Chlorine Dioxide Gas Decontamination of Pall Filter Arrays from BSL-3/BSL-4 Containment Facility

Ronald Schmidt, Decontamination Specialist - DRS Laboratories, Inc., Allentown, PA

Abstract

An alternate method of decontaminating high-containment infectious disease laboratory vent line filter arrays for servicing purposes was evaluated. Current method of live steam decontamination requires constant pressure monitoring/adjustments, a double exposure, cool-down between steaming, and double disassembly/re-assembly of filter arrays in order to place and retrieve biological indicators for quality control purposes.
The use of an enclosed, automated chlorine dioxide generation system (MCS) proved to be quicker, less labor-intensive, and just as effective as steam decontamination.

Introduction

- Pall filters – redundant barrier for high containment facilities
- Require periodic maintenance
- Needs decontamination prior to servicing
- Current decon method involves live steam, constant monitoring and adjustment of steam levels
- Decon verified by two types of Biological Indicators (BI)

Materials

- DRS Laboratories, Inc. Mini-Chlorine Dioxide System (MCS) & Components
- PPE
- Manometer
- Early Gas Detection Equipment
- Signage / Caution cordon-off tape
- Temp/RH Senor
- Biological Indicators – Steris verify dual species (Geobacillus stearothermophilus and bacillus atropheus) ampule and Spordex single species (B. subtilis)
- CD Generation Chemicals and Neutralizer Tablets

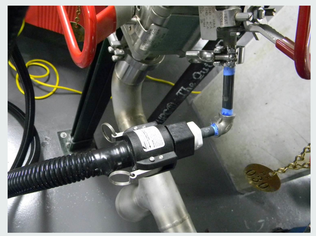
Setup and Procedure

Connecting adapter to test port

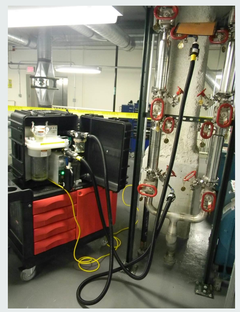
Prior to, post area with appropriate signage and secure with caution cordon-off tape

BI's within the Temp/RH and BI Holder (for decontamination verification) and attach to Return Hose

CD Supply hosing connected to upper test port

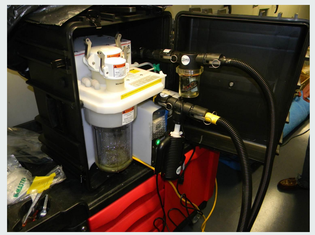


CD Return hosing connected to lower test port

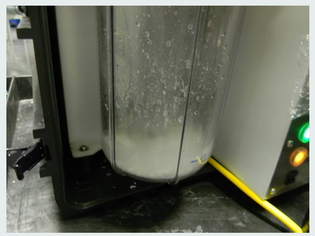


MCS connected to one side of pall filter array

Adding CD Generation Chemicals and Neutralizer Tablets to the MCS



MCS in operation
Exposure Time – 1.5 hours & 1 hour



MCS in Neutralization / Scrubbing Phase

Why Chlorine Dioxide was Chosen

- Availability of automated decon agent delivery system for small volume applications
- Shorter, easier equipment setup
- Less hazardous procedure
- Easier exposure control/monitoring

Steam Decontamination	Chlorine Dioxide Decontamination
Requires separate water source, access to 220V	Self-contained, 110V
Manual delivery, must be constantly adjusted	Automated delivery, no need for adjustments
Requires double exposure, disassembly/assembly of filter housings and cool-down periods	Single exposure and no filter disassembly, no-cool down period
Danger of thermal injuries, ruptured filter membranes	Operates at low temperature and pressure

Results (BI's)

- Successful decon in 1.5 hours
- Control on Left

- Successful decon in only 1 hour
- Control on Left

Discussion and Conclusion

- MCS provides a safer and easier method of decontaminating smaller volume areas such as inline drain vent filter housings
- Constant CD delivery assures proper exposure to decon chemicals
- Validation proved to be successful on first attempt

Acknowledgments

Mark Verduin, MSOH
Safety & Occupational Health Specialist
ESHCO Biosafety Team

U.S. Centers for Disease Control & Prevention,
Roybal Campus, Atlanta, GA