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AHG tests Fresh-Aire's APCO air purifier

Contributor | March 10, 2013

Lab test proves UV light, activated carbon media and PCO processes "highly effective" for IAQ

Airmid Healthgroup (AHG), an Ireland-based third-party indoor air cleaning device test facility, has announced the successful laboratory test results of a new combination ultra-violet (UV-C) light, activated carbon media air purification and photocatalytic oxidation (PCO) device – the APCO air purifier manufactured by Fresh-Aire UV, Jupiter, Florida. AHG added that the demonstration proved APCO's capability to both sterilise microorganisms and reduce volatile organic compounds (VOCs), and reported that the APCO's UV light was "highly effective" at inactivating microbes, and that its titanium-dioxide infused carbon media matrix and PCO combination was "capable of reducing high concentrations" of VOCs commonly found in residential, as well as commercial buildings, such as hospitals, hotels, offices and schools.

The company gave further details: The UV-C light portion of the study simulated airstream microbe inactivation in an ASTM/AHAM style environmental test chamber simulating a typical building's indoor environment and HVAC air handler arrangement. A single pass test was also performed on an ASHRAE Standard 52.2 test duct system.

AHG revealed that the test's UV-C light single-pass inactivation results were: Bacteria (*S.epidermidis*) – 98.85%; Virus (*MS2 coliphage*) – 99.03%; and Mould (*A.niger*) – 78.80%.

According to AHG, the test, which simulated the typical indoor HVAC conditions of 73°F (23°C), 55% relative humidity and airflow velocity of 492-fpm (0.93 m3/sec), was performed on a single pass. IAQ experts claim even higher inactivity rates among the three tested microbes could occur in a multiple pass environment, such as a typical building HVAC recirculation unit with an APCO device, the company added.

Additional multiple passes of the air contaminants through the APCO product will further decrease the total concentration (mg/m3 or ppmv) of the air contaminants in the test chamber or indoor space, believes Dean T Tompkins, PhD, PE, a Milwaukee, Wisconsin-based IAQ consultant who reviewed the AHG test results. "For practical reasons, demonstration test data assessing the performance of the APCO were based on experiments performed for a finite period of time," Tompkins said. "When operating in a building's HVAC system with no finite time period of concern, additional air passes through the APCO will result in contaminant concentrations below those achieved at the end of AHG's experimental test period." Tompkins is the former chairman of ASHRAE Technical Committee 2.3. – Gas Phase Contaminants and Removal Equipment – and a 15-year research scientist in the Environmental Chemistry and Technology Programme of University of Wisconsin, Madison, in the United States.

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AHG went into the nitty-gritty of the test process: The commercial and residential APCO models are designed to sterilise and inactivate mould, fungi, viruses and other microorganisms in the airstream and on internal surfaces of HVAC air handlers. Meanwhile, the activated carbon media matrix element adsorbs airborne VOCs, such as cleaning agents, off-gassing from interior furnishings materials and other gaseous contaminants. The UV-C light performs a second duty because its close positioning to the activated carbon media creates a PCO process that chemically transforms the captured gaseous contaminants to harmless carbon dioxide (CO₂) and water vapour (H₂O) molecules.

In addition to UV light disinfection, VOC removal capabilities using APCO's activated carbon media and PCO functions were also reportedly tested. According to AHG authorities, the APCO is "capable of reducing very high concentrations of formaldehyde and acetaldehyde." This is in light of the fact that the test used a limited residence time combined with 100 times normal gas contaminant concentration exposures found in typical commercial building environments. Multiple passes, typical of a re-circulating HVAC system, Tompkins said, will also reduce gaseous contaminants further.

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