

Introduction to an Innovative Type of Air Filtration

UV-Filtration™

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Improving Indoor Air Quality

With indoor air quality becoming a bigger concern in the US and indoor air related illnesses becoming more prevalent, the focus has shifted to improving indoor air quality. Studies have confirmed that indoor air can contain pollution levels that far exceed outside air levels, sometimes as much as 100 times more polluted! According to the EPA, indoor air quality is one of the top 5 environmental health risks of our time. The EPA has suggested the following three methods for improving indoor air quality: source control, outside air ventilation and air cleaning.

While source control and outside air ventilation are important elements of controlling air quality, air cleaning can actually improve the air quality. According to the EPA, air cleaning principals typically involve using air filtration approaches to reduce household indoor air contamination loads. This can be accomplished by utilizing portable air filtering devices or whole house approaches, such as using the heating, ventilating and air conditioning system to filter the air.

There are three sources of indoor air contamination that exists in residential indoor air: particulate, biological, and chemical & odor molecule contamination. Typical 1" household air filter elements consist of either permanent or disposable media that filter to various levels of efficiency. Often times, they are limited to just particulate types of air filters and are not sufficient at controlling or reducing the biological or chemical contaminants of the indoor air. Coatings can be added to filter elements to prevent the growth of captured biological contaminants on the filter elements, but these coatings are only effective as long as the filters are changed regularly, and it is not effective on the contaminants the filter is not capable of capturing, such as bacteria and viruses. Absorption media can be added to filter elements to assist in the reduction of the chemical vapor aspects of indoor air, but these also have a finite capacity limited by the amount of chemical vapors the media can absorb.

In order to overcome the pitfalls associated with typical residential air filters, we need to look at ways of improving upon the current technology. UV Light advances this technology in a way that can provide indoor air comfort over that of standard filtration.

Why UV Light and Filtration

UV light technology, which is rapidly growing in popularity, has proven itself as a technology choice that is effective in reducing the biological, chemical and odor aspects from indoor air when properly integrated into whole house air handling systems. Studies have shown that UV technology is an effective sterilizer that can prevent the growth of biological contaminants that occur in air handling systems and can assist in reducing the spread of indoor air related biological contaminants such as bacteria and viruses. Additionally, UV light has been shown to greatly reduce the presence of these contaminants from indoor air when used in conjunction with photocatalytic technologies, which are catalysts that can oxidize indoor chemical and odor molecules (much like the catalytic converter in an automobile).

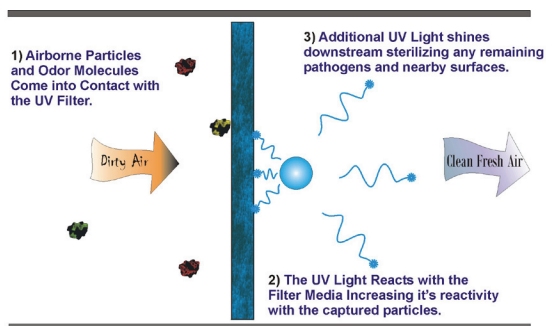
By combining the sterilization and oxidation power of UV technology into a 1" filter, we now have the best available technology for indoor air filtration - a filter that is capable of filtering particulate, sterilizing biological contaminants, and oxidizing chemical and odor molecules. This combined approach, coined *UV-Filtration™*, is an innovative approach which can greatly enhance indoor air quality and improve indoor comfort.



The Science

A *UV-Filtration™* unit or element is composed of a special filtration media that is capable of filtering hard to sterilize organic components of the airstream such as mold spores, pollen, dander and dust. The filter media is not intended to be an absolute filter, but more of an "organic" filter. Additionally, this media is constructed of materials that are resistant to UV light and that can also enhance the UV lights transmission and reflection throughout the media.

The smaller elements, such as bacteria and viruses, are not intended to be captured, but merely slowed down to create dwell time in order for the UV light to provide enough UV for disinfection. Once sterilized, these components are typically rendered as harmless.



By positioning the UV light within a close proximity to this filtration media, we can provide the necessary UV exposure to the media to provide this type of filtration. In addition, we can then utilize the remaining excess UV light for airborne exposure to reduce additional airborne organics such as bacteria and viral components that typically cannot be easily filtered. Plus, the UV light can be illuminated downstream to target problematic areas of the HVAC system, such as the mold growth that can occur on the coil or drain pans.

In addition, the filtration media can be enhanced with photocatalytic materials to help reduce other indoor problems such as odor molecules or volatile organic chemicals (VOC's). The filtration element is coated with a UV sensitive catalyst that when exposed to UV light can assist in the breakdown of indoor VOC's through a catalytic reaction, much like a car's catalytic converter.

The End Result

UV-Filtration™ provides a less restrictive method for filtering indoor air providing better overall results than higher MERV rated particulate filters, without causing airflow restrictions that can compromise the efficiency of your system. In addition, *UV-Filtration™* provides additional benefits such as odor and VOC reduction, plus HVAC system maintenance that traditional filtration cannot provide. With UV technology becoming more popular and air filtration as a proven method, why not combine the two to greatly enhance indoor air quality and improve indoor comfort.

About The Author

Chris Willette is president of Triatomic Environmental Inc., which specializes in providing advanced germicidal light solutions for the enhancement of indoor air quality. Chris has been designing and developing products for the indoor air quality industry since 1994, is a published author and has several patents pending, including one for the application of UV light technology into 1" air filter elements. To learn more visit, www.freshaireuv.com.