TANK

New Equipment Sterilization

A beverage processing facility was installing a new processing tank to help increase production. After the tank had been installed, but before it was put into use, the tank was decontaminated with chlorine dioxide gas in order to make it safe for product to be introduced. Treatment time to complete the decontamination was under 6 hours and the tank went into use the next morning. No rinse or wash down was necessary as ClorDiSys' chlorine dioxide gas does not leave a residue.



CONFECTIONARY

Decontamination of Tented Equipment

A roaster caught fire at a confectionary facility. Worried the water used by the fire department to put out the fire contained organisms which could contaminate their production line, they wanted to clean the equipment before production started again. The equipment's interior was not easily accessible, so once the majority of cocoa powder was removed, the company opted to decontaminate with chlorine dioxide gas. That equipment was tented and fumigated, as the rest of the room was not deemed a concern. The setup and decontamination of the roughly 8,000 ft³ space took place in one day and successfully provided a 6-log sporicidal reduction of all surfaces within the equipment.

TRANSPORTATION TRUCKS

Decontamination of a Vehicle

A food transport truck trailer was determined to have been contaminated with Salmonella from a load of food. The truck was decontaminated with chlorine dioxide gas over the course of 3 hours. Swabbing showed complete eradication of the organisms, and the trailer was put back into service.



CHEESE PRODUCTION FACILITY

Listeria Remediation

A 230,000 ft³ mozzarella cheese processing area was contaminated with listeria. While shutdown, the facility underwent minor renovations, then decontaminated it with chlorine dioxide gas. Prior to the fumigation, forklifts, pallets, parts, and equipment from other areas were brought into the mozzarella processing area in order to maximize the impact of the decontamination. The decontamination took one day and production started back up the next day.

TORTILLA PRODUCTION AREA

Salmonella Remediation + Routine In-House Decon

A 50,000 ft³ tortilla production area was contaminated with salmonella. The space was decontaminated using chlorine dioxide gas, and the salmonella was completely eliminated. Months later, the facility found salmonella at other locations within the facility, but the Tortilla Room remained negative. Pleased with the Tortilla Room's lasting results, the facility purchased a CD gas generator to routinely decontaminate other areas of the facility.

WHAT IS CHLORINE DIOXIDE?

Chlorine dioxide (CD) is a greenish-yellow gas with a chlorine-like odor recognized since the beginning of the 20th century for its disinfecting properties. It is widely used as an antimicrobial pesticide and an oxidizing agent in drinking water as well as to whiten paper for the pulp and paper industry.

ClorDiSys uses chlorine dioxide gas for its broad efficacy against microorganisms. It is applied in a number of different applications and industries to provide a 6-log (99.9999%) sterilization level decontamination. The rapid sterilizing activity of CD is present at ambient temperature and a wide range of gas concentrations, from 0.3 to 20 mg/L.

Chemical Formula:	ClO ₂
Molecular Weight:	67.45 g/mole
Melting Point:	-59°C
Boiling Point:	-40°C
Density:	2.4 times that of air

True Gas at Room Temperature

Chlorine dioxide is a true gas at room temperatures which enables it to fill the space it is contained within evenly and completely, just like oxygen in air. This property is essential when trying to eradicate pathogens from an area, as the gas will get everywhere and not allow anything to “hide” from it.

Measured and Controlled

Due to its yellow-green color, chlorine dioxide gas can be measured using a photometer. A photometer measures the darkness of the gas (darker color = higher concentrations) which allows for a highly accurate and reliable measurement to ensure tight process control.

Different from Chlorine

While “chlorine” is in its name, chlorine dioxide gas is VERY different. Chlorine dioxide’s method of kill is oxidation, where chlorine kills through chlorination. Therefore, unlike chlorine, chlorine dioxide does not produce environmentally undesirable organic compounds and is safer on materials.

HOW DOES CHLORINE DIOXIDE WORK?

Chlorine dioxide acts as an oxidizing agent, which kills organisms by “stealing” electrons from cells, which breaks their molecular bonds. The method and potency of chlorine dioxide gas prevents cells from mutating to a resistant form. This eliminates the need to rotate decontamination methods to prevent overuse and resistance. Additionally, because of the lower reactivity of chlorine dioxide, its antimicrobial action is retained longer in the presence of organic matter making it more effective than most other decontamination methods at killing within dust, dirt, and other organics.

IS CHLORINE DIOXIDE ENVIRONMENTALLY FRIENDLY?

Chlorine dioxide’s properties make it an ideal choice to meet the challenges of today’s environmentally conscious society. Chlorine dioxide gas is non-carcinogenic, leaves no residues or waste to treat or clean up, and does not deplete the ozone layer. It can be safely vented into the atmosphere in all parts of the world. It is used to treat drinking water and approved for organic crops on the USDA’s National List of Allowed and Prohibited Substances. (7 CFR §205.601)

HOW DOES CHLORINE DIOXIDE REACT WITH WATER?

While chlorine dioxide has “chlorine” in its name, it is very different from chlorine. Chlorine reacts with water to form hydrochloric acid, but chlorine dioxide does not and maintains a neutral pH in water. Gaseous CD is the only decontaminating fumigant that penetrates water, decontaminating both the water and the surface beneath. If liquid is present, the sterilization efficacy of CD is not affected.

SAFETY

All decontamination agents are dangerous as this is their function. However, gaseous chlorine dioxide can be used safer than other fumigation methods due to its chemical properties and safety profile.

SAFETY WARNINGS (SELF ALERTING)

The best safety feature with CD is that it is self-alerting. Chlorine dioxide gas has a smell very similar to chlorine. It has an odor threshold at or below the 8 hour Time Weighted Average (TWA), so the user is made aware of exposure at a low, safe level. The potential for personal harm is decreased drastically being that workers can make corrective actions towards the cause of the leak or vacate the area without being subjected to unsafe levels. While there are external sensors, badges, and monitors available for chlorine dioxide gas, they do not need to be relied upon as heavily and the chance of experiencing a health hazard is greatly reduced.

SHORTER CYCLE TIMES

Chlorine dioxide is the fastest acting decontaminating gas or vapor. For the various decontamination methods, cycle times can range from 3½ hours to over 12 hours to decontaminate a 2500 ft³ room (70.8 m³). With normal aeration exhaust rates, a CD cycle would be about 3½ hours or less, formaldehyde would be about 12½ hours, and VPHP could be 10+ hours when you include the aeration times. This means that a potentially unsafe condition exists for a far shorter time when using CD.

EQUIPMENT LOCATED OUTSIDE THE TARGET CHAMBER

The CD generating equipment is located outside the decontamination target chamber. If equipment is inside the chamber and an issue occurs, the user may have to enter with a decontamination agent present in order to shutdown. Since CD generation equipment is located outside the chamber, if an issue occurs, the equipment can easily be shutdown by hitting the stop button located on the generator or simply pulling the plug.

QUICK EMERGENCY AERATION

Chlorine dioxide gas is removed quickly from a space being it is a dry process that doesn't absorb or condense onto materials. Rooms can be aerated in as little as 30 minutes, while entire facilities can be down to safe levels in as little as 60 minutes. Chlorine dioxide gas is not an ozone depleting chemical so ventilation to the outside is permitted, allowing faster aeration. For facilities which cannot accommodate outside ventilation, chlorine dioxide gas can be removed using carbon based scrubbers.

NON-CARCINOGENIC

Chlorine dioxide gas is not considered to be carcinogenic, and the ACGIH does not list CD as a carcinogen of any kind. Chlorine dioxide is used to treat fruits, vegetables, poultry, and other foods. It has also been used in the treatment of drinking water since the 1920's around the world.

NO RESIDUES

Our proprietary method of generating chlorine dioxide gas produces a dry, 100% pure chlorine dioxide gas which leaves no residue after treatment. One of the first commercial uses for this method of chlorine dioxide gas was for the sterilization of implantable contact lenses, where it was proven to the FDA that no trace of a residue was left on the contact lenses. Other chlorine dioxide gas providers generate the gas using liquids, and their byproducts can create corrosive and unsafe residues.

COMPLETE DECONTAMINATION

Chlorine dioxide and formaldehyde are gasses that reach and penetrate all surfaces and crevices, unlike vapors which have trouble guaranteeing complete coverage and penetration. While it distributes nicely, formaldehyde is a residue forming carcinogen which cannot penetrate water. As the only decontaminating agent able to penetrate water, CD gas decontaminates the water and the surface beneath it. If the decontaminating agent cannot reach ALL of the dangerous organisms, at the proper concentration, for the prescribed amount of time, then a complete decontamination will not occur causing worker and product safety to become compromised. CD gas is able to be accurately measured in realtime using a UV-vis spectrophotometer, allowing for the correct concentration and exposure levels to be met every time.

US vs. THEM

Comparison of ClorDiSys and Traditional Sanitation Methods

Chlorine dioxide gas is not an alternative to traditional sanitation, but used as a supplement to provide a more complete decontamination. In order for any antimicrobial agent to be effective, it must achieve the following:

- The agent must be capable of killing the organisms in question.
- The agent must be able to reach the organisms.
- The agent must contact the organisms at the correct concentration and time necessary to kill them.

If the antimicrobial agent is able to achieve all three points, then decontamination will be successful. Traditional sanitation methods, such as sprays, fogs, liquids, steam and ozone, all have challenges trying to accomplish these points fully. Unable to consistently achieve all three rules of decontamination, these procedures often leave behind organisms in harborage sites, causing “recurring contaminations” as time goes on. Chlorine dioxide gas is different.

SPRAYS, FOGS, & LIQUIDS	OZONE	STEAM
<p>Chemicals capable of eliminating specific organisms can be identified by reading their EPA approved product label. However, these methods lack the ability to contact organisms in hard-to-reach areas. Behind, underneath, and inside equipment becomes difficult for these methods to reach, as are cracks, crevices, and drains.</p> <p>Locations further away from the injection point and in hard-to-reach locations will have lower concentrations than nearby locations, making it very difficult to guarantee that all organisms are contacted at the right concentration for the right amount of time.</p>	<p>Ozone is effective against all organisms and is a true gas. However, its challenge is that it breaks down very quickly. This makes it difficult in reaching and killing organisms that are not close to the injection location, as the ozone levels will diminish the further the gas gets from the generator. As such, it becomes difficult to achieve a complete decontamination of large spaces such as rooms, and typically have limited efficacy.</p>	<p>Steam is capable of killing all organisms, but its efficacy is limited due to its difficulty treating large areas or intricate pieces of equipment. The main challenge is raising the temperature high enough at all points to eliminate all resident pathogens.</p> <p>Additionally, not all items can be steam treated due to the effect that moisture and condensation can have on electronics and other temperature sensitive components.</p>
CHLORINE DIOXIDE GAS		
<p>Chlorine dioxide gas is able to access the harbor locations and prevent recurring contaminations from happening. Being a true gas, it will fill the space it is introduced into evenly and completely. With a molecule size smaller than the smallest bacteria, it can reach further down crevices than organisms can hide. Together, this means that there are no safe spaces for pathogens in your facility. With the capability of monitoring its concentration at multiple locations throughout the area, the process is only complete when the correct parameters have been met. This leaves the decontamination process extremely effective compared to traditional sanitation.</p>		



US vs. THEM

Comparison of ClorDiSys and Other Chlorine Dioxide Gas

	ClorDiSys Solutions	Others' CD Gas
EPA Registration	Approved as a sterilant (6-log sporicidal reduction)	Not approved as sterilants
Purity of CD Gas	100%	Less than 100%
Concentration Monitoring	Highly accurate sampling from multiple locations	Less accurate sampling method at single location or none at all
Humidity Control	Environment kept at $\geq 65\%$	Does not control humidity

ClorDiSys approaches decontamination differently than other chlorine dioxide gas companies.

We strive for excellent process control, high quality, and outstanding safety. Our principals were a part of the team who developed and refined this method of decontamination at Johnson and Johnson™. At ClorDiSys, we've built upon that knowledge by conducting research and performing testing on many topics and applications.

Our chlorine dioxide gas is registered with the US EPA as a sterilant.

It is proven capable of providing a 6-log (99.9999% reduction) of all viruses, bacteria, fungi, molds and spores. Our chlorine dioxide gas is the only one registered at this highest antimicrobial level.

Our method of generating chlorine dioxide produces a 100% pure gas.

Other methods of generating chlorine dioxide gas are not as pure, introducing acidic byproducts into the area which can cause corrosion issues and potentially leave residues. ClorDiSys' chlorine dioxide gas has been proven to the FDA to leave behind no measurable residue.

Our decontamination process recognizes the importance of relative humidity for sporicidal reduction.

Our studies have shown that a relative humidity level of $\geq 65\%$ is essential to eliminate spores. Humidity is important for sporicidal reduction as it causes the spores' hard shell to swell and crack, which allows the chlorine dioxide inside to inactivate the spore easier.

ClorDiSys uses a highly accurate UV-vis spectrophotometer to measure the concentration.

Our Decon Service team measures the concentration of chlorine dioxide gas throughout the entire process at multiple locations in order to ensure that all locations reach the proper dosage necessary to achieve a 6-log sporicidal reduction. Other chlorine dioxide gas decontamination processes monitor one location using a less accurate chemical sensor, making the process less repeatable and reliable.

PROCESS CONTROL AND VALIDATION

ClorDiSys provides superior process control to help ensure the decontamination process is effective. Most importantly is our EPA Registration, which proves the process' effectiveness at completely eliminating all viruses, bacteria, mold, fungi and their spores. ClorDiSys utilizes a reliable, highly accurate concentration monitor to measure the chlorine dioxide gas concentration continuously throughout the process. This concentration monitor has been validated by the US Army and US EPA to give an accurate measure the concentration and the overall dosage. The dosage becomes the governor of the decontamination process itself, such that the process is not completed until the proper dosage has been reached.

To validate the process achieved a 6-log sporicidal reduction, ClorDiSys employs the use of biological indicators (BI's). Also known as spore strips, BI's consist of a paper substrate impregnated with over a million bacterial spores wrapped within Tyvek®. With spores being more resistant than bacteria and viruses, BI's are a great indicator of process efficacy. BI's can be placed in the hard-to-reach areas of a facility, including the inside of equipment, under forklift tires, inside closed cabinets, and next to known hot spots. After the decontamination, BI's are processed to ensure 100% kill.

MATERIAL COMPATIBILITY

Chlorine dioxide is an oxidizer, as is hydrogen peroxide, ozone, bleach, and many other decontaminating agents. However, CD gas is the gentlest on materials among those options due to its lower oxidation potential. A higher oxidation potential means it's a stronger oxidizer and more corrosive. Chlorine dioxide has an oxidation potential of 0.95V, which is lower than other commonly used decontaminating agents.

Biocidal Agent	Oxidation/Corrosion Potential (V)
Ozone	2.07
Peracetic Acid	1.81
Hydrogen Peroxide	1.78
Sodium Hypochlorite	1.49
Chlorine Dioxide	0.95

While scientifically less corrosive, chlorine dioxide gas has a bad reputation due to the link with chlorine as well as the other chlorine dioxide products that lack the purity that our process uses. Other methods of generating chlorine dioxide mix an acid and a base which forms a chlorine dioxide solution which is then off-gassed to fumigate a space. That generation method produces two acidic components, acidified sodium chlorite and chlorous acid, alongside chlorine dioxide which makes these methods more corrosive. Our method of generating pure chlorine dioxide gas is accomplished by passing a low concentration chlorine gas through a proprietary sodium chlorite cartridge to convert the chlorine gas into pure chlorine dioxide gas. This allows our process to be safe when decontaminating stainless steel, galvanized metals, anodized aluminum, epoxy surfaces, electronics, and the most common materials of construction. Typically, if water will not corrode an item, neither will our CD.

DRY STERILIZATION

Our chlorine dioxide gas is generated through a completely dry process, leaving no concern over liquid-sensitive materials or components being affected.

OUR GENERATION METHOD

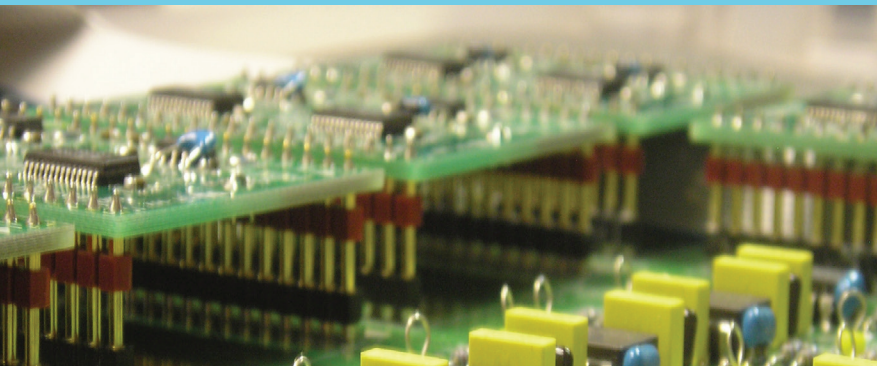
Not all chlorine dioxide products are equal. Our CD gas generators produce a pure chlorine dioxide gas without the acidic byproducts typical of other chlorine dioxide products.

OXIDATION POTENTIAL

Pure chlorine dioxide has a lower oxidation/corrosion potential than ozone, peracetic acid, hydrogen peroxide, and bleach. This means chlorine dioxide is safer on materials than those chemicals.

RESIDUE FREE

Our CD gas does not leave a residue on equipment and surfaces after a decontamination. Once the gas has been removed, the area is safe and does not require additional cleanup.



IF YOU DON'T TRUST US, TEST US!

We offer free* material compatibility testing for items you are concerned about.

*ClorDiSys will expose your items to chlorine dioxide gas, then return to you for observation and testing. Testing is free for small items or batches less S/H. For large items or extended testing, please call.

CD has been used to decontaminate interior components of a \$3 million Transmission Electron Microscope with no adverse effect.



PORTABLE CHLORINE DIOXIDE GAS GENERATORS

The ClorDiSys family of portable chlorine dioxide gas generators all automatically control the decontamination process. They have the capability to interface with nearly any chamber or room, as well as building management systems. The generators are manufactured using industrial components, feature password protected HMIs, and have cycle management systems with real time trending. Easy to learn and easy to use, our portable CD generators are perfect for routine decontamination. No cycle development is needed, the same cycle works regardless of the application or space.

MINIDOX - M™ Sterilization System



- Accurate CD Gas concentration monitor ensures every cycle is effective
- Able to decontaminate spaces up to 70,000 ft³ (1,982 m³) in ideal conditions
- Fully automated process
- Efficiently decontaminate any enclosed space
- Simple control system and interface
- Multiple alarms and checkpoints for increased safety
- Dual data storage via paper printout and USB drive
- No required maintenance contracts
- Injection tubing can fit under most doors without any modifications
- Remote monitoring with laptops, tablets, and smartphones available

IDEAL APPLICATION: Any facility looking to decontaminate rooms, isolators, equipment, or supplies

Overall Size:
30" W x 56" H x 29" D

Power: 100-240 VAC
5 amp, single phase

MINIDOX-B™	MINIDOX-L™
The Minidox-B offers cost savings compared to the Minidox-M by removing the concentration monitoring system. This makes the Minidox-B closely comparable to Hydrogen Peroxide generators in that they inject based on volumetric calculation. It can be used on any room or chamber sized between 1-20,000 ft ³ (566 m ³).	A smaller, more economical gas generation system designed for use in any chamber under 300 ft ³ (8.5 m ³) such as an isolator, incubator, HEPA housing, or a Biological Safety Cabinet (BSC). It includes a BSC interface plate, carbon-based scrubber for removal of CD gas, and required tubing.

CLORIDOX-GMP™

The Cloridox-GMP Sterilization System can be used on any room or chamber up to 70,000 ft³ (1982 m³) in ideal conditions. The system can also be attached to most vacuum chambers to provide a method for component or product sterilization as well. The Cloridox-GMP features fully validated software and comes standard with an accurate, real time concentration monitor, allowing for tight process control, easy validation, and repeatability.

IDEAL APPLICATION: GMP facilities or facilities where vacuum cycles need to be conducted in addition to the decontamination of rooms, isolators, pass-through chambers, spiral freezers, tanks, vessels, equipment, or supplies.



Overall Size:
45" W x 64" H x 28" D

Power: 100-240 VAC
5 amp, single phase



MEGADOX - P™

The Megadox-P chlorine dioxide gas generation system provides a rapid and highly effective method to decontaminate large volume areas up to 280,000 ft³ (7,928 m³) in ideal conditions with a concentration monitor that can measure from up to 5 locations

The Megadox-P is portable in design with the same dimensions as a standard pallet for fast transport around a facility or around the world. All instrumentation, including the concentration monitoring system, can be easily calibrated to traceable standards.

Overall Size:
48" W x 76" H x 48" D

Power: 100-240 VAC
10 amp, single phase

EQUIPMENT DECONTAMINATION CHAMBERS

The Equipment Decontamination Chamber is custom designed for use with any ClorDiSys CD Generator. It provides the ability to rapidly and effectively decontaminate computers, electronics, instruments, supplies, components, and equipment entering an aseptic or clean facility, acting as a pass-through chamber. Items can also be decontaminated before removal from a dirty area into a clean area without the concern for cross-contamination.

IDEAL APPLICATION: Decontaminating incoming products, equipment, or supplies into a research or production area.



LIQUID CHLORINE DIOXIDE PRODUCTS

CD-TABS™ Chlorine Dioxide Generating Tablets



CD-TABS offer a simple method for generating chlorine dioxide liquid. Simply drop one tablet into a gallon of water to produce a generic, 100 ppm solution of liquid chlorine dioxide in under 10 minutes. CD-TABS are inexpensive, easy to use, and provide a non-acidic, chlorine dioxide odor-control solution. If higher concentrations are desired, simply add another tablet.

Chlorine dioxide keeps all of its properties when dissolved in water.

Acidic by-products generated by most other liquid methods can cause harm to equipment and surfaces. CD-TABS create a neutral pH solution and won't cause these issues.



CSI-3000™ Liquid Chlorine Dioxide Concentrate

CSI-3000 is EPA-registered (#75757-2-80802) pure chlorine dioxide concentrate. No on-site mixing or “activation” is required, just dilute from the 3000 ppm to your use concentration. It is storage stable at room temperature and simply applied by chemical feed pump. It is used to control microorganisms in research, production, pharmaceutical and agricultural applications. It is easier to apply, safer to handle, and more effective than chlorine or bromine-based products. It rinses clean with no residue.

APPLICATIONS:

- Sanitizer for Food and Non-Food Contact Surfaces
- Sanitizer for Food Processing Equipment
- Microbial Control and to Extend Freshness of Fruit and Vegetable Washes
- Treatment of Cooling Water Systems, Process Water Systems, Flume Waters, and Cooling Towers
- Treatment of Ventilation Systems
- Disinfect Water for Consumption by Poultry, Swine, and Cattle



AVAILABLE IN 6 DIFFERENT SIZES

½ Gallon

5 Gallons

15 Gallons

30 Gallons

55 Gallons

275 Gallons

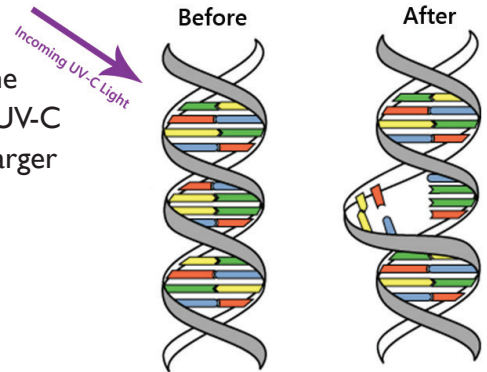
ULTRAVIOLET LIGHT DISINFECTION

In addition to chlorine dioxide gas, ClorDiSys offers a line of ultraviolet light products and services.

EPA Est. #80802-NJ-001

WHAT IS UV EFFECTIVE AGAINST?

UV-C has been proven effective against a broad spectrum of microorganisms including viruses, bacteria, molds, and even spores. UV-C works by altering the nuclei of a microorganisms cells to prevent replication and cause cell death. UV-C works quickly, providing high-level disinfection in small areas in seconds and larger areas in minutes depending on the system being employed.



SAFETY

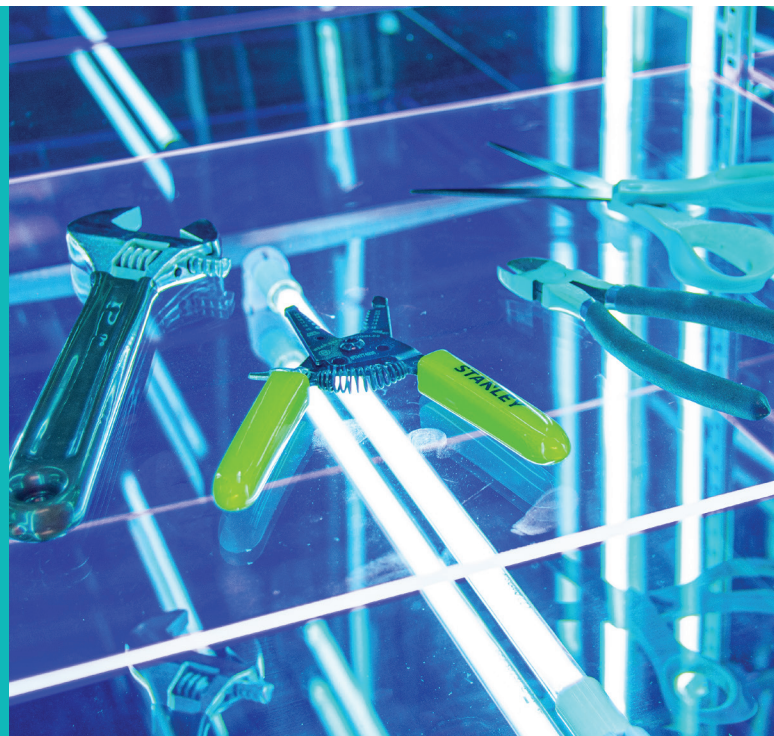
UV-C presents a hazard to skin and eyes, so direct exposure is always to be avoided. UV-C is blocked by a number of materials, including glass (but not quartz glass) and most clear plastics, so it is possible to safely observe through a window. UV-C is chemical-free, so there are no dangerous residues to be wiped down or neutralized after the disinfection occurs.

BENEFITS

- Disinfection in minutes, which allows for extremely fast turnover times
- Quick to learn and extremely easy to operate
- Unaffected by temperature, pressure, or humidity level
- No sealing of doors, vents, or windows is necessary
- The cost to run is very low, with a typical treatment cost under 2 cents.
- Requires little maintenance or upkeep
- UV-C bulbs last thousands of hours

COMMON APPLICATIONS

- Production rooms
- Electronics, parts, tools, and supplies
- Micro labs
- Transport vehicles
- Processing tanks and vessels
- Pass-throughs and conveyors
- Reduction of airborne organisms
- Elimination of odors
- Product, packaging, and components
- Shoes and safety glasses
- Water systems



the FLASHBAR™

Ideal for Creating Custom Disinfection Rooms, Installing on Conveyors or General Room Disinfection

The Flashbar is a highly versatile tool for disinfection. Lightweight, simple in design, and available in a number of sizes and strengths, Flashbars can be used for a variety of contamination control purposes. Flashbars have been mounted to walls, ceilings, conveyors and other sites to offer targeted disinfection of common areas and specialty sites. Furthering their flexibility in design, Flashbars can be wired to switches, timers, motion sensors and other advanced control systems.

The Flashbar is available in multiple sizes and styles, from 18" to 48" and can utilize 1, 2, or 4 bulbs depending on your application and requirements.



The 2-bulb, 4 foot Flashbar outputs UV-C light at 68 $\mu\text{W}/\text{cm}^2$ at ten feet to provide rapid disinfection.



Custom Disinfection Rooms

Using Flashbars to create your own disinfection room is exceptionally easy and offers many benefits. UV-C is a measurable, repeatable disinfection method which can be used more reliably within a disinfection protocol than manual spray and wipe methods to disinfect items entering a cleanroom area.

Custom solutions and configurations are determined based on the room size and typical dimensions of items entering the space. Systems can range in complexity based on each facilities requirements and budget. Contact us for complimentary assistance in determining the best system for your facility.

Options:

- Motion sensors to prevent accidental exposure
- Magnetic locks to prevent accidental exposure
- Variable exposure timers
- UV-C Sensor for dosage reporting
- Integration into building management systems
- Lamp guards to help protect accidental breakage

the FLASHBOX™ and FLASHBOX-MINI™

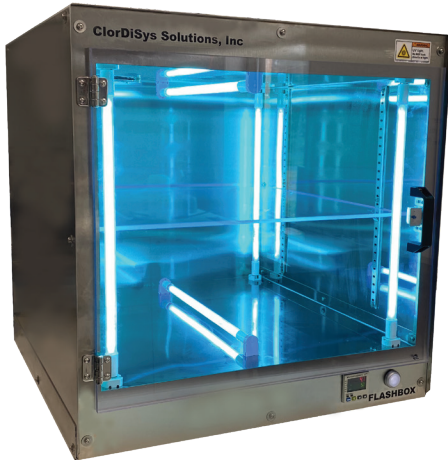
Ideal for Handheld Electronics and Small Items

The Flashbox and Flashbox-mini UV Disinfection Chambers provide a rapid and highly effective method to disinfect laptops, tablets, keyboards, phones, electronics and components. Both offer a calculated 99.99% reduction of common viruses and bacteria in 30 seconds and spores in minutes, disinfecting components without removing them from the room, minimizing the chance for cross-contamination.

The Flashbox-mini contains 2 protected UV-C bulbs, one on the top and one on the bottom, and a quartz glass shelf. The Flashbox contains 6 protected UV-C bulbs and a quartz glass shelf to provide increased disinfection coverage of items placed inside. Quartz glass shelving allows for full exposure of all surfaces on items being disinfected.

A recent MIT study determined the Flashbox-mini was the most effective and consistent method for sanitizing smartphones.

FLASHBOX™



Specs

Usable space for items:

14" H x 23" D x 18.5" W

Overall Dimensions:

25.75" H x 24" D x 24" W

Weight: 90 lbs.

Power: 115 VAC, 3 Amps

Bulb Lifespan: 16,000 Hours

Optional 2nd Shelf Available

FLASHBOX-MINI™



Specs

Usable space for items:

5" H x 6" D x 12" W

Overall Dimensions:

9" H x 8" D x 14" W

Weight: 11 lbs.

Power: 115 VAC, 2 Amps

Bulb Lifespan: 11,000 Hours

the FLASH-THRU™

UV-C Pass-Through Chamber

The Flash-Thru provides a swift and highly effective method to disinfect equipment, tablet computers, laptops, keyboards, phones, electronics, instruments, and components entering a clean room. Flash-Thru offers dual-door design to disinfect components in between an ordinary room and a clean room without any cross-contamination.

The Flash-Thru contains quartz glass shelving to support the item(s) being disinfected while allowing for UV-C disinfection of the surface in contact with the glass shelf. The chamber produces an efficient UV-C output of 60 mJ/cm² every minute to get a calculated 99.9% reduction of bacteria in 10 seconds and a 99% reduction of spores in one minute. Bulbs last up to 16,000 hours making maintenance use and maintenance costs extremely affordable.



Specs

Usable space for items:

14" H x 23" D x 18.5" W

Overall Dimensions:

25.75" H x 24" D x 24" W

the FLASH TUNNEL™

Ideal for Packaged Raw Materials & Items Entering a Production Facility

The Flash Tunnel is a UV Disinfection system providing a quick, chemical-free, liquid-free method of aseptically bringing packaged raw materials and other products into a production facility. The Flash Tunnel can be customized to fit specific needs and requirements of any space. Featuring 360° of UV-C coverage to disinfect all sides of the items passing through, the Flash Tunnel offers a measurable and consistent disinfection method more reliable than manual wipe down methods.



Options:

- Conveyor dimensions
- Conveyor material
- Conveyor speed
- Disinfection level (UV-C Intensity)
- UV-C Intensity Monitor for reporting
- Variable speed control

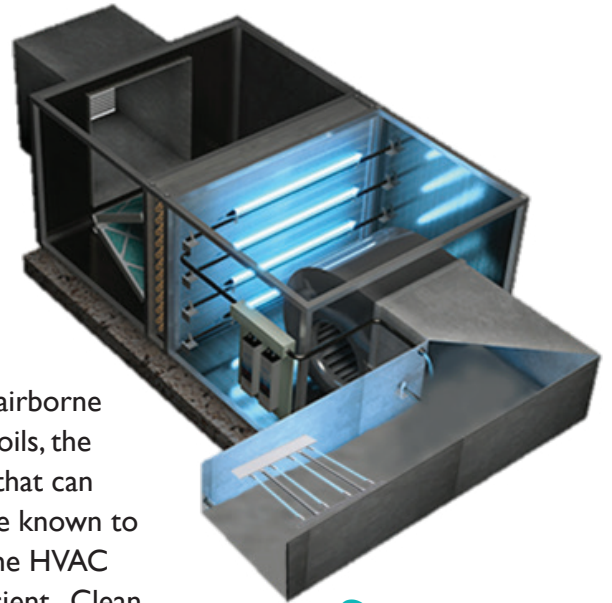
the AIRGLOW™

In-Duct Ultraviolet Light Disinfection

The AirGlow helps reduce and/or eliminate the growth of bacteria, mold and spores on supply and return airflow or within cooling coils. Designed for continuous and long-term use, the AirGlow is constructed out of corrosion-resistant stainless steel and uses UV-C bulbs with a lifespan of 13,000 hours (approx. 18 months).



When used in the ductwork, it kills airborne organisms. When used on cooling coils, the AirGlow is used to reduce biofilms that can accumulate on the coils. Biofilms are known to increase static pressure and cause the HVAC system to work harder and less efficient. Clean coils can deliver a 30% increase in cooling capacity which in turn reduces energy consumption and costs.



Specs

Overall Size:

16-13/16" H x 8-1/8" W

x Various Depths

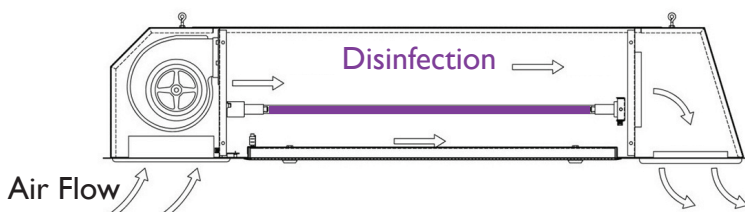
Power:

120/230 VAC

the TORCH AIRE-RECESSED™

Ideal for Any Laboratory or Research Setting

Designed to replace a standard ceiling tile, the Torch Aire-Recessed installs easily to help reduce airborne pathogens. Air passes over enclosed UV-C bulbs to kill harmful organisms and sent through a filter to catch large particulates, then returned into the environment. This design prevents UV-C exposure to those in the room, making it safe for people to be in the space at all times. Bulbs last up to 10,000 hours or 416 days if running continuously.



Specs

Overall Size:

9-7/8" H x 46-5/8" L x 22-1/8" W

Power: 110 VAC, 50/60 Hz, 4.2 Amps

Max Capacity: 12,600 ft³ per hour

the TORCH™ and TORCH+™

Ideal for Room Disinfection

the TORCH and TORCH+ are inexpensive, easily transportable, powerful disinfection systems designed to provide a rapid and highly effective method to disinfect surfaces, components, and common touch points. The TORCH and TORCH+ contain eight high powered UV-C lamps to provide quick disinfection times. They plug into standard wall outlets and produce an efficient UV-C output of $200 \mu\text{w}/\text{cm}^2$ at 8 feet ($12 \text{ mJ}/\text{cm}^2$ per minute) to get a calculated 99% reduction of harmful organisms in seconds and spores in minutes.

Specs

Overall Size:
23" W x 23" D x 68" H

Weight: 72 lbs

Power: 110-240VAC
6 Amps, 50/60 Hz

Bulb Lifespan: 16,000 Hours

The TORCH+ comes with an iPad™ for remote operation and monitoring. Data recording and management becomes easy and efficient with cycle data stored on the iPad™ at the end of every use. Data stored includes date, time, address, room number, and operator name. Disinfection cycles can be controlled based on time or by accumulated UV-C dosage using the integrated UV sensor in order to provide the right process to meet your needs.



Specs

Overall Size:
10" W x 10" D x 14" H

Weight: 10 lbs

Power: 115 VAC, 4 Amps

Bulb Lifespan:
9,000 Hours



the LANTERN™

Ideal for Small Spaces & Transport Vehicles

The Lantern is a lightweight, easily transportable UV-C generator that can be used in both the upright and inverted positions, allowing it to be hung from railings or hooks. Both an exposure and delay timer allow for operators to safely exit the space, but also achieve desired disinfection time.

The Lantern produces an efficient UV-C output of over $130 \text{ mw}/\text{cm}^2$ to get a calculated 99% bacterial kill in 1 minute and a 99% reduction of spores in 5 minutes for surfaces within 4 feet. Farther distances take just a few more minutes!

BIOLOGICAL EFFICACY OF CHLORINE DIOXIDE

ClorDiSys' Chlorine Dioxide Gas is registered with the United States Environmental Protection Agency as a sterilizer. The U.S. EPA defines a sterilizer as able "to destroy or eliminate all forms of microbial life including fungi, viruses, and all forms of bacteria and their spores."

Below is a table of some of the more commonly seen organisms that chlorine dioxide has been proven to eliminate. To date, no organism tested against Chlorine Dioxide Gas has proved resistant.

PRODUCT: CSI CD CARTRIDGE	EPA REGISTRATION #: 80802-1
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BACTERIA	VIRUSES	ALGAE, FUNGI, MOLD, & YEAST
<i>Blakeslea trispora</i> ²⁸	<i>Adenovirus Type 40</i> ⁶	
<i>Bordetella bronchiseptica</i> ⁸	<i>Calicivirus</i> ⁴²	<i>Alternaria alternata</i> ²⁶
<i>Brucella suis</i> ³⁰	<i>Canine Parvovirus</i> ⁸	<i>Aspergillus spp.</i> ^{12,28}
<i>Burkholderia spp.</i> ³⁶	<i>Coronavirus</i> ³	<i>Botrytis species</i> ³
<i>Campylobacter jejuni</i> ³⁹	<i>Feline Calici Virus</i> ³	<i>Candida spp.</i> ^{5,28}
<i>Clostridium botulinum</i> ³²	<i>Foot and Mouth disease</i> ⁸	<i>Chaetomium globosum</i> ⁷
<i>Clostridium difficile</i> ⁴⁴	<i>Hantavirus</i> ⁸	<i>Cladosporium cladosporioides</i> ⁷
<i>Corynebacterium bovis</i> ⁸	<i>Hepatitis A, B & C Virus</i> ^{3,8}	<i>Debaryomyces etchellsii</i> ²⁸
<i>Coxiella burneti (Q-fever)</i> ³⁵	<i>Human coronavirus</i> ⁸	<i>Eurotium spp.</i> ⁵
<i>E. coli spp.</i> ^{1,3,13}	<i>Human Immunodeficiency Virus</i> ³	<i>Fusarium solani</i> ³
<i>Erwinia carotovora (soft rot)</i> ²¹	<i>Human Rotavirus type 2 (HRV)</i> ¹⁵	<i>Lodderomyces elongisporus</i> ²⁸
<i>Franscicella tularensis</i> ³⁰	<i>Influenza A</i> ²²	<i>Mucor spp.</i> ²⁸
<i>Fusarium sambucinum (dry rot)</i> ²¹	<i>Minute Virus of Mouse (MVM-i)</i> ⁸	<i>Penicillium spp.</i> ^{3,5,7,28}
<i>Helicobacter pylori</i> ⁸	<i>Mouse Hepatitis Virus spp.</i> ⁸	<i>Phormidium boneri</i> ³
<i>Helminthosporium solani (silver scurf)</i> ²¹	<i>Mouse Parvovirus type 1 (MPV-1)</i> ⁸	<i>Pichia pastoris</i> ³
<i>Klebsiella pneumonia</i> ³	<i>Murine Parainfluenza Virus Type 1 (Sendai)</i> ⁸	<i>Poitrasia circinans</i> ²⁸
<i>Lactobacillus spp.</i> ^{1,5}	<i>Newcastle Disease Virus</i> ⁸	<i>Rhizopus oryzae</i> ²⁸
<i>Legionella spp.</i> ^{38,42}	<i>Norwalk Virus</i> ⁸	<i>Roridin A</i> ³³
<i>Leuconostoc spp.</i> ^{1,5}	<i>Poliovirus</i> ²⁰	<i>Saccharomyces cerevisiae</i> ³
<i>Listeria spp.</i> ^{1,19}	<i>Rotavirus</i> ³	<i>Stachybotrys chartarum</i> ⁷
<i>Methicillin-resistant Staphylococcus aureus</i> ³	<i>Severe Acute Respiratory Syndrome (SARS)</i> ⁴³	<i>Verrucar A</i> ³³
<i>Multi-Drug Resistant Salmonella typhimurium</i> ³	<i>Sialodscryoadenitis Virus</i> ⁸	PROTOZOA
<i>Mycobacterium spp.</i> ^{8,42}	<i>Simian rotavirus SA-11</i> ¹⁵	<i>Chironomid larvae</i> ²⁷
<i>Pediococcus acidilactici PH3</i> ¹	<i>Theiler's Mouse Encephalomyelitis Virus</i> ⁸	<i>Cryptosporidium</i> ³⁴
<i>Pseudomonas aeruginosa</i> ^{3,8}	<i>Vaccinia Virus</i> ¹⁰	<i>Cryptosporidium parvum Oocysts</i> ⁹
<i>Salmonella spp.</i> ^{1,2,4,8,13}	BACTERIAL SPORES	<i>Cyclospora cayetanensis Oocysts</i> ⁴¹
<i>Shigella</i> ³⁸		<i>Giardia</i> ³⁴
<i>Staphylococcus spp.</i> ^{1,23}	<i>Alicyclobacillus acidoterrestris</i> ¹⁷	OTHER
<i>Tuberculosis</i> ³	<i>Bacillus spp.</i> ^{10,11,12,14,30,31}	<i>Beta Lactams</i> ²⁹
<i>Vancomycin-resistant Enterococcus faecalis</i> ³	<i>Clostridium. sporogenes ATCC 19404</i> ¹²	<i>Pinworms Eggs</i> ⁴⁶
<i>Vibrio spp.</i> ³⁷	<i>Geobacillus stearothermophilus spp.</i> ^{11,31}	<i>Volatile organic compounds (VOCs)</i> ⁴⁷
<i>Yersinia spp.</i> ^{30,31,40}	<i>Bacillus thuringiensis</i> ¹⁸	<i>Biofilms</i> ⁴⁵

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Microbial Decontamination Products and Services

Take the offensive against pathogens by using chlorine dioxide gas



Reduce your risk of recall



Excellent distribution eliminates harborage locations and hard to reach areas



Keep your facility cleaner than ever before

**PROVIDING THE SAFEST AND MOST EFFECTIVE
DECONTAMINATION SOLUTIONS AVAILABLE SINCE 2001**

**ClorDiSys Solutions, Inc is a worldwide leader in decontamination
and contamination control.**



Founded in 2001, we utilize the most effective method of decontamination available, chlorine dioxide gas. Our chlorine dioxide gas decontamination process was developed in the pharmaceutical industry by Johnson and Johnson™, where our founders were part of the development team. Keeping the same high standards for purity, quality, and efficacy, ClorDiSys provides clients a solution for operating cleaner and safer than ever before by eliminating pathogens from the hardest to reach locations by leaving them no room to hide.