

Decontaminating HEPA Housings

HEPA housings can undergo a decontamination process for multiple reasons. Most frequently, HEPA housings are decontaminated prior to filter changeout. They can also be decontaminated as part of a yearly routine, or during construction/renovation.

HEPA housings can be on the Supply or Exhaust side of an HVAC system for a facility. On the supply side, they are purifying the incoming air to maintain sterility for a clean facility. On the exhaust side, they are purifying the air exhausting a facility that works with biologically hazardous organisms so as to prevent their escape.



Formaldehyde used to be the most prevalent decontamination method used to attain a 6-log sporicidal kill. This method was effective but the process typically took over 12 hours and held considerable safety concerns. Formaldehyde is a carcinogen, and is known to leave residues behind. Both of these attributes are concerning, especially if a HEPA housing is on the supply side of the room.

Chlorine dioxide has become a more optimal decontamination method compared to formaldehyde, especially when considering HEPA housings. Chlorine dioxide gas works faster, with overall cycle times between 1.5-3 hours. Part of this is because chlorine dioxide does not leave a residue and the aeration time is shorter. For exhaust HEPA housings, aeration is accomplished by simply turning on the exhaust blower and opening the “infeed” and “exhaust” dampers on a HEPA housing. This method aerates a HEPA housing in under a minute. For supply HEPA housings, this is accomplished by using a carbon scrubber to break down the CD gas. This method aerates a HEPA housing in under an hour.

Hydrogen peroxide vapor is another decontamination method utilized for HEPA housing decontamination. Due to adsorption issues into the HEPA filter itself, aerating HEPA housings can take considerably longer and typically lasts overnight. Adsorption into the filter material can cause uneven concentration amounts on either side of the filter too, potentially limiting the success of the decontamination.



ClorDiSys

Decontamination Method Comparisons

CD gas vs Formaldehyde

Quicker cycles with Chlorine Dioxide (CD) Gas than Formaldehyde

1.5 to 3 hours depending on the concentration chosen vs. typically 12 hours for formaldehyde.

No carcinogenic effects with Chlorine Dioxide (CD) Gas than Formaldehyde

Unlike formaldehyde, chlorine dioxide is not carcinogenic and is used for treating food and drinking water.

CD gas vs VPHP

Quicker cycles with Chlorine Dioxide (CD) Gas than Vapor Phase Hydrogen Peroxide (VPHP)

1.5 to 3 hours depending on the concentration chosen vs. typically overnight for VPHP.

No cycle development required for CD gas

CD: 1 mg/liter for 2 hours or 5 mg/liter for 30 minutes of Exposure.

VPHP: Cycle parameters must be developed for every specific size and shape HEPA Housing. If ambient temperatures change, the cycle parameters most likely need to be changed.

Better distribution with a true gas like CD gas

CD gas is a true gas which naturally fills the space it is contained within, no matter the shape or amount of items inside the space.

VPHP is a liquid at room temperature and as such has limited natural diffusion. Too rapid flow through the HEPA filter or too low of injection rate does not get kill. Too slow a flow or too high of injection rate causes wetting of the filter. Internal corners create dead areas that prohibit vapors to flow and decontaminate these critical internal components. Variability of the filter "loading" also affects flows as well as creating too much organic matter preventing complete kill by using up the hydrogen peroxide, thus lowering the concentration.

CD Gas Features:

- Decontamination at ambient temperatures
- Short cycle times
- Precise concentration monitoring
- Uses a true gas
- Simple to validate
- Detailed cycle reporting
- No liquids in process
- Quick aeration (can literally be minutes)
- Non-carcinogenic, non-flammable
- No measurable residuals

CD ClorDiSys

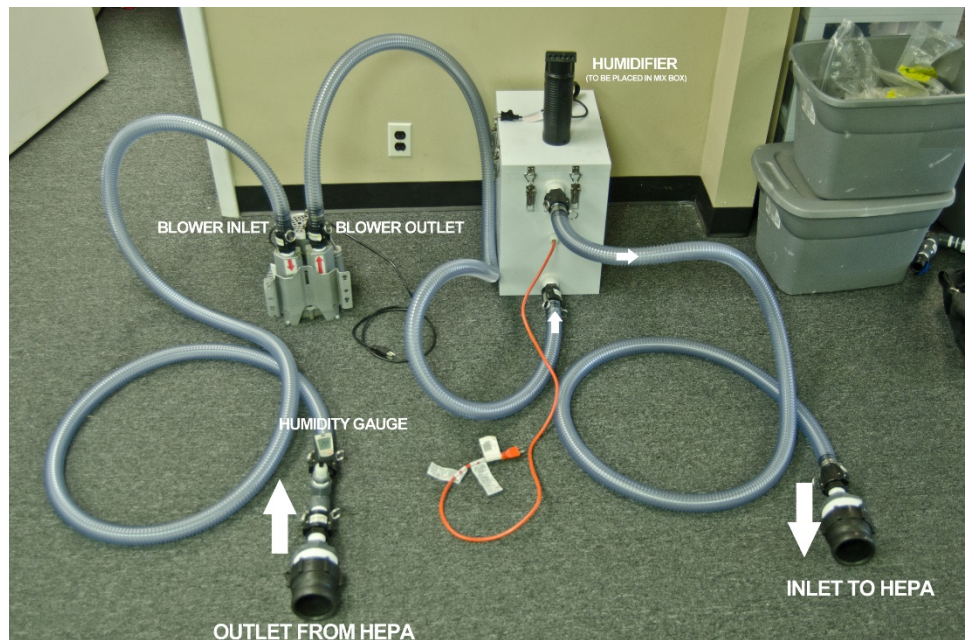
- Excellent distribution into hard-to-reach areas
- Does not condense out or breakdown during the process

Chlorine Dioxide Gas Decontamination Procedure:

Equipment Required:

The equipment required to decontaminate a HEPA Housing consists of:

- Minidox-M/Cloridox-GMP / Portable CD Generator
- ClorDiSys SCT which includes a mix box for humidification, a sealed circulation blower to distribute the RH and CD gas, and a Carbon Scrubber System (optional)



Equipment Setup:

The setup of the equipment varies for exhaust vs. supply HEPA Housings. The diagram above shows the items involved and where connections take place. Most HEPA housings have decontamination ports located on both the “clean-side” and “dirty-side”. The ClorDiSys SCT utilizes 1” female cam-lock fittings. Adapters are required to interface them to the ports on the HEPA housings.

Equipment Operation:

The first step is to isolate the HEPA housing by closing the bubble-tight dampers both upstream and downstream of the HEPA housing. Once this is completed, connect the SCT system and turn the circulation blower on.

The operation of the equipment for a ClorDiSys CD gas generator utilized to decontaminate HEPA housings is as follows:

The normal sterilization process is automated and consists of 5 steps:

1. Precondition: Raising of humidity to make spores susceptible to gas.
This is achieved by using the RH probe in the loop to read humidity and then turning on the steam generator located in the mix box as needed to adjust the RH.



2. Condition: Holding of raised humidity level for spore softening.
3. Charge: Injection of gas into chamber
This is achieved by injecting CD gas into the CD Gas Inject Tee until the photometer measures that the concentration is reached.
4. Exposure: Holding of gas concentration for the set amount of time.
5. Aeration: Expulsion of gas and humidity. For exhaust HEPA housings, this is simply accomplished by turning on the exhaust blower and opening the “infeed” and “exhaust” dampers on the HEPA Housing. This method aerates the HEPA Housing in under a minute. For Supply HEPA Housings, this is accomplished by using a carbon scrubber to break down the CD gas. This method aerates the HEPA Housing in under an hour.

If you have any questions about decontaminating HEPA housings, please contact us at 908-236-4100 or email us at info@clordisys.com.