

# MITIGATING THE RISK OF COVID-19 AND IMPROVING INDOOR AIR QUALITY IN SCHOOLS

Following CDC, ASHRAE Guidelines is Crucial to Healthy Environments.

By Mike Wolf, P.E.

ACCORDING TO THE U.S. Government Accountability Office, 40% of school districts (representing about 36,000 schools nationwide) need to update or replace their Heating, Ventilating and Air Conditioning (HVAC) systems. In 2020 and 2021, Congress passed three stimulus bills that provided nearly \$190.5 billion to the Elementary and Secondary School Emergency Relief (ESSER) Fund. A significant portion of the ESSER Fund is earmarked for schools to undertake HVAC system maintenance and make the upgrades necessary to mitigate the spread of COVID-19 and improve Indoor Air Quality (IAQ).

When evaluating options for maintaining and upgrading an HVAC system, it is important to follow guidelines established by the U.S. Centers for Disease Control and Prevention (CDC). A key CDC recommendation for HVAC systems references guidance from the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). ASHRAE Standard 62.1 outlines the functions that a well-designed and maintained HVAC system should perform to maximize IAQ and mitigate pathogen risks. These functions include:



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## Ventilation

Introducing outdoor air into a building is critical to ensure proper IAQ, as the fresh air allows the HVAC system to purge contaminants (e.g., airborne viruses, bacteria, volatile organic compounds) from the building. When introducing outdoor air into a building to mitigate the risk of COVID and improve IAQ, consider one or more of the following:

- Disable demand control ventilation to maximize the amount of outdoor air introduced into the space, regardless of occupancy level.
- Run the HVAC system continuously to prevent buildup of contaminants.
- Run the HVAC system longer than normal occupancy mode. Start delivering fresh air into the space before occupants arrive and continue after they leave, providing a pre- and post-occupancy flush of the air.

## Filtration

Increasing air filtration is another tool to mitigate the risk of COVID and improve IAQ. HVAC systems typically utilize filters with a Minimum Efficiency Reporting Value (MERV) rating of 8. MERV 8 filters are effective at capturing large particles, such as dust and pollen, but are not effective at capturing smaller pathogens. Filters with a MERV 13 rating or higher can capture approximately 85% of airborne respiratory particles and are recommended to help capture SARS-CoV-2 and other pathogens.

However, filters with higher MERV ratings will increase resistance to airflow. To overcome the resistance of filters with higher MERV ratings, the ventilation

system's fans will likely need to run faster to deliver the proper ventilation rate. Consult a qualified HVAC engineer or contractor to ensure fans have the capacity to run at higher speeds and that the duct system can support the higher pressures.

## Circulation

Air circulation refers to how air moves within a space as a function of air rotations and air velocity. Proper air circulation reduces high concentrations of pathogens from forming in a space. Air circulation also aids in destratification (mixing hot air that rises with cooler air beneath) to help improve occupant comfort and reduce energy costs. High volume low speed (HVLS) ceiling fans are ideal for increasing circulation in a space.

## Humidification

Studies show that maintaining a relative humidity of between 40%–60% will reduce the potential of airborne viral transmission. Utilizing energy recovery with a dedicated outdoor air system (DOAS) will help reduce the cost to humidify (or dehumidify) ventilation air. Supplemental humidification and/or dehumidification can be added to more traditional HVAC systems. Again, it is wise to consult a qualified HVAC engineer or contractor to maximize your system capabilities and minimize operating costs.

## Additive Air Cleaning Technologies

Air cleaning technologies may also be added to existing HVAC systems.

Popular options include:

- Ultraviolet germicidal irradiation (UVGI): UVGI uses short-wavelength ultraviolet light to kill or inactivate microorganisms and can be installed near ceilings or within HVAC equipment.
- Bipolar ionization (BPI) and needlepoint bipolar ionization (NBPI): BPI and NBPI produce a stream of ions that attract viral particles to cling together, improving the effectiveness of filter systems. Studies regarding the application of BPI and NBPI to mitigate the risk of pathogens such as SARS-CoV-2 are ongoing.

### Importance of Energy Efficiency

HVAC systems typically account for approximately 40% of the energy usage in commercial buildings. Upgrading an HVAC system to improve IAQ will likely increase energy consumption. To minimize HVAC operating costs when incorporating IAQ upgrades, make sure to comply with the latest guidelines for ASHRAE 90.1, which provides minimum energy efficiency requirements for building design and local energy codes.

### Recommendations

To maximize the use of ESSER Funds to improve your HVAC system, consult with an experienced HVAC engineer or con-

tractor familiar with CDC ventilation guidelines, ASHRAE Standard 62.1 and ASHRAE 90.1. If new HVAC equipment is needed, make sure that the manufacturer performance claims are verified by an independent, third-party, certified ratings program. Trade associations such as the Air Movement and Control Association (AMCA) and Air Conditioning Heating Refrigeration Institute (AHRI) have excellent performance certification programs in place to ensure that manufacturers' products perform as specified.

Using ESSER Funds to maximize HVAC system operation, mitigate the risk of COVID-19 and improve IAQ will ensure students can safely attend school in a healthy environment that maximizes their ability to learn.

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#### Recommended sources:

- [www.ashrae.org/technical-resources/reopening-of-schools-and-universities](http://www.ashrae.org/technical-resources/reopening-of-schools-and-universities)
- <https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>
- [www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/ventilation.html](http://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/ventilation.html)

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