

Chlorine Dioxide Gas Decontamination of Exhaust HEPA Filter Units

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Abstract

The Mini Chlorine Dioxide System (MCS) utilizing Chlorine Dioxide Gas (CD) is a more efficient and safer method of decontaminating Exhaust HEPA Filter Units. In the past, the Formaldehyde method was cumbersome, time consuming and frequently ineffective. With formaldehyde, a human suspect carcinogen, one would possibly have to build enclosures and/or use booster fans, as well as wait for several hours of contact time, before being able to access the HEPA unit for certification or repair. Improper neutralization of formaldehyde also left behind significant residues. The MCS offers a simpler, safer, and quicker decontamination of exhaust HEPA units. With the MCS, setup, contact, and breakdown are achieved in less than 3 hours. In addition, CD poses a lower health risk to personnel and leaves no harmful residue behind. Biological indicator validation (reduction of 10^6 *Bacillus atrophaeus* spores) demonstrates the effectiveness of the MCS decontamination procedure.

Introduction

If a risk assessment deems it necessary, exhaust HEPA filter units may need to be decontaminated prior to internal maintenance, repair, or certification. This double HEPA filter bank was decontaminated with a MCS prior to its annual certification at the University of Georgia by Southeastern Certification, Inc. Although the bag-in/bag-out feature is present on this unit, facility protocol requires decontamination and a pressure decay test as well.

Materials and Method



Materials Include:

- Mini Chlorine Dioxide System (MCS) (Not Shown) & Components
- PPE
- Manometer
- Early Gas Detection Equipment
- Signage / Caution cordon-off tape
- Temp/RH Sensor
- Biological Indicators
- CD Generation Chemicals & Neutralizer Tablets



Shutdown lab serviced by unit

- Post appropriate signage
- Secure caution cordon-off tape

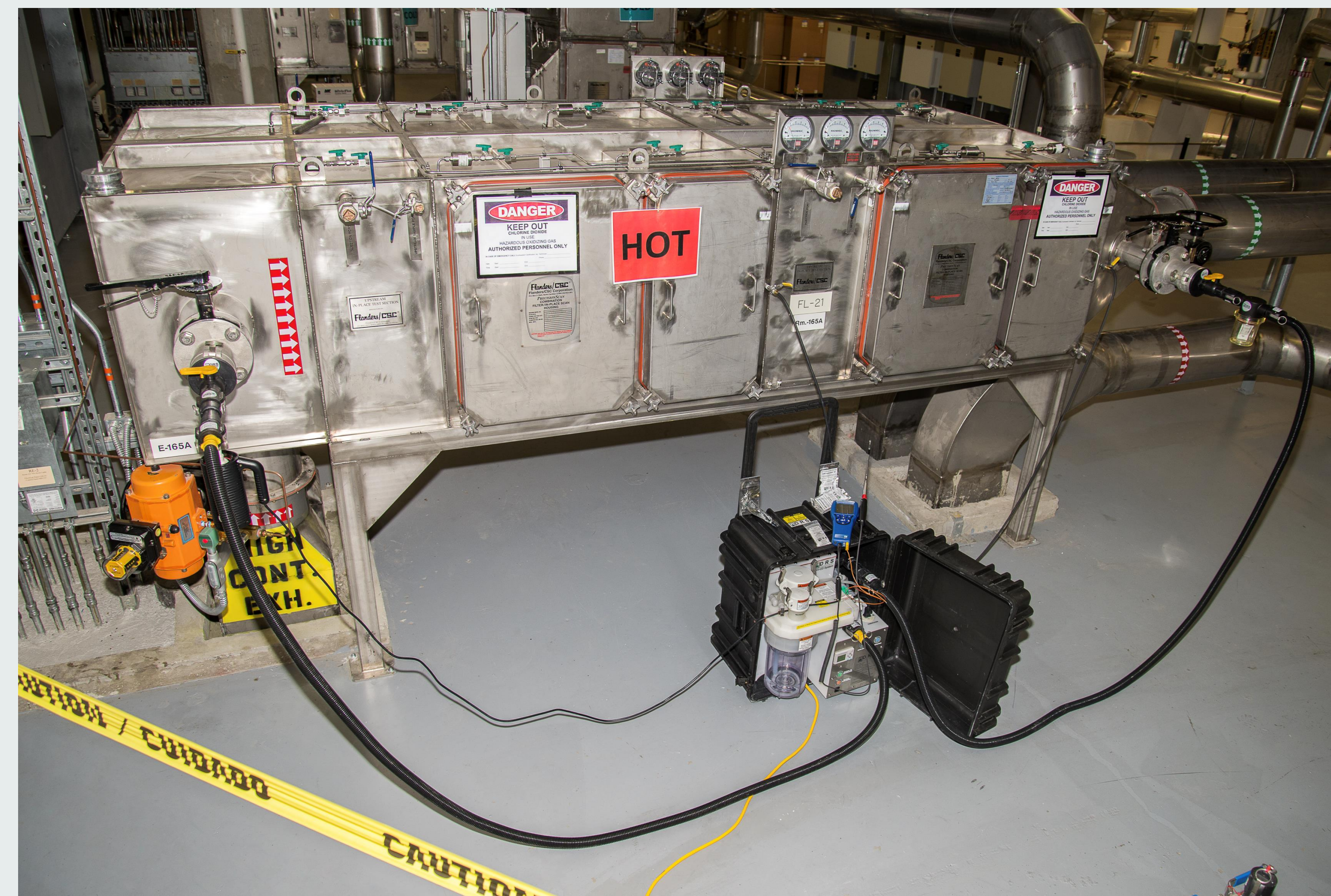
Close pre and post dampers

- Check all access doors are tight, so there is no leakage through the doors



Verify differential pressure

- Shall be 0.00" W.C.
- If pressures (+ or -) are found, chances damper seals are defective
- Attach manometer on the clean side of the bank, measure to ambient



Materials and Method (cont.)



Perform CD Decontamination

- Perform CD decontamination as if performing on a BSC using the MCS
- Install the In-Line Humidification Holder on the upstream port
- Install the Temp/RH and BI Holder on the downstream port
- Affix the MCS via supply and return hoses
- Use the proper number of CD tablets as per the calculated volume of the unit, include ductwork up to dampers
- Run the MCS decontamination cycle
- At the completion of the contact time (90 minutes) you may scrub or direct vent



Material and Method (cont.)

Optional Validation

- Place a BI (spore strip or other) within the Temp/RH and BI Holder to validate the process OR you may place a BI within the unit (clean side) itself



Contingency Plan

- If for any reason there is an indication of CD in the decontamination area (housed in the mezzanine or penthouse) or in the area that the unit services (lab below), immediately open the dampers and energize the exhaust fan to evacuate the gas. Remediate issue.

Results

Southeastern Certification, Inc., has successfully decontaminated over 20 Exhaust HEPA Filter Units (both single and double) using the MCS by DRS Laboratories, Inc. and the exhibited procedure. 10^6 *Bacillus atrophaeus* biological indicators have been used with this and every run to validate the decontamination process. The simple set-up and 90 minute contact time allows multiple HEPA units to be decontaminated in a short period of time.

Discussion and Conclusion

Using the MCS procedure for decontaminating a BSC has proven to be just as effective on Exhaust HEPA Filter Units.. The only difference between the two procedures is that the MCS is run throughout the entire 90 minute decontamination cycle in order to achieve more effective movement of CD gas throughout the HEPA unit. Labor savings, increased safety, and simplicity of the Mini Chlorine Dioxide System make it a more desirable way to decontaminate Exhaust HEPA Filter Units.

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