

Uses and Applications of Hydrogen Peroxide Vapor (HPV) Decontamination

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HYDROGEN PEROXIDE VAPOR

KEY FACTS

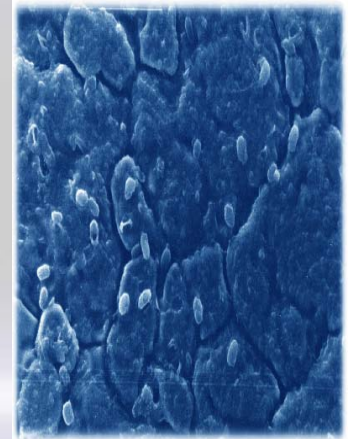
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Hydrogen Peroxide - Key Facts

- ❏ H_2O_2 is an Oxidant - releasing free radicals on decomposition, it is a surface bio-decontamination, not a cleaning process
- ❏ Does not require lowered or elevated humidity to operate successfully
- ❏ Decomposes to Water and Oxygen
- ❏ No residues - no secondary wipe down
- ❏ Compatible with most materials
- ❏ Non-carcinogen, Non-resident, No risk of explosion
- ❏ No risk of forming salt deposits, or need to perform bio-decon. in darkness
- ❏ Fully validatable, generally using Log 6 *Geobacillus Stearothermophilus*



Methods of Decontamination

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Differences between Hydrogen Peroxide Vapor (HPV) and other gaseous decontamination methods

Hydrogen Peroxide Vapor (HPV)

- ❑ Personal Exposure Limit (PEL) for an 8 hour TWA approved by OSHA is 1ppm.
- ❑ Immediately Dangerous to Life and Health (IDLH) approved by NIOSH is 75ppm.
- ❑ Relative humidity range of 10-99%. Temperature range of 40 to 115 degrees Fahrenheit.
- ❑ HPV uses either HVAC system or catalytic converters to break down the chemical into oxygen and water while leaving no residue or odor. Operations resume upon reaching 1 ppm.

Chlorine Dioxide Gaseous decontamination

- ❑ Personal Exposure Limit (PEL for an 8 hour TWA approved by OSHA is much greater.
- ❑ Immediately Dangerous to Life and Health (IDLH) approved by NIOSH is 5ppm for some gaseous decontamination methods
- ❑ Environmental conditioning required prior to gassing. Relative humidity at least 70% or greater. Temperature range of 70-85 degrees Fahrenheit.
- ❑ Typically require the use of the HVAC system or a scrubber with sodium thiosulfate carbon to remove chlorine dioxide. Operations resume upon reaching 0.1 ppm rather than 1 ppm.

Applications

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Applications



Isolators



Incubators



Decon
Chambers

Applications



Rooms/facilities

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Efficacy

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Efficacy

A critical part of HPV technology is verification of the HPV process

- 6 log *Geobacillus stearothermophilus* indicator/Test Strip is the most resistant micro organism to Hydrogen Peroxide Vapor
- Spore Form – VERY HARD TO KILL (same challenge as steam sterilizer)

Efficacy Examples

- Bacillus Spores*
- Mycoplasma*
- Viruses*
- Mold*



Material Compatibility

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Material Compatibility

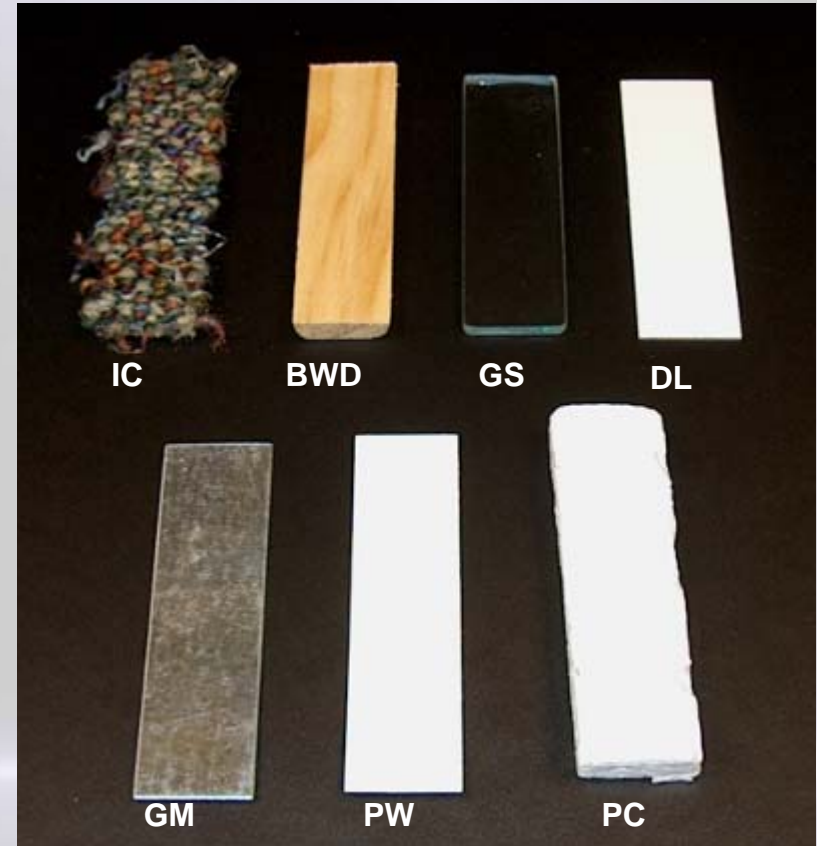


860 cycles = 4 months

- No electronic failures
- Electrical wiring undamaged
- Stainless steel unaffected

Independent EPA Testing

- ❑ Industrial-grade carpet (IC)
- ❑ Bare wood (pine lumber) (BWD)
- ❑ Glass (GS)
- ❑ Decorative laminate (DL)
- ❑ Galvanized metal ductwork (GM)
- ❑ Painted (latex, flat)
- ❑ Wallboard paper (PW)



Electronic equipment compatibility



Gambro Dialysis Machines



Siemens Servo 300C Ventilator



Tyco Puritan Bennett 800 Ventilator



Siemens Servo 900C Ventilator



Siemens Patient Monitor Systems



Philips Defibrillators



Dinamap NIBP

Safety

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Safety!

■ Containment

- ✓ Vapor not gas
- ✓ Easy to seal

■ During Cycle

- ✓ Sensors inside target area
- ✓ Highly sensitive sensors outside area

■ Post Decontamination

- ✓ Two sensors used to confirm area safe for re-entry
- ✓ No dangerous residue



Stages of Process

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Stages of Process

Just 3 Stages!

- **Conditioning**
 - ✓ Internal Safety Checks
 - ✓ System Heat Up
 - ✓ Typically 10 minutes
 - ✗ No pre/de- humidification required
- **Injection**
 - ✓ Volume Specific Times
- **Aeration**
 - ✓ System Dependent
 - ✓ Optimized to Client Requirements
 - ✓ Either use HVAC and/or catalytic converter



Room Decon Techniques

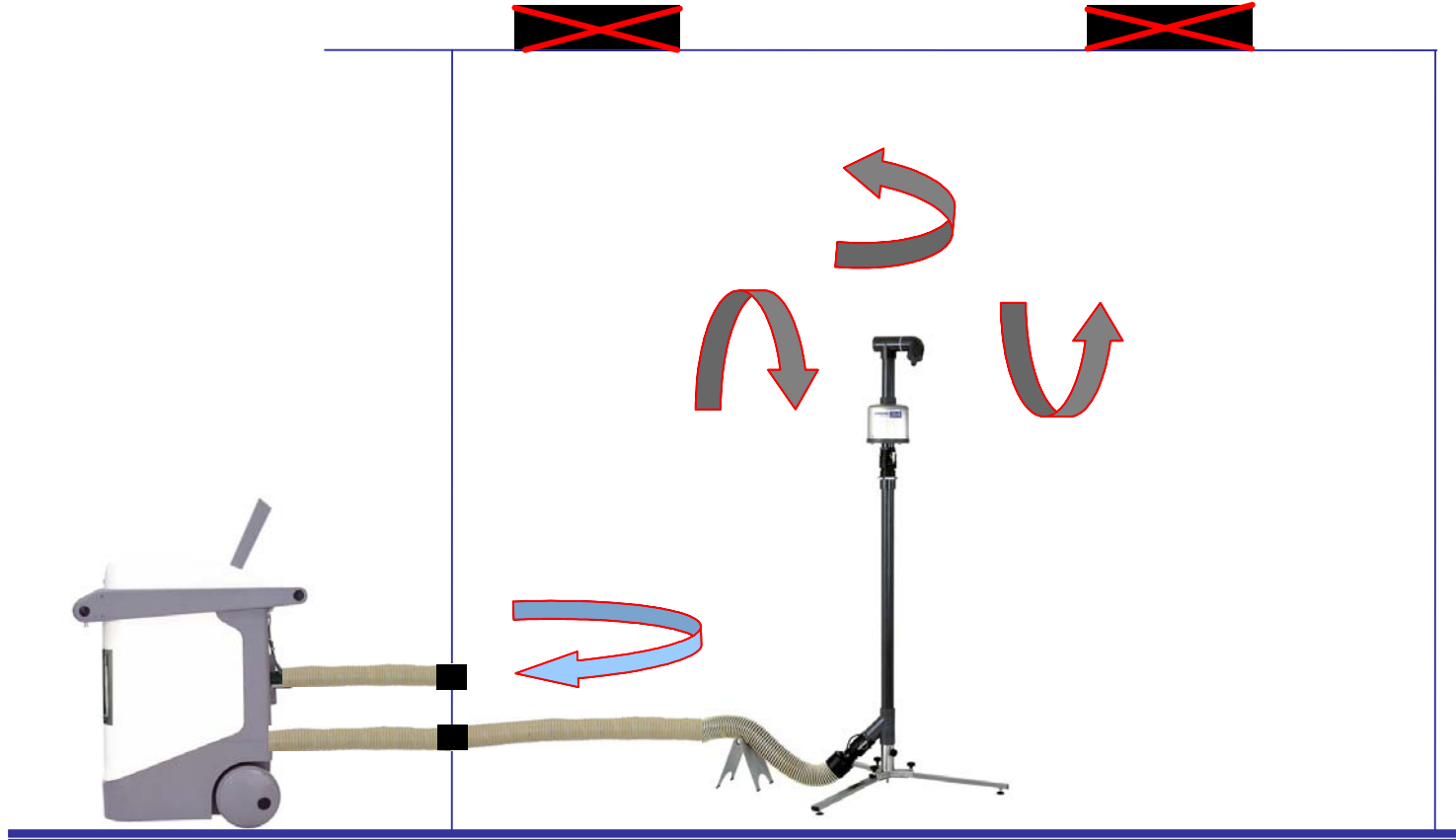
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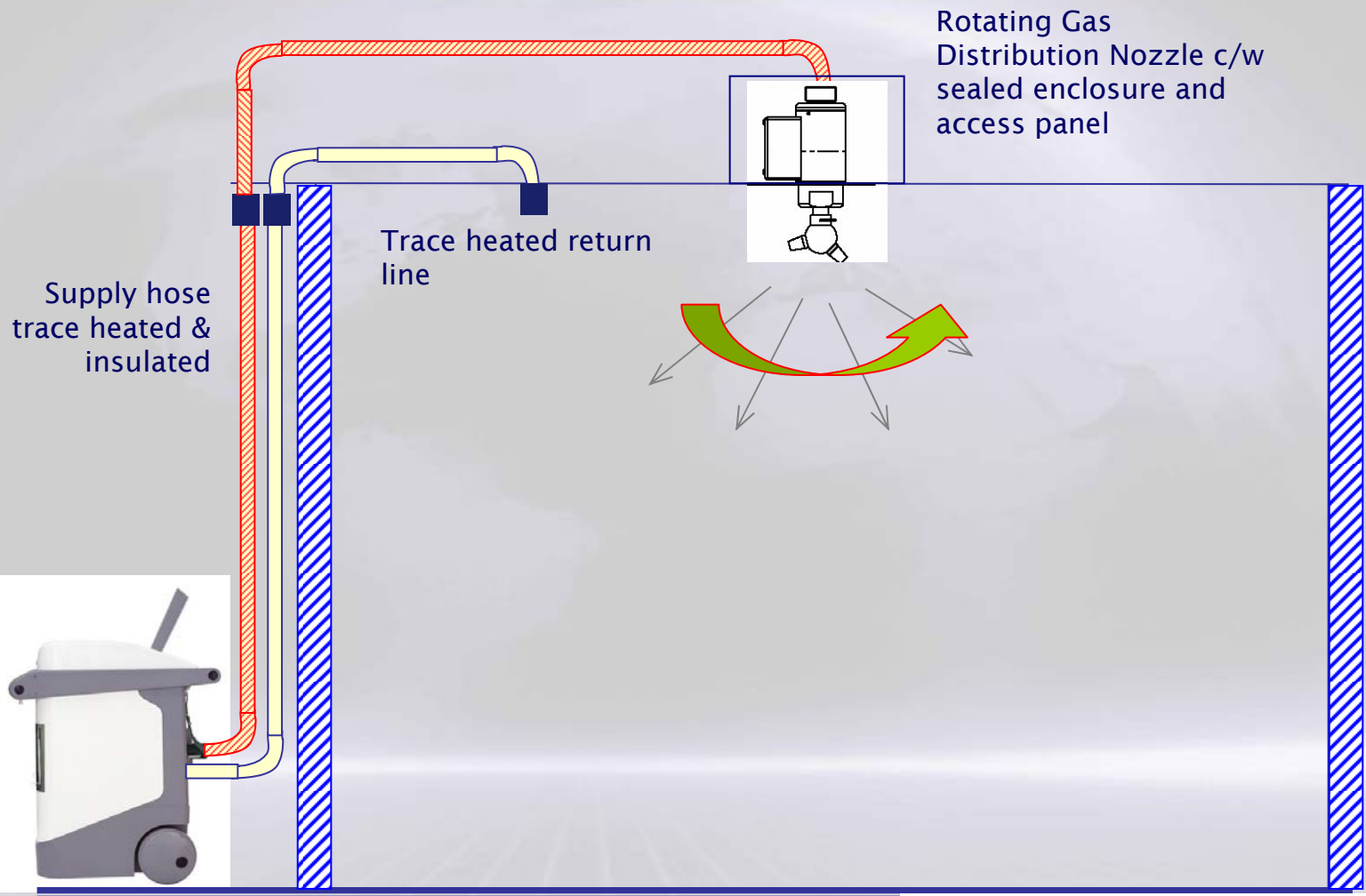
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Room Decon Techniques

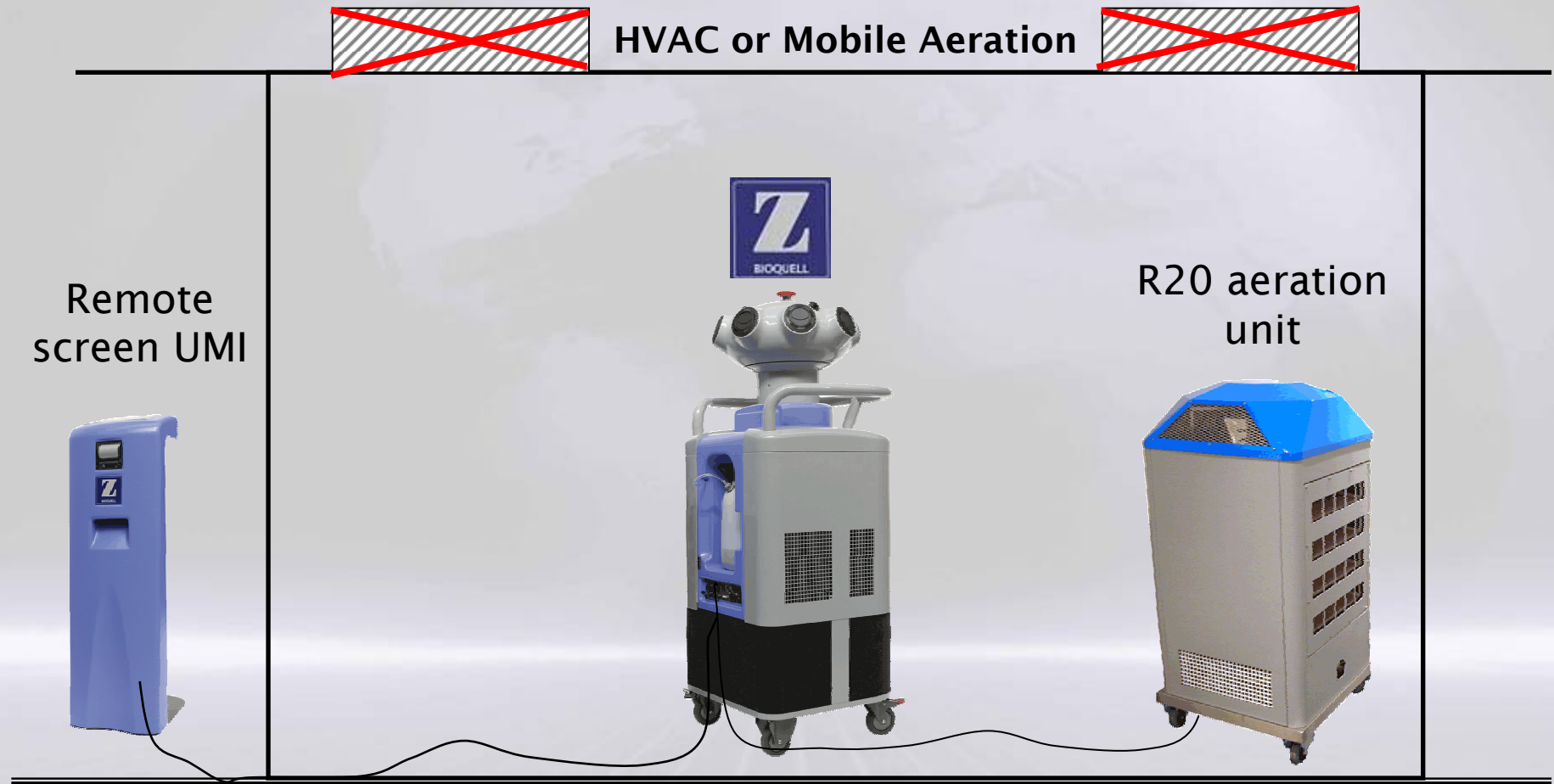
HVAC (Off/Isolated) for Gassing Cycle
HVAC (On) for Aeration/Out gassing



Room Decon Techniques



Room Decon Techniques



Case Studies

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Case Study #1

Background

Company – **Confidential**

Type of Facility – **High Containment Area (BSL-4)**

Description of Facility – **BSL-4 lab that included incubators, safety cabinets, computers, microscopes, and other pieces of precise electronic equipment.**

Approximate Volume – **4300 meter³**

Need for decontamination – **Annual decon for preventative maintenance to be performed on equipment inside lab.**



Case Study #1: Client Requirements

Client Requirement

- Rapid, Residue-Free, decontamination was sought so employees could perform basis preventative maintenance on equipment after decon.
- A high-level disinfection was required due to the nature of the organisms researched inside the lab (Ebola, Plague, etc.)
- Wanted to ensure all surfaces were decontaminated (Behind, under, and inside all equipment)
- All equipment (Computers, microscopes, incubators, etc.) had to be left inside the area.



Case Study #1: Results

Results:

- Full kill on 48 out of 48 biological indicators (Behind equipment, floors, ceilings, inside safety cabinets, etc.)
- Using Hydrogen Peroxide Vapor (HPV), the entire area was safely decontaminated
- All equipment showed no after effects and operated normally after decontamination
- Decon has been repeated again on the BSL-4 with the same outstanding results and now decons all their labs (BSL-3 and BSL-2) with HPV



Case Study #2

Background:

Company - Confidential

Type of Facility - Pharmaceutical Vaccine Manufacturing

Description of Facility - Manufacturing facility that does both yellow fever and influenza vaccine production The facility includes numerous pieces of stainless steel, incubators, and precise electronic equipment.

Approximate Volume -4900 meter³

Need for decontamination - Quarterly decon for change over from one product (yellow fever) to another (influenza).



Case Study #2: Client Requirements

Client Requirement

- Decontamination was sought so employees could execute a quick changeover between product lines.
- A high-level disinfection was required so there was no possible cross-contamination between products.
- Health & Safety was very interested in keeping employees safely away from decon method
- All equipment (Computers, microscopes, incubators, etc.) had to be left inside the area.



Case Study # 2 Results

Results:

- Using Hydrogen Peroxide Vapor (HPV), the entire area was safely decontaminated
- Full kill on 32 out of 32 biological indicators (Behind/inside equipment, floors, ceilings, etc.)
- All equipment showed no after effects and operated normally after decontamination
- Decon has been 4 times annually with the same outstanding results for the last 3 years.



THANK YOU

Tom Gieseke



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