

How Effective is UV for Air Purification?

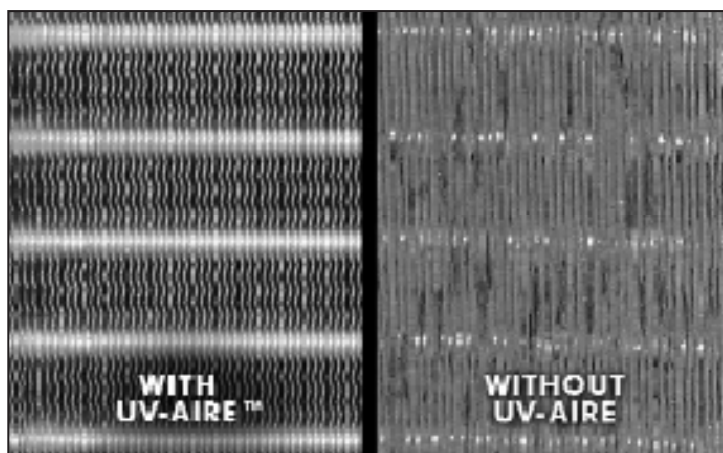
For many years, ultraviolet light has proven effective in sterilizing medical equipment, purifying water and processing food. Currently, the use of UV lights is gaining industry acceptance in HVAC applications. Microbe Management, Inc., a testing agency in Greenville, NC, has conducted three separate tests to examine UV's effect on indoor air quality. The test results reviewed in this article conclude that UV is an integral part of a whole house approach to improving Indoor Air Quality.

Attack The Source

While experts disagree on the root causes of many IAQ problems, there is consensus that stopping problems at the source is crucial to long-term air quality improvement. First, the homeowner must eliminate any unwanted sources of moisture in the home such as roof leaks and drainage problems. Likewise, the air conditioning coil must be addressed since it is a natural breeding ground for molds, which thrive in a dark, moist environment. Familiar with the rank smell generated when switching from air conditioning to heat mode? That is the smell of mold and bio-film burning off the coil. Whenever the blower is engaged, mold spores from contaminated A-coils are released into the ductwork and distributed throughout the building. These spores then seek alternative surfaces in other parts of the home to breed and multiply.

Surface Test: UV Kills and Prevents Mold on A-Coils

A specific test was designed to determine UV's effectiveness in treating mold on coil surfaces. The test simulated the damp, dark settings where A-coils are found. In this study "We took a standard A-coil, sterilized it, introduced two kinds of mold and then placed it in a controlled, moisture-laden environment," says Bernard Kane, of Microbe Management. "We created two separate chambers in our lab. One chamber was bathed in UV light. The other was not." The results were dramatic and conclusive. The side of the A-coil that was exposed to the ultraviolet light was clean and clear of mold growth. Mold continued to grow unabated on the side without UV. Subsequently, the contaminated side was bathed in UV light and the mold was eradicated. Kane summarized the results: "Properly positioning a UV lamp over the A-coil in a residential or commercial air conditioning system can eliminate surface mold on the coil and prevent future mold growth as well."



Airborne Testing

Bacteria and viruses are introduced into the building by its occupants and often cannot be controlled at the source. Therefore, it is important to attack these airborne invaders early and often, before they have an opportunity to multiply. The single pass test proves that UV effectively kills these airborne microorganisms in the duct.

Since HVAC systems typically re-circulate the air 40-75 times per day, a multi-pass, cumulative test was conducted. Results demonstrate that repeated, multi-pass exposure to UV light dramatically reduces the concentration of bacteria and viruses throughout the home.

Single Pass Test: UV Deadly for Airborne Microbes

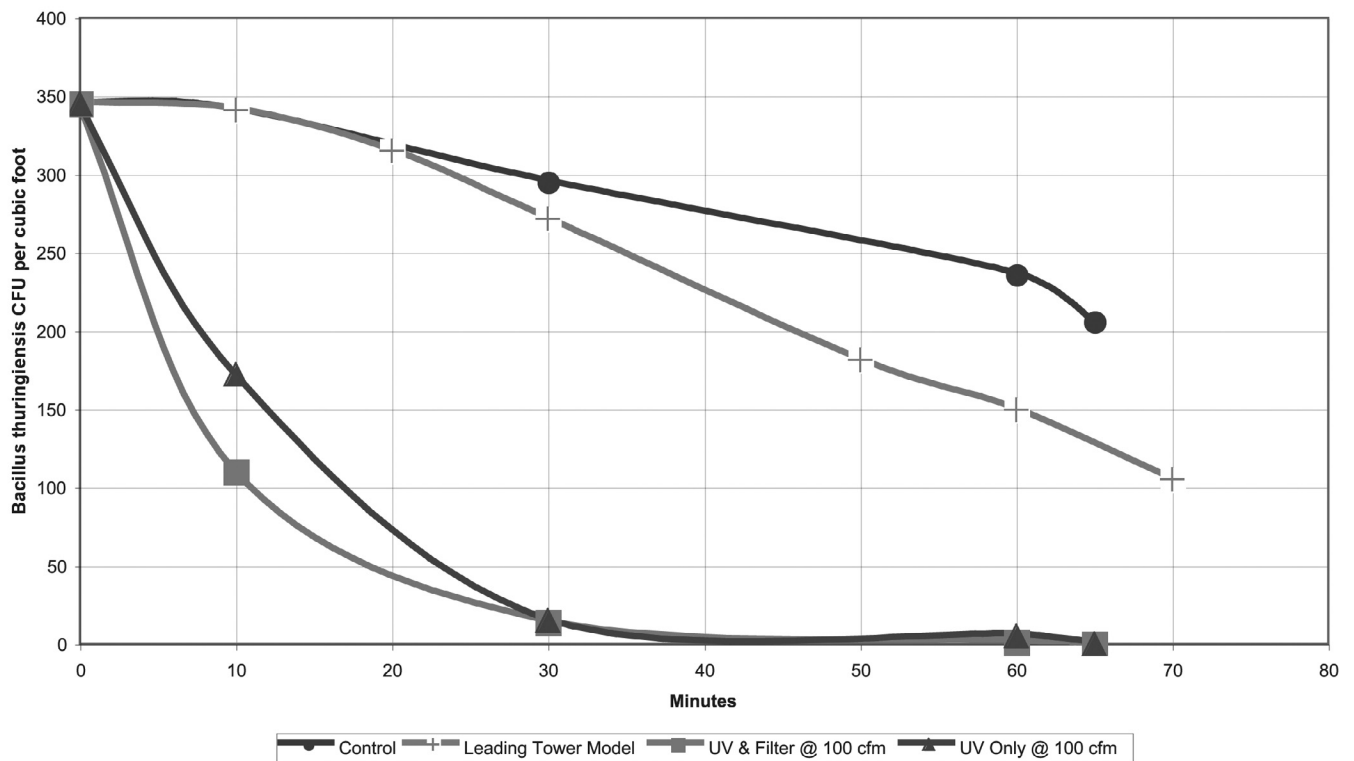
This study introduced a common bacterium into a galvanized air duct equipped with a UV light to determine how effective the lamp would be in reducing the bacteria with one exposure, or a “single pass.” The tests were conducted at two speeds: 1125 cfm and 2250 cfm in an 18” x 18” duct. The UV lamp yielded at least a 90% reduction of the test bacteria with a single airflow pass at 1125 cfm and at least 71% reduction at 2250 cfm.

Cumulative Test: Multiple Exposures Dramatically Improve IAQ.

To further investigate the effectiveness of UV on indoor air quality, Microbe Management created a new series of tests designed to measure the cumulative effect of UV in reducing airborne contaminants. The test was performed in a structure with two isolated 8’ x 8’ x 8’ rooms where air could be sampled. In the control room, no UV was present, while the other room utilized a portable UV air purifier.

According to Bernard Kane Ph. D., of Microbe Management, “Test results were very encouraging. In both rooms, we introduced a resistant, spore forming bacteria until the air was saturated with 350 colonies per cubic foot. In the room with the portable UV unit, the spore count was reduced by 50% in just 10 minutes and by 98% within 30 minutes. In the control room, without UV, more than 85% of the bacteria were still active after thirty minutes.” Similarly, the leading consumer UV “tower” model was also tested, but showed only minimal effectiveness. (See Chart 1)

Chart 1: Recirculation testing of the UV-1500 (Room size 8ft x 8ft x 8ft)



Conclusion: UV Is An Effective Part of “Whole House” Solution

A-coil irradiation, single pass, and cumulative tests confirm that UV is an important and effective contributor to a healthier home environment. UV technology used with a quality filter (MERV rated 8 or higher) will dramatically improve Indoor Air Quality. Additionally, portable units can be used in combination with in-duct models. This combination is strongly recommended for individuals with depressed immune systems, asthma, allergies, or other respiratory conditions. For homes without forced-air, portable UV air purifiers are recommended to enhance IAQ. Also, health care professionals, teachers and day-care workers can benefit from additional UV protection from influenza and other viruses.

Field Controls manufactures a full line of duct-mounted and freestanding UV-Aire products. Twenty models are available for residential and commercial applications, including heat pumps, package systems and traditional forced-air systems. Portable UV-Aire models include high efficiency filtration with a MERV 8 rating and charcoal filtration to attack odors and VOCs. Detailed reports and protocols on the above tests are available online at www.fieldcontrols.com/literature.php, form #4291.



FIELD CONTROLS

2630 Airport Road • Kinston, NC 28504
Phone: 252.522.3031 • Fax: 252.522.0214
www.fieldcontrols.com