Foggers & Sprayers Equipment evaluation and usage

Four distinct methods of dispersing disinfectants.
These methods are defined chiefly by the size of water droplets produced:

Wet foggers/misters
ULV (ultra-low volume) sprayers
Thermal-fogging devices
Electrostatic sprayers

These comprise the largest class:

- **Wet foggers/ misters**

These constitute a large class of application tools. Misters work by mechanical action, using air pressure and specialized nozzles to break liquid into droplets.

Droplets dispersed by these machines range in size from 25-100 microns.

Disadvantages

Often lack precision metering.
When machine operator is inexperienced, wetting, fallout and staining can occur to moisture sensitive surfaces.
The droplet size is typically much larger than the size of odor molecules and, therefore, does not penetrate the same as other types of fogging equipment.

- **ULV foggers**

These are wet foggers that produce smaller droplets than wet foggers/ misters.

ULVs can be adjusted to generate particles in the 8-15 micron size range.
Droplets can stay suspended in air for five or six hours instead of a few minutes with a wet fogger/ mister.

Disadvantages

Larger droplets generated by compression sprayers have a greater ability to coat surfaces than ULV generated droplets.
Does not get small enough in droplet size to get the best penetration and permeation into cracks and crevices and, therefore, does not reproduce the penetration of the deodorant vapors.

- **Thermal fogging devices**

Thermal foggers are machines that utilize heat to change liquids into small droplets. These droplets condense when introduced into a cooler atmosphere. Thermal foggers can produce droplets as small as 0.5 microns up to 2 microns in size. Petroleum-based formulations are normally used with thermal fogging devices.

Differences between thermal and ULV fogging

The principle difference between ULV and thermal fogging is the thermal generation process produces a smaller and more consistent droplet size. Thermal fogging produces a dry or damp fog as opposed to the wet ULV aerosol.

The concentration of active material in thermal fogging is usually lower than in ULV applications.
Thermal fog droplets have better penetration and permeation properties than ULV droplets.
Thermal fog lends itself to treatment of both large and small dwellings and buildings.

- **Electrostatic Sprayers**

Electrostatic spray surface cleaning is the process of spraying an electrostatically charged mist onto surfaces and objects. Electrostatic spray uses a specialized solution that is combined with air and atomized by an electrode inside the sprayer. Subsequently, the spray contains positively charged particles that are able to aggressively adhere to surfaces and objects. Because the particles in the spray are positively charged, they cling to and coat any surface they're aimed at.

For most disinfectants to work, a targeted surface must be completely coated and remain wet for up to 10 minutes. Plus, all targeted surfaces need to be disinfected correctly – not just "high-touch" areas.

There are some limitations to consider:

Disinfectants applied via such a spray technology require a droplet size of 80 microns or larger to meet OSHA requirements.
Even at this relatively large droplet size, disinfectants tend to dry out in two to three minutes, which is short of the vast majority of product label stated dwell times, which range from five to ten minutes (disinfectants provide no ongoing cleaning or protection once they dry out).

Consequently, some have questioned the efficacy of disinfectants when applied via such methods. However, research has indicated that 50% of the effective 'kill rate' of some surface disinfectants occurs within the first 60 to 90 seconds of surface contact time.

Disinfectants:

This leads to other questions about stated 'kill rates' of disinfectants and how applicable they are to 'real world' usage. Stated 'kill rates' are based on lab testing environments, where there is no biofilm present.

The **CDC** acknowledges biofilm inhibits disinfectants reaching pathogen cell walls, and so impacts the efficacy of such products, as disinfectants do not fully address biofilm. As biofilm is almost universally present on indoor surfaces, the implication is that the stated 'kill claims' on disinfectant labels may not be as high as results achieved when used in everyday applications.

For these reasons, the effective dwell times when applying disinfectants with electrostatic sprayers will likely be less than what is stated on product labels. So, although it may be a technically effective means of application, the results may not be 'as advertised.' What, then, are the alternatives?

Fine Misting/Fogging Whole Room Systems:

Whole room fine misting/fogging, delivering products such as hydrogen peroxide. Devices are wheeled into the room which is then sealed off while the unit fills the room with a fine mist of hydrogen peroxide.

This equipment delivers a one micro droplet sized mist into the enclosed space. This process involves filling the enclosed room with this fine fog, which may take several hours. People and animals cannot be present during the application.

With this process, the hydrogen peroxide mist will reach all areas of the room, areas that conventional 'spray & wipe' protocols may miss (electrostatic spraying only impacts surfaces they are directed to).

An advantage of whole room misting is the disinfectant may have greater surface contact dwell time. However, all surface disinfection products provide relatively poor soil removal (including biofilm), and no residual cleaning or protection once they dry out. Surface areas that are missed with such products also remain pockets of contamination that support rapid surface re-population by pathogens.