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UVC Offers Nonchemical Method For Duct Cleaning

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Ultraviolet C-band (UVC) lights, used in many HVAC systems for IAQ and infectious disease control, are now becoming popular for another timely application: duct and other surface cleaning.

This trend follows on the heels of an open letter released by the U.S. Environmental Protection Agency (EPA) in mid-March. In the letter, the EPA issued strong cautions about the use of disinfectants, sanitizers, and other types of antimicrobials for duct cleaning and other surface treatments in HVAC systems. The announcement left contractors and building owners scrambling for alternatives.

"UVC lights are an excellent option because they offer contractors an effective, nonpolluting, and permanent way to clean ductwork of microbial contamination," states Robert Scheir, Ph.D., president of Steril-Aire Inc. (Cerritos, CA). "Also, a well-designed UVC installation delivers a host of benefits besides keeping ducts and other surfaces clean."

GOING TO THE SOURCE: THE COIL

In the majority of cases, Scheir suggests that direct cleansing of ductwork by UVC light is not even necessary.

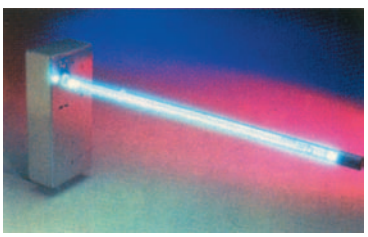
He points to the air conditioning coil as the primary source of mold growth in HVAC systems.

"Fresh inoculation coming off the coil typically migrates downstream and some of it settles in the ductwork — a process that's self-perpetuating. But when you destroy mold and microbial growth at the coil, you eliminate the food source, so the chain is broken and the contamination that has already built up on duct surfaces will eventually decay away."

A common solution, therefore, is to install UVC lights at the source (i.e., downstream of and facing the coil, or on the return air side if installing it downstream is too difficult). Coil surfaces are continuously bathed in germicidal light, designed to kill microorganisms that grow and multiply there — not only on the visible part of the fins, but also on surfaces within the coil, where the greatest amount of mold activity occurs.

"The total surface area of the coil may exceed that of the ductwork by a factor of three, four, or even five," Scheir notes. "But contamination on the coil tends to be less visible. When you inspect the inside of a duct and it looks moldy, people respond to that — not realizing that the coil is the real culprit."

Scheir says there is much evidence that infestation in ductwork, though it may look scary, does not contribute materially to problems in the occupied space. The movement of air along interior duct walls is actually very slight, so the amount of contamination coming off the ducts and into the building interior is not usually significant, he states.



With this UVC device designed for installation in ductwork, a small penetration is made into the duct wall and the UVC tube is inserted across the width of the duct. *(Photo courtesy of Steril-Aire Inc.)*

That also explains why some building owners with mold problems have seen air quality improve in just two or three days after installing UVC lights at the coil. "As noted, the coil is the source of the trouble — and when you eradicate mold growth at the source, the related odors quickly disappear. Occupants report a fresher smelling environment and the abatement of many allergy and discomfort problems," explains Scheir.

DUCT-CLEANING GUIDELINES

So why bother to clean ductwork at all if you've installed UVC at the coils? Sometimes infestation on ducts is extremely heavy; and even if it isn't, building owners may be uncomfortable with the idea of "ignoring" duct cleaning when surface contamination exists.

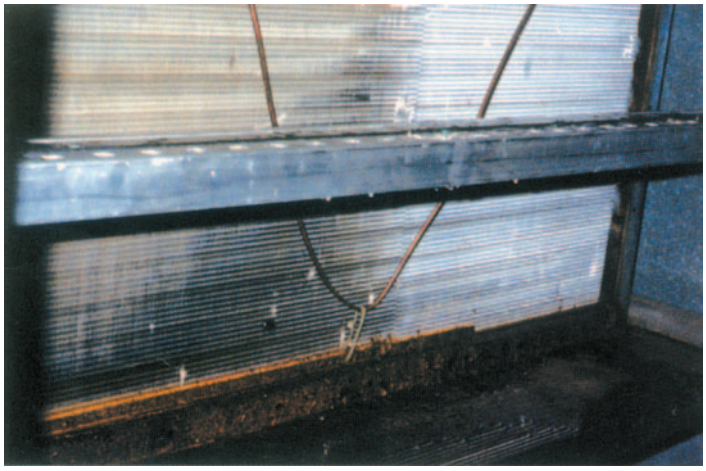
In such cases, the solution is to install additional UVC lights in the infested ductwork. "The word 'additional' is key here," says Scheir. "If you irradiate the ducts but don't irradiate the coil, you're treating the symptoms and not the disease."

Typically, such installations involve making a 1-inch penetration into the duct wall and running the light across the width of the duct. The UVC energy rapidly "cooks off" mold and other microbes, leaving ductwork free of organic buildup. No other surface cleaning is necessary, Scheir says.

He also advises contractors to ask suppliers the following questions when selecting UVC lights for coil and duct cleaning applications:

- *Is the UVC device designed for HVAC applications?*

Specifically, make sure it will provide the required output under the temperature and air velocity conditions in which the light will operate. Ask for documentation to support output claims. Also, make sure the device is designed for both air and surface treatment.



The right side of this A/C coil has been irradiated with high-intensity UVC light. After just a few days, the treated side of the coil is cleaner and nearly free of mold. When left untreated, mold originating in the coil can migrate downstream and settle in the ductwork. *(Photo courtesy of Steril-Aire Inc.)*

- *Is the device designed for installation in ductwork?*

For duct cleaning applications, select a design where only the lamp or "tube" will penetrate into the ductwork and the power supply will be external. This will ensure minimum intrusion into the ductwork. The tube should ideally be long enough to extend across the width of the duct.

- *How many lights will be needed?*

UVC devices provide line-of-sight irradiation only, with a typical effective range of about 10 feet in a ducted system. (This range is related to lamp size and output, and may vary from manufacturer to manufacturer.) Be sure to compare not only the number of lights but the total installed costs.

OTHER BENEFITS

When you install UVC to keep coils and ductwork clean, it's essentially a permanent fix. "There's little to do except change the bulbs about once a year, or when a radiometer indicates that the output has dropped below specified levels," says Scheir.

Buildings employing UVC technology report going for years without cleaning coils, drain pans, and plenums, says Scheir. As a result, service crews and building occupants are no longer exposed to the questionable cleaning agents associated with these tasks.

Also, when coils stay constantly clean, the resulting increase in net cooling capacity can yield big reductions in power consumption. American Electric Power, a utility in Dallas, TX, has achieved annual six-figure energy savings that they attribute directly to the coil cleaning efficacy of UVC. They have also cut back gradually from four 300-ton chillers to only two.

With numbers like that, the potential for a UVC system to pay for itself becomes evident.

For more information, contact Steril-Aire, Inc. 818-565-1128; **www.steril-aire.com** *(website).* (N)

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