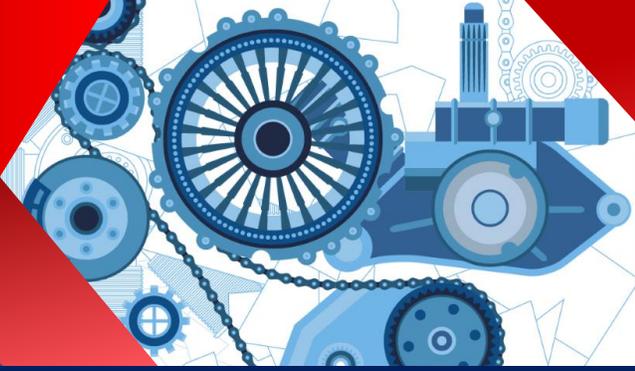


ADE ENGINEERING UPDATE



Combating Covid-19: Upgrading Fan Powered Box Filters

As we move into the new normal of living with Covid-19, we have had to reassess how we can combat virus transmission inside our buildings. While upgrading one's HVAC system is not going to alleviate every single issue (social distancing measures and frequent cleaning of surfaces are still very important), it will provide a boost in elimination of viral transmission. An easy way to upgrade your HVAC system is to add enhanced filtration measures in your system.

Covid-19 is primarily transmitted between people through physical contact and respiratory aerosols that an infected person releases when they cough, sneeze or speak. These aerosols can land on people or surfaces, or could remain suspended in the air for 3 hours or more. An unknown amount of those aerosols is mixed into the room air and may spread to another space. In the majority of VAV systems, air being introduced into a space is a mixture of return and outdoor air, which could possibly be contaminated.

The challenge with upgrading filtration is the increased resistance associated with the filters, that fans in the system may not be able to handle. This is especially true when trying to implement high efficiency particulate air (HEPA) filters. Viruses are generally in the 0.3-1-micron size range, which HEPA filters are very good at filtering out (99% efficient and up), but pressure drops could be up to 1.5" w.g. each. In addition, the respiratory droplets that the virus clings to are in the 1-5-micron range. A viable alternative is a MERV 13 filter. While MERV 13 filters are not as efficient, the pressure drop across them is significantly less, and they still provide a 70% capture rate of particles in the 0.3-1-micron range and 90% capture rate of particles in the 1-3-micron range (Figure 1).

So, how can we implement these filters in existing systems? An easy way to do this is put them on the return inlet of your fan powered box. Each fan powered box has a "construction phase" filter channel in them. This is to protect the internal components from any dust created during construction. While the filters are usually taken out after construction, the filter channel itself remains. These filter channels are usually 1" deep, but a retrofit piece can be used to make a 2" channel (Figure 2), which would further reduce pressure drops.

To get more information regarding Covid-19 mitigation techniques through HVAC systems, check out Titus' paper, "[HVAC Systems and Methods of Abating Airborne Infection](#)" and Price's paper, "[HVAC Solutions for Reducing Airborne Pathogens.](#)" ADE can also provide other solutions and technologies to combat Covid-19, Fan Filter Units, Duct Mounted Units, Portable Air Purification Units, UV Lights, Bipolar Ionization and more. To get more information or assistance on selections, please contact adeengineering@adehvac.com.



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Filter Efficiency vs. Particle Size

MERV	0.3-1 μm	1-3 μm	3-10 μm
4 ^a	1%	9%	15%
7 ^a	17%	46%	50%
11 ^a	30%	65%	85%
13	70%	90%	90%
14	80%	90%	90%
15	90%	90%	90%
16	95%	95%	95%
HEPA	99.9%	99.9%	99.9%

^a Values for 0.3-1 and 1-3 μm are taken from Stephens and Siegel (2012)

Source: Stephens, B., HVAC Filtration & Wells Riley Approach, Built Environment, 3/1/12

Figure 1: Filter Efficiency vs Particle Size



Figure 2: 2" Return Inlet Retrofit Piece

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