Application Note 15: HEPA Housings

Uses:

HEPA Housings can be on the Supply or Exhaust side of an HVAC system for a facility. They are basically stainless steel enclosures holding a large HEPA filter. On the Supply side, they are purifying the incoming air to maintain sterility in 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. A HEPA Housing is typically decontaminated on a periodic basis and always before filter changeouts or repairs. The previous method for decontamination was by using formaldehyde to attain a 6-log sporicidal kill. This method was effective but typically took over 12 hours for the process. The carcinogenic effects of formaldehyde also are of concern. Chlorine dioxide is now the method of choice. For BSC's, formaldehyde and chlorine dioxide are the only methods approved by NSF. After the proper sterilization time is reached, the chlorine dioxide is aerated out. 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.

Benefits:

CD 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 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 effects flows as well as creating too much organic matter preventing complete kill by using up the hydrogen peroxide thus lowering the concentration.

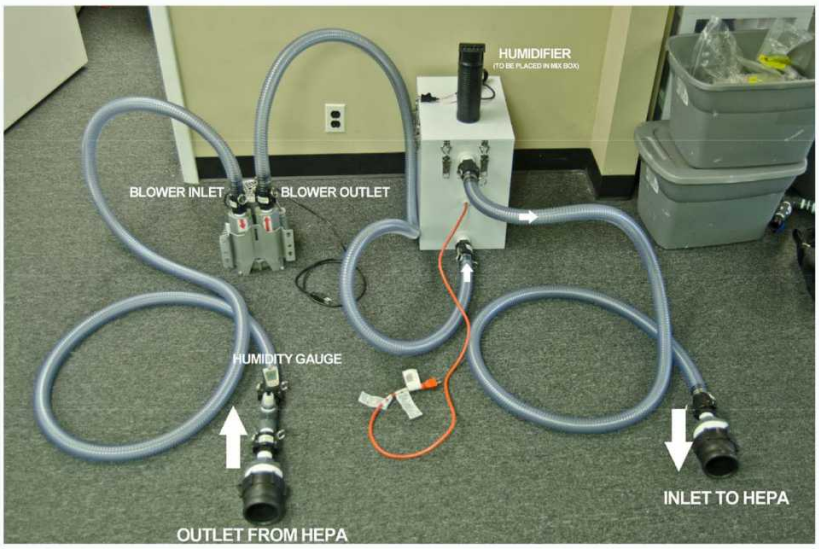
CD Gas Features:

- Decontamination at ambient temperatures
- short cycle times
- precise concentration monitoring
- Uses a true gas
- excellent distribution into hard to reach areas
- simple to validate
- detailed cycle reporting
- no liquids in process
- does not require tight control of dew point
- quick aeration (can literally be minutes)
- non-carcinogenic
- non-flammable
- no measurable residuals
- does not condense out or breakdown during the process
- HEPA filter loading not an issue

Equipment Required:

The equipment required to decontaminate a HEPA Housing consists of:

- Minidox-M/Cloridox-GMP Portable CD Generator
- ClorDiSys SCT with Carbon Scrubber System (optional)



Equipment Setup:

The setup of the equipment varies foe Exhaust vs Supply HEPA Housings.

Equipment Operation:

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.