ClorDiSys

"The Chlorine Dioxide People"

Providing you with chlorine dioxide solutions for your decontamination needs

Application Note 16: Room Sterilization via Decontamination Ports

General:

Decontaminating BSL-3 and BSL-4 suites and laboratories through ports located outside of containment in either an adjacent area or in the mezzanine/interstitial space above the laboratory can be very beneficial. This can allow you to you store your decontamination equipment outside of your contaminment suite instead of inside of containment.

Being a true gas, chlorine dioxide can travel large distances (well over 500 ft) without any adverse effects or concentration loss and without the need for any special installation requirements such as delivery piping insulation. This makes it an ideal agent for high-containment applications since the generator can be housed outside of these hazardous environments and the laboratory or suite can be decontaminated by personnel while outside of containment.

Port Location and Size:

The Decontamination Ports can be located on either the "clean-side" or the "dirty-side" of the HEPA Housing units servicing these laboratories or on both sides. If decontaminating the HEPA Housings and filters will be part of the decontamination protocol, the gas can easily penetrate to these components and will decontaminate both the room and all HEPAs in a single cycle. Chlorine dioxide gas can interface with any variety of port sizes. (3", 1", ½", ¼", etc.).

Isolation/Gas Tight Dampers:

To fully isolate the laboratory from its HVAC system, gas or bubble tight dampers should be installed. These will allow a full shutdown of the HVAC system and will prevent any sterilant gas from escaping through the ductwork to other areas outside the spec of the decontamination. These can be either manual or automatically controlled. When possible, the system should be designed such that there is a minimum of 12-15 total air exchanges per hour. Since it takes approximately 12 to 15 air-exchanges to reduce the gas to safe levels, the faster the air exchanges the quicker the decontamination cycle will be.

In addition to the HVAC dampers, all entry and exit doors into this space will need to be sealed. This can be accomplished by either manual or automatic sealable gaskets or simply tape and plastic.

Chlorine Dioxide Gas Decontamination Steps:

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:** Removal of gas and humidity. This can be accomplished by exhausting the gas through the HVAC system. If removal of the gas through the HVAC system is not possible, activated carbon scrubber systems can be installed.

Equipment Required:

The equipment required to decontaminate a laboratory consists of:

- Minidox-M/Cloridox-GMP Portable CD Generator
- ClorDiSys SCT (Mix Box/Blower System)

Equipment Setup and Operation:

(*Please refer to the following page for a diagram of SCT setup*)

The operation of the equipment for a ClorDiSys CD gas generator utilized to decontaminate laboratories from remote decontamination ports is as shown in the diagrams below:

Humidifier
(To be placed Inside MixBox)

Gas Sample TEE
(will connect to CD Generator)

Mix Box

Flow direction

Blower

RH Probe & TEE
(output to CD Generator)

Gas Inject TEE
(will connect to CD Generator)

INLET from HEPA or Decon ports

OUTLET to HEPA or Decon Ports

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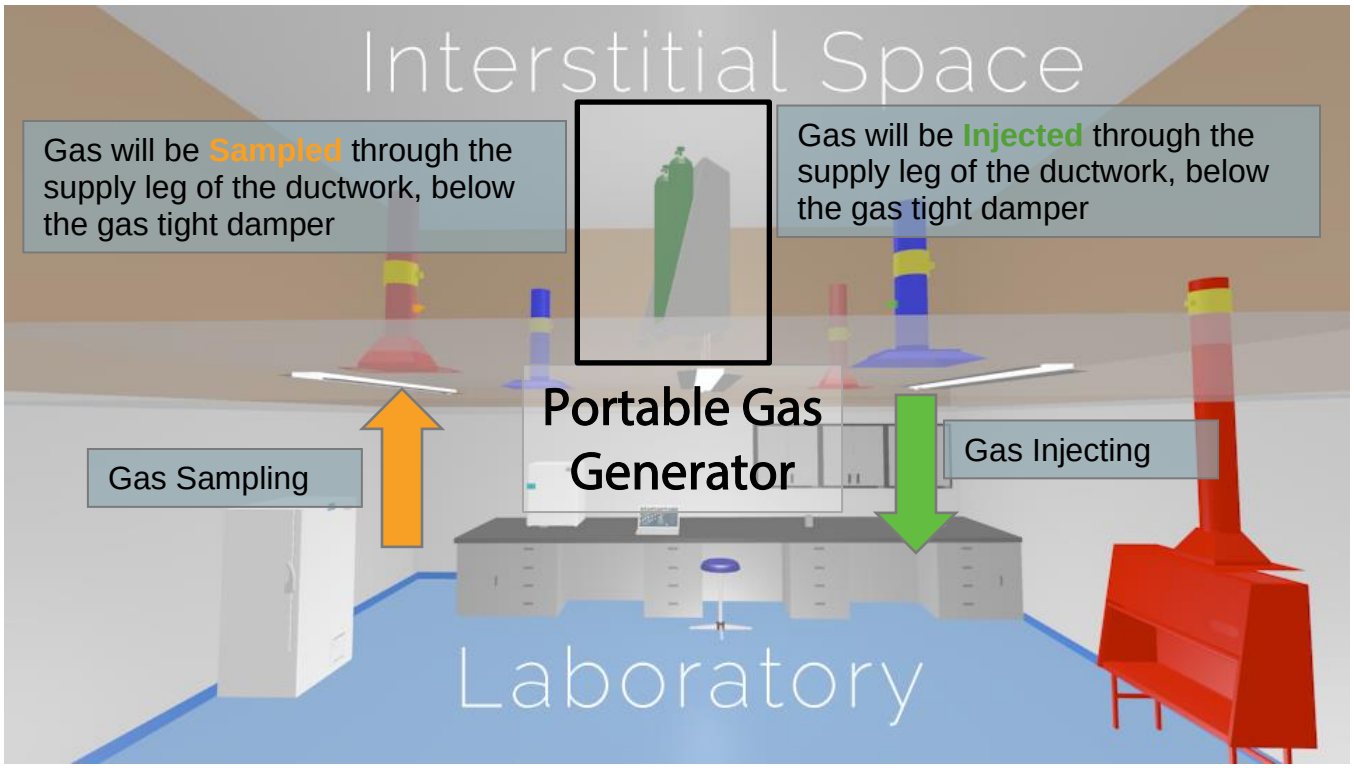

Benefits:

Chlorine Dioxide 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 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.

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