

# HVAC UPGRADES CAN REDUCE COVID-19 RISKS

BY MARY LOU JAY

The rates of COVID-19 infections began rising again in late October 2020 and health experts expect that trend to continue throughout this winter. But no one wants to return to the total lockdowns that the country experienced last spring. By making changes to their HVAC systems, businesses, schools and other organizations can at least partially limit the risk of spreading the coronavirus throughout their buildings.

Mechanical contractor Shapiro & Duncan, Inc. started making upgrades to its own HVAC systems immediately after the virus hit in March, and has performed similar work for customers over the last several months.

“Increasing your filtration and your fresh air are key,” said Mark Drury, the company’s vice president, business development. Bringing in more fresh air could be as simple as opening doors and windows and using fans. Shapiro & Duncan’s pre-fabrication facility, for example, didn’t require any HVAC upgrades because it already operated with bay doors open and large exhaust fans that provide frequent air changes. If fans and open windows aren’t an option, the first step for most companies would be to alter the HVAC controls to bring in four to six air changes per hour, Drury said.

Companies can also run systems for a longer time after normal working hours to ensure that more fresh air is brought into the building.

Next, companies should install MERV 13 air filters that can better remove the COVID-19 particles from the air. In its offices, Shapiro & Duncan replaced the MERV 8 filters it had previously used in its variable air volume (VAV) system with the higher efficiency MERV 13 filters. MERV, which stands for minimum efficiency reporting value, represents the efficiency of a filter at capturing particles of certain sizes. MERV 13 filters are better than MERV 8 filters at capturing the respiratory droplets to which the COVID-19 particle attaches. Although filters with a MERV 14 or higher rating might capture even more particles, they would restrict too much of the airflow in most HVAC systems. Although high-efficiency particulate air (HEPA) filters are even more efficient at capturing the particulates, they would block almost all of the airflow in systems that aren't designed for them.

Companies should continue with their normal filter change routines, which is

usually monthly or quarterly, depending on the system. "The air filters are designed to pick up the particulates, and they are dynamic; as they load up, they start to get even more effective until their next filter change," said Raj Setty, president of Setty Engineering, an MEP engineering and commissioning firm. When it is time for a replacement, the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommends removing the used filter while wearing a properly-fitted respirator (N95 or higher); eye protection such as safety glasses, goggles or face shields; and disposable gloves. This would protect the person doing the maintenance from contact with any COVID-19 particulates that the filter has captured.

## DISINFECTING SPACES

In addition to replacing its filters, Shapiro & Duncan placed UV lights high on its walls to disinfect the air. Although UV lights are sometimes installed in air handlers, they take about 30 seconds to kill the COVID-19 virus particulates, and Drury said the air moved too quickly through its system for this to be effective. Companies could also install the UV lighting in plenum spaces.

UV-C technology has proven effective in hospitals, which have used germicidal ultraviolet C, in the 253.7 nanometer bandwidth, to kill mold spores on HVAC coils for many years. "So now we're just starting to reapply that technology to kill everything that comes through the air

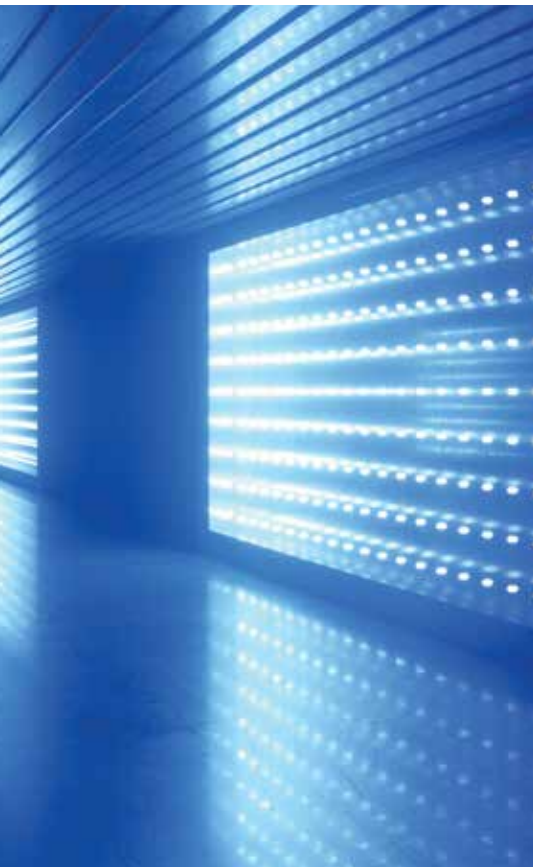
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handler ducts. We focus on the air handlers because they are the centralized place where the air in the building is pulled through,” Setty said. “You have to pick the right light intensity and then you need to adjust the system based on the speed of the air. The slower the air flow, the more effective the UV-C is; the faster the air flow, the more UV-C lights we need.”

Shapiro & Duncan added bipolar ionization systems to its HVAC equipment as well. Bipolar ionization works by electrifying the air, charging particles so that they stick to each other and are more easily caught by an air filter.

The total cost of all these upgrades at Shapiro & Duncan was about \$2 per square foot, Drury said. “The installation cost is relatively small, and the operating cost is very small.”



### **DON'T IGNORE BASIC PRECAUTIONS**

Additions to HVAC systems can reduce the number of COVID-19 particles present in a building's air supply, but they don't eliminate them completely. That's why it's essential that organizations continue to require building occupants to wear masks, maintain social distancing of at least 6 feet and wash their hands thoroughly and frequently.

If HVAC system upgrades aren't possible, companies could purchase room-size, stand-alone HEPA filtering machines that capture the coronavirus-carrying respiratory droplets in the air.

Many companies have installed plexiglass dividers between cubicles as a means of preventing the spread of the coronavirus, but Setty said their usefulness is limited. Although they do stop the initial transmission of the COVID-19 particles, the air inside the cubicle isn't stagnant, which means the particles eventually travel back into the main air handling unit. That's why it's important to bring in fresh air and to filter and/or disinfect the air before it gets circulated back into the building.

Another way to reduce the risk to building occupants is to limit the amount of time that they spend indoors. Schools, for example, shouldn't keep students confined to one classroom for eight hours a day, according to Setty, who is a member of ASHRAE's technical committee on educational facilities. He recommends instead that students have classes together for an hour or two and then go outside or to another room so that the air in the initial classroom can be filtered and cleaned.

Businesses could follow the same principles by limiting the number of hours that employees spend at the office each day.

Companies that want to make COVID-related upgrades to their HVAC systems should begin the process as soon as possible. Due to high demand and shortages throughout the supply chain, equipment that used to be available in four to six weeks can now take 16 weeks or more to arrive, said Drury.

Even after a COVID-19 vaccine is available and the worst of the pandemic is over, upgrades to HVAC systems will provide benefits for many years. “They are going to improve your indoor air quality for the long run, and that is better in terms of the flu, in terms of allergies, in terms of the common cold. You will benefit by not spreading all of these things amongst your employees,” said Drury.

### **FOR MORE INFORMATION**

Setty Engineering provides a free infection risk estimator that allows users to adjust for multiple variables (like making certain HVAC improvements or reducing the number of hours people spend in a building) to predict the probability of spreading COVID-19 in a closed environment. You can find this tool at [www.setty.com/recovery-readiness](http://www.setty.com/recovery-readiness).

ASHRAE's website has a variety of coronavirus-related technical resources that can provide guidance on everything from building readiness to filtration and disinfection systems. ([www.ashrae.org/technical-resources/resources](http://www.ashrae.org/technical-resources/resources))