

Integration of bio-decontamination systems in pharmaceutical cleanrooms

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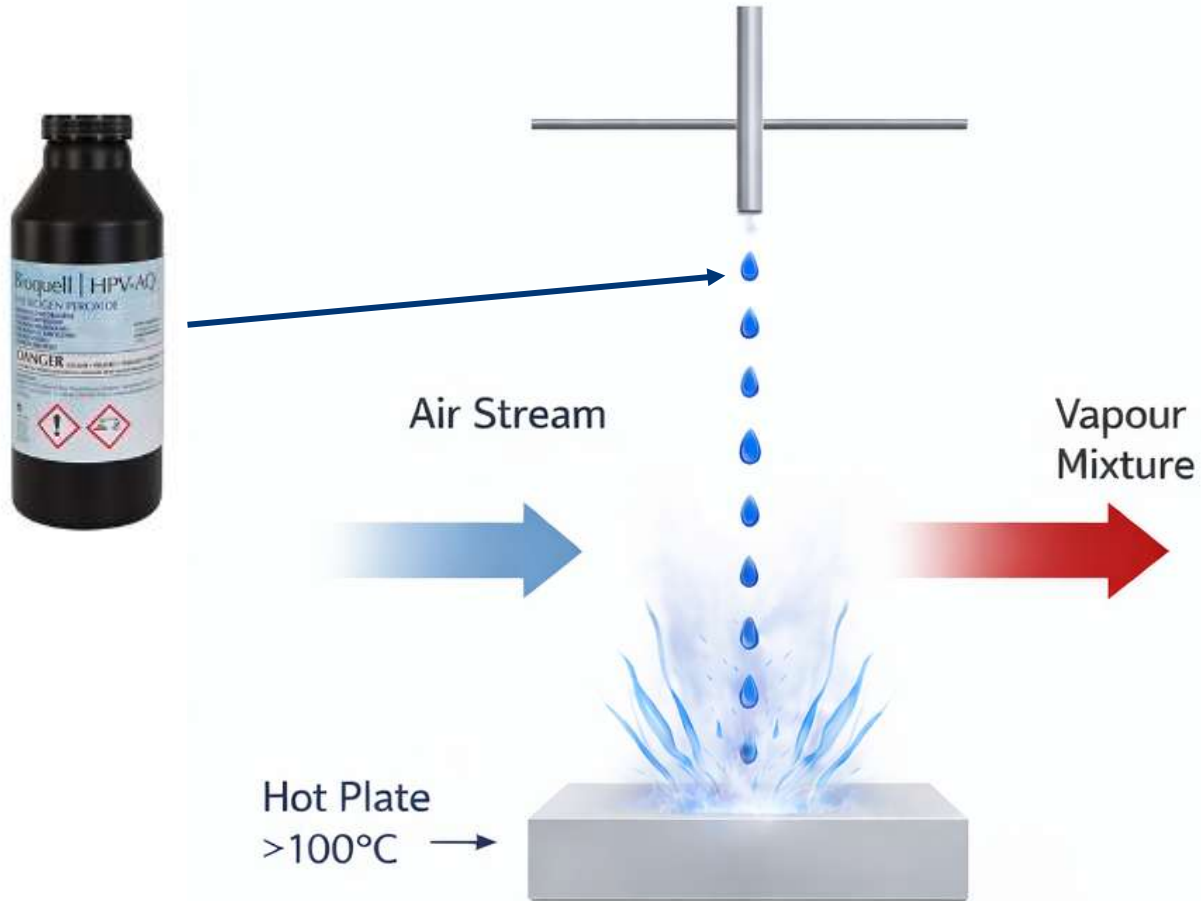
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What is Hydrogen Peroxide Vapour?

Bio-Decontamination technology achieving 6-log sporicidal kill

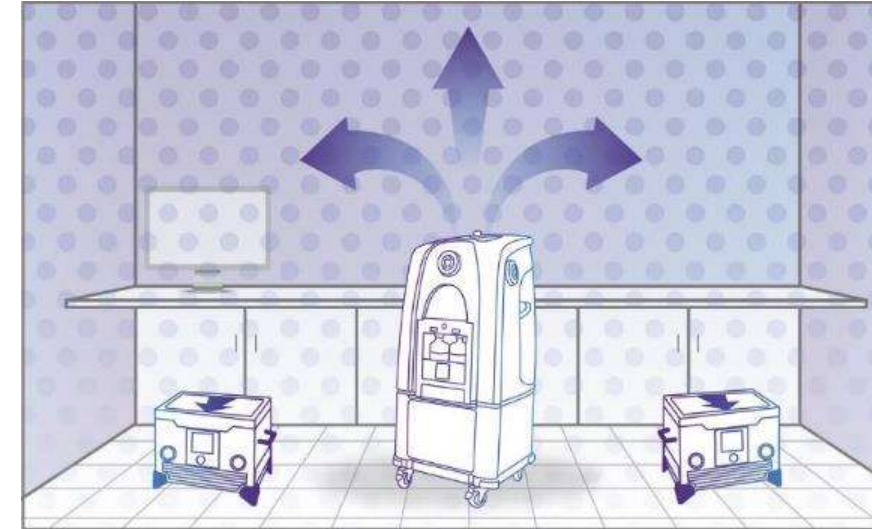
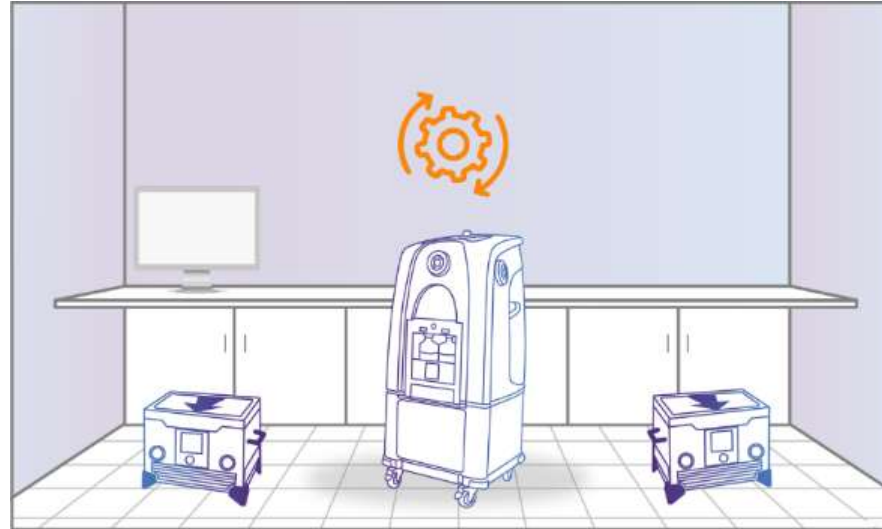


- Liquid is delivered onto a vaporiser, flash evaporated into a vapour, and delivered into an enclosure via a heated airstream
- With flash evaporation ALL of the solution instantly changes into a vapour
- This is different to when hydrogen peroxide goes into the vapour phase through entropy (i.e. naturally)
- The components are in the same proportion in the vapour as the liquid

Bio-Decontamination Process

Pre-Requisites:

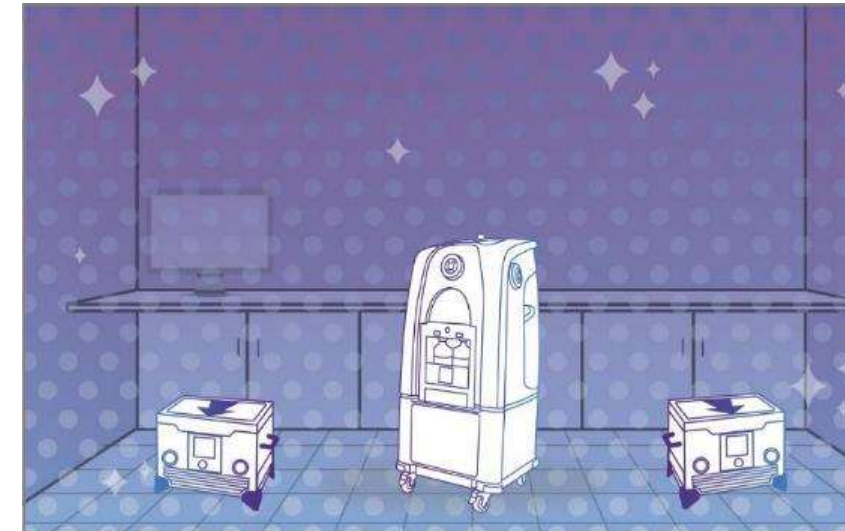
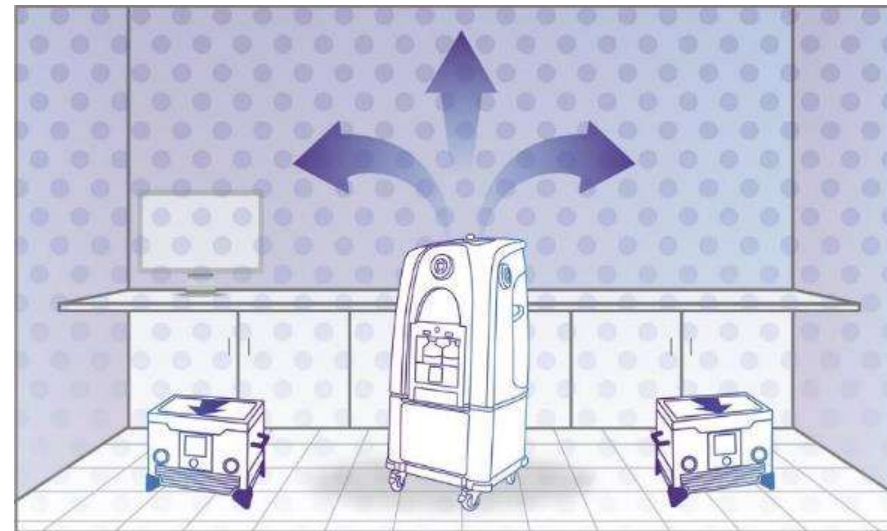
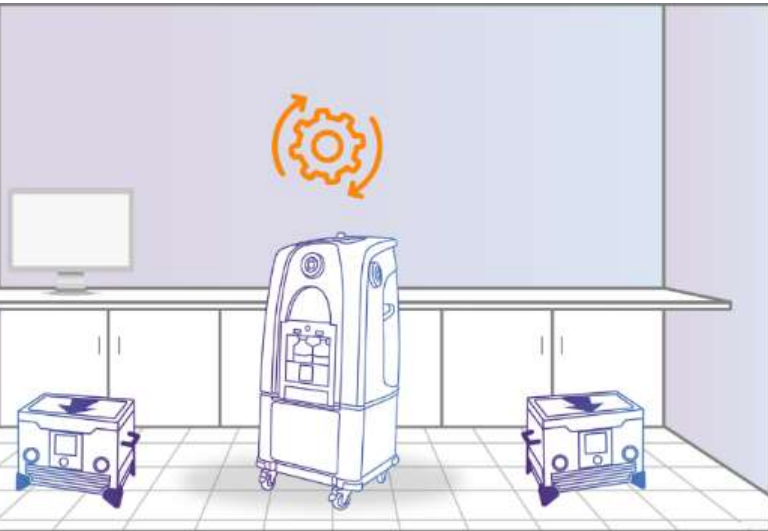
- Clean, dry, exposed surfaces
- HVAC off / isolated
- Room/Doors sealed



STEP 1: PREPARATION

The Decontamination generator warms up.
No need to change the temperature or humidity levels.

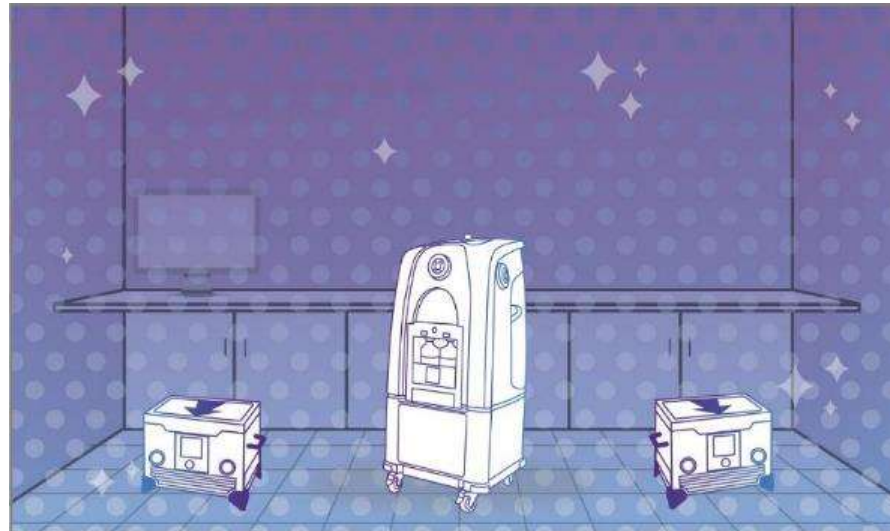
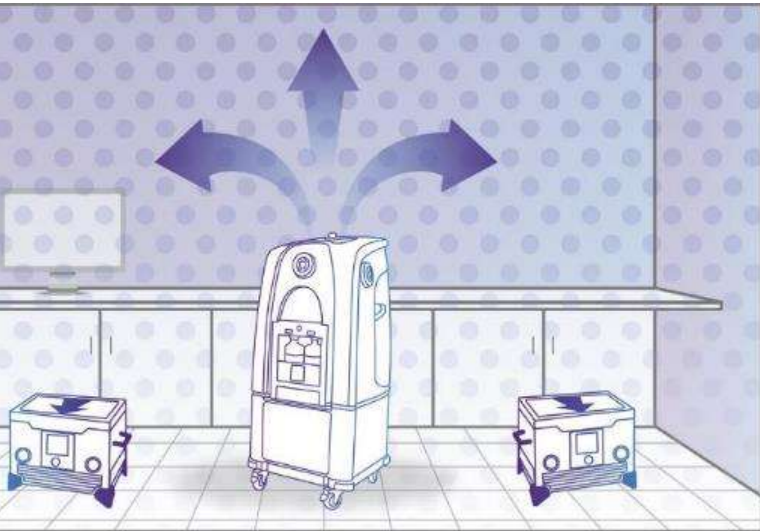
Bio-Decontamination Process



STEP 2: VAPORIZATION

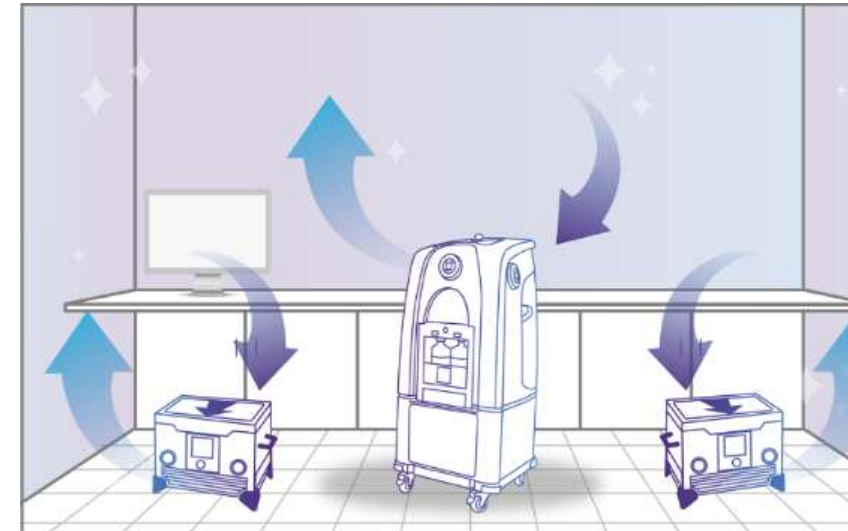
The Decontamination generator distributes peroxide vapour into the enclosed area and fills the space, forming micro-condensation on every exposed surface, including complex shapes

Bio-Decontamination Process

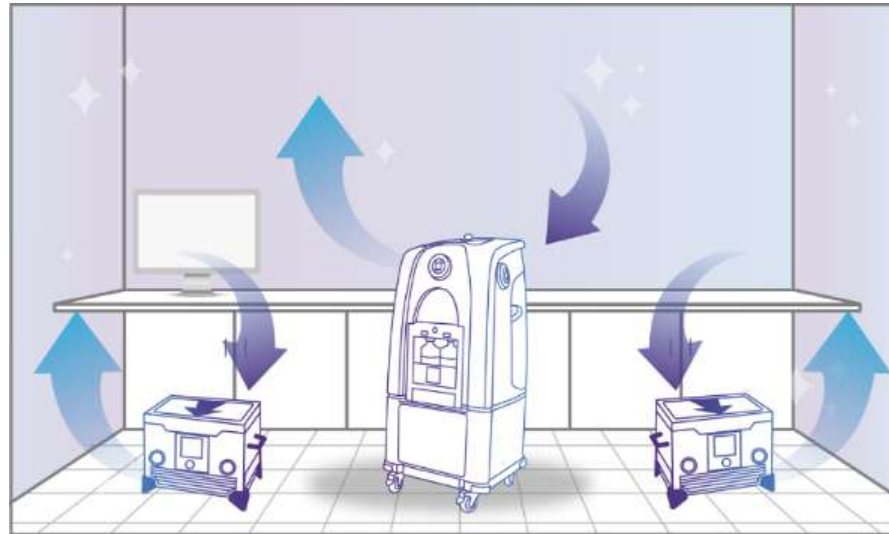


STEP 3: DWELL

The enclosed area is at a standstill, allowing the peroxide to dwell on every exposed surface and kill pathogens through oxidation



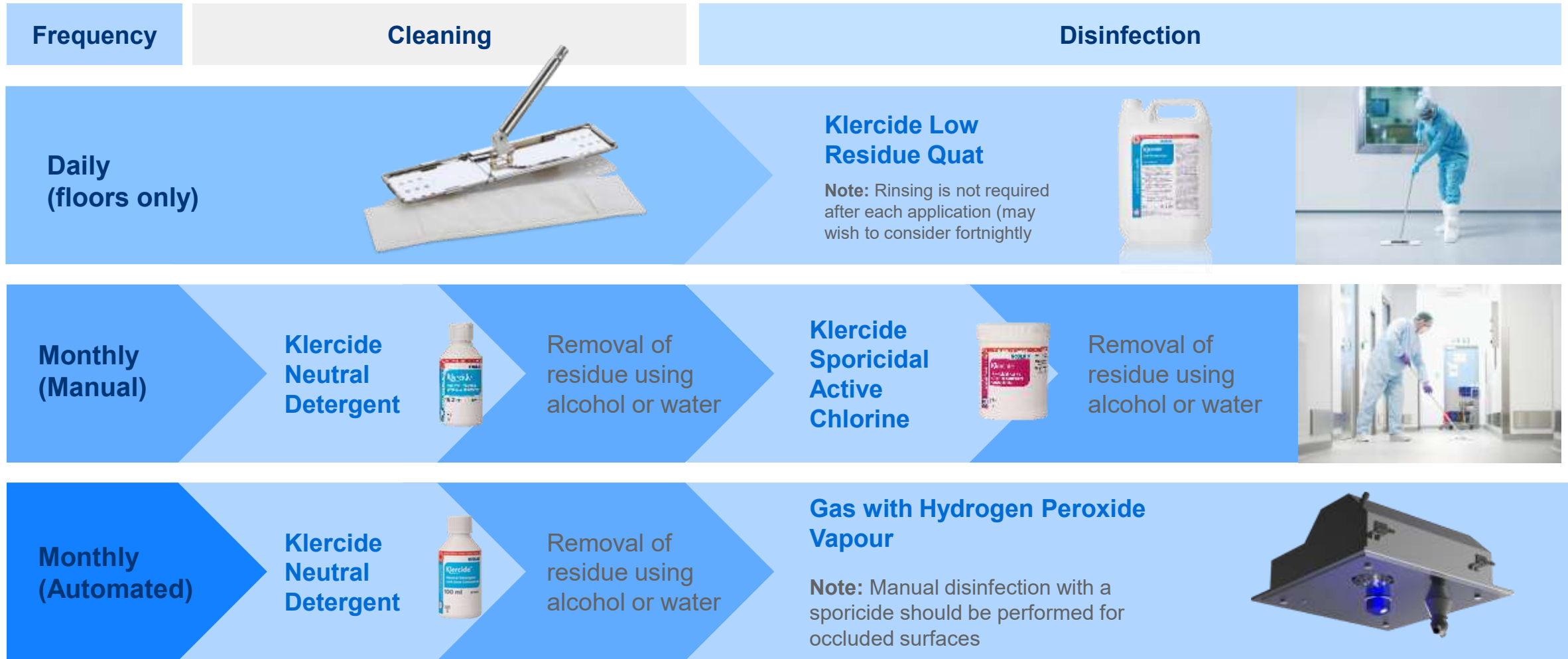
Bio-Decontamination Process



STEP 4: AERATION

Aeration units convert the peroxide into water vapour and oxygen using catalytic conversion or the HVAC system

How Bio-Decontamination fits in a CCS Program



Bio-Decontamination Methods for Cleanrooms

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Mobile Generator

Commonly used for infrequent bio-decontamination needs

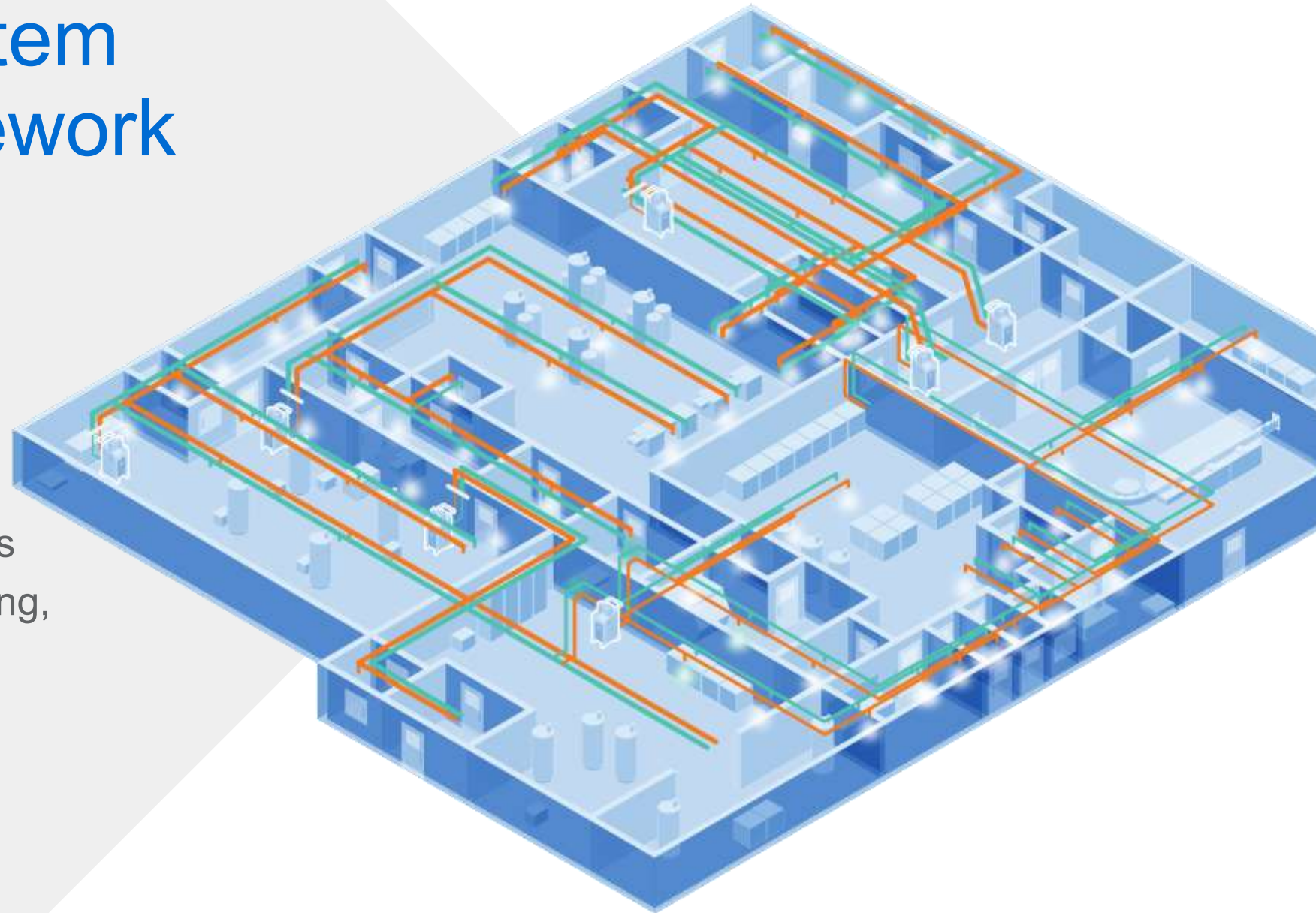
- 1 Lectern** which wirelessly connects to the other components and controls the cycle, is placed out the bio-decontamination area.
- 2 Vaporizer** placed in the center of the room distributes the vapor evenly throughout the room until the exposed surfaces are covered.
- 3 Aeration** units not only remove the peroxide from the room at the end of the process but help distribute it during early stages of a cycle.



Integrated System using rigid pipework

Rigid pipework limitations:

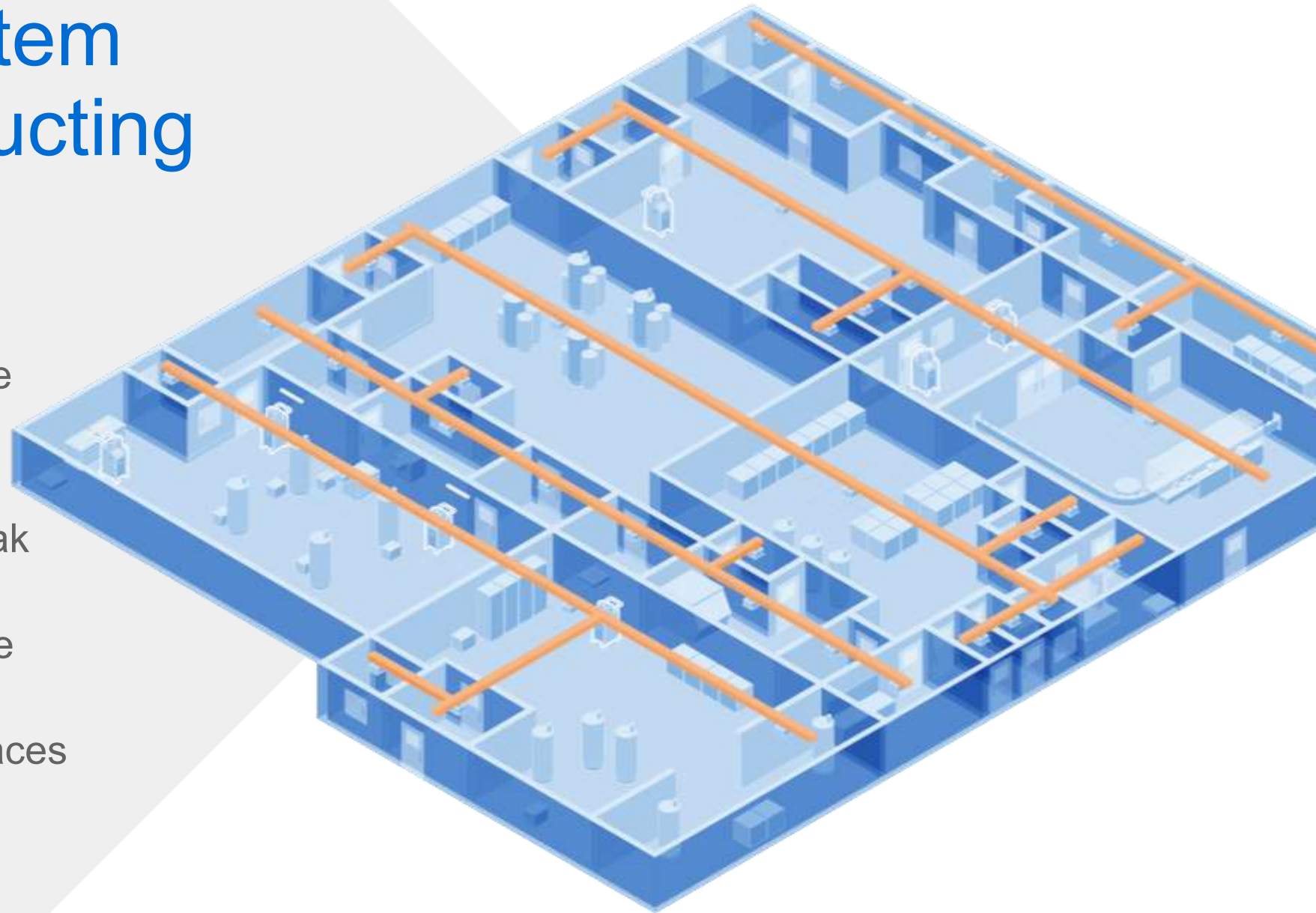
- Design work
- Long install times
- Reliance on other contractors
- High costs (PVC, trace heating, insulation)
- Preventative maintenance (pressure testing)



Integrated System using HVAC Ducting

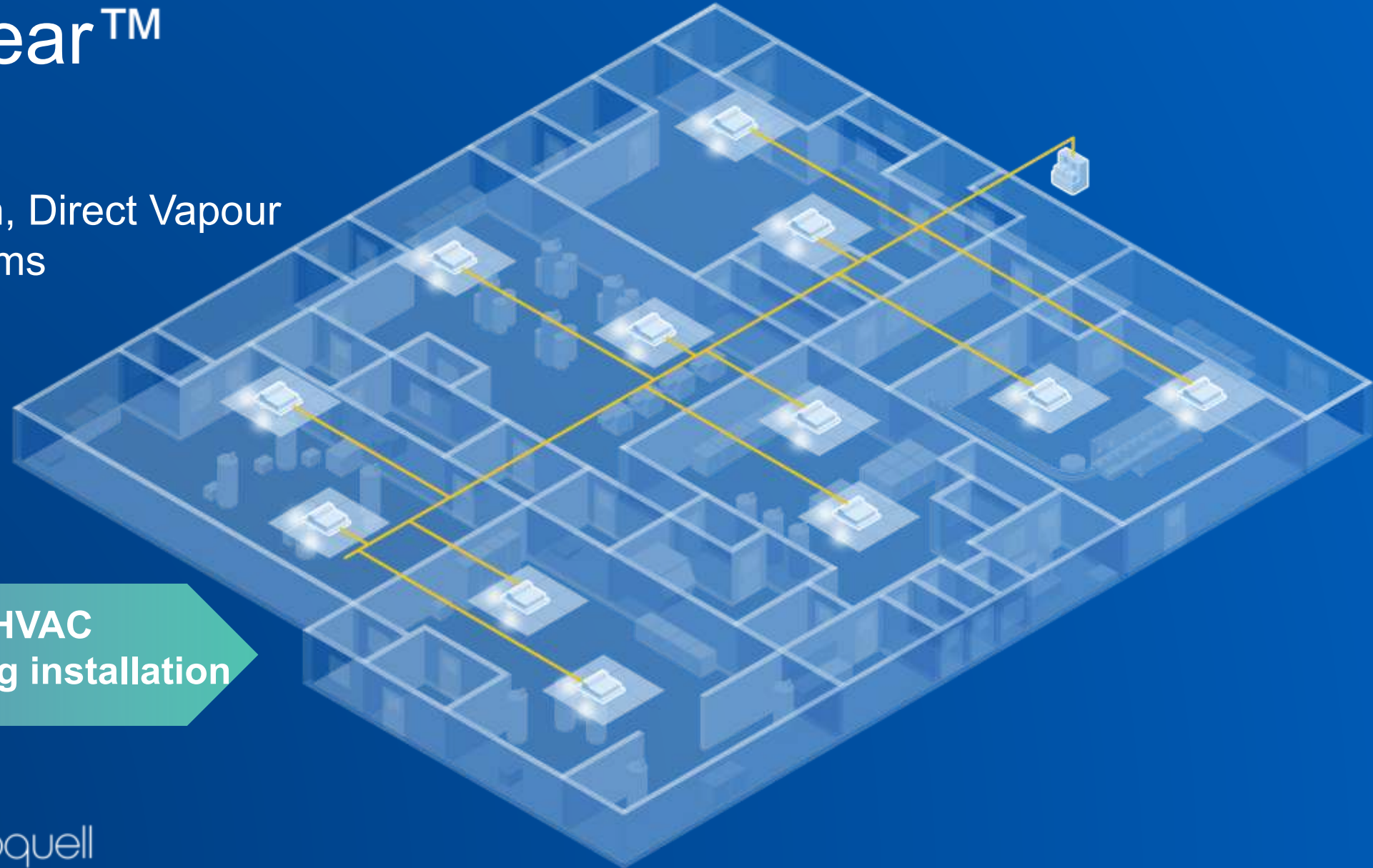
HVAC ducting limitations:

- Extended consumable usage (filter absorption)
- Extended cycle times
- Modifications required for leak tightness
- Limited distribution can make validation challenging
- Risk of damage to duct surfaces



Revolutionary New Integrated System – Bioquell Qlear™

Remote Liquid Station, Direct Vapour
Generation within rooms

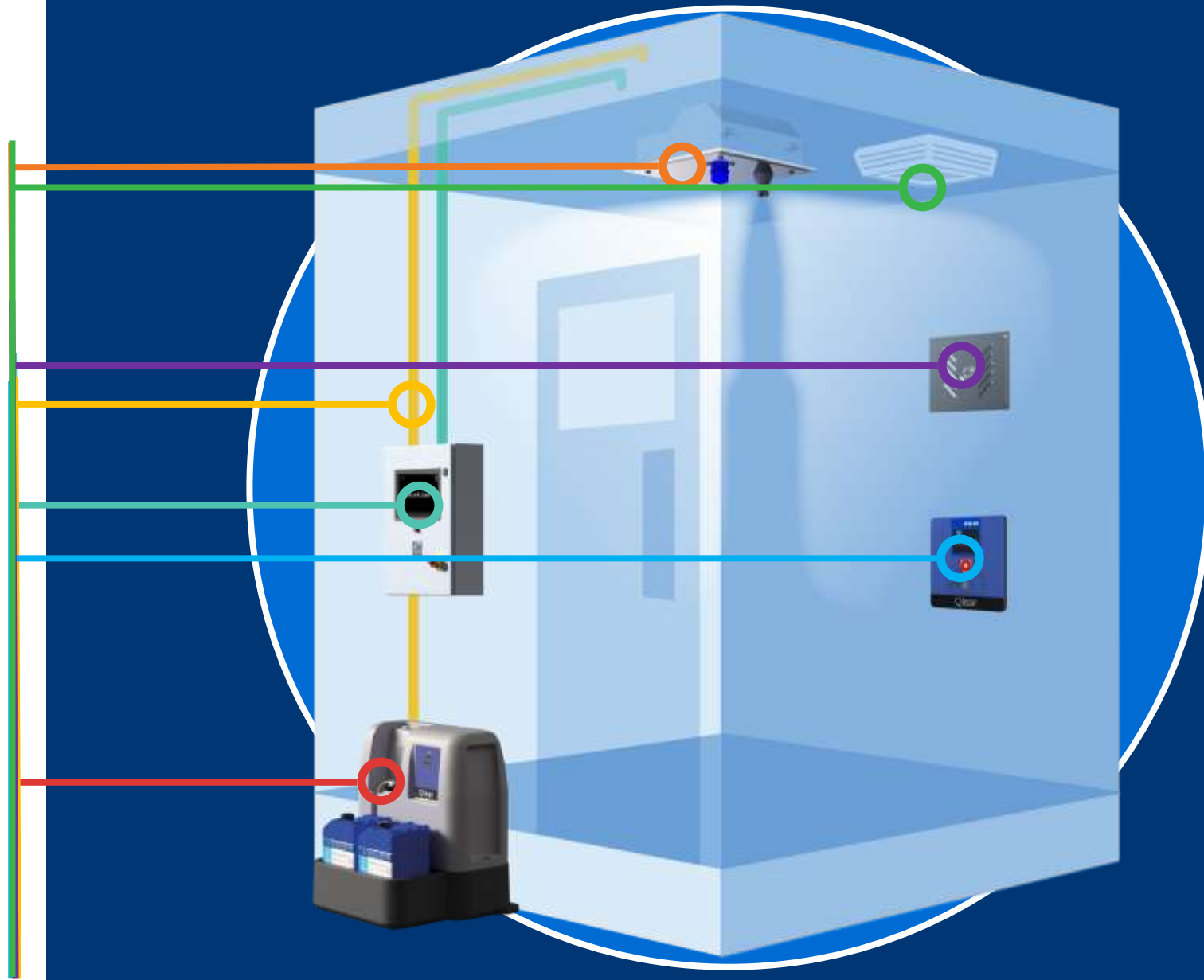


Eliminates pipework / HVAC
distribution, simplifying installation

Bioquell Qlear™ Components

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The Bioquell Qlear™ consists of a range of components that can be installed in a laboratory to provide a clean, controlled environment. The Qlear™ is designed to be installed in a laboratory with a BMS/AC system.



Summary of Integrated Bio-Decontamination Methods

Technology	Ease of Use	Ease of Install	Cycle time	Safety	Repeatability
Integrated System (Pipework)	✓	✗	—	✓	✓
Integrated System (HVAC Ducting)	✓	✓	—	—	✗
Integrated System (Direct)	✓	✓	✓	✓	✓

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PROTECTING WHAT'S VITAL[™]