



# Heating, Ventilation, and Air Conditioning (HVAC) Improvements for Small Businesses to Minimize the Spread of COVID-19

**August 20, 2020**

According to the Centers for Disease Control and Prevention, the primary transmission pathway for the COVID-19 virus is close person-to-person contact (CDC 2020). The virus is mainly spread through respiratory droplets produced when an infected person coughs, sneezes, or talks. The virus can also linger on surfaces, where it can spread to individuals who touch the contaminated surface (CDC 2020). While it is unclear what role HVAC systems play in spreading the virus, proper operations and maintenance of these systems is critical to maintaining healthy indoor air quality (Turpin 2020; Schoen 2020).

Experts provide the following guidance for proper operation of HVAC systems during the COVID-19 pandemic:

- Increase outdoor ventilation as much as possible
- Improve filtration as much as possible
- Use active air-cleaning technologies, so long as the existing HVAC system can accommodate them (Turpin 2020)

With this context in mind, Michigan Saves has compiled a list of measures that businesses could implement to ensure that they are taking every reasonable precaution to minimize the spread of COVID-19. Michigan Saves can provide financing for the projects that exceed \$5,000.

| <b>HVAC Measure</b>   | <b>Rationale</b>   | <b>Installation Cost Range</b>                      |
|---|--|---|
| Increase outdoor ventilation                                  | The effective dilution ventilation per person is increased   | \$0   |
| Disable demand-control ventilation                            |  | \$0   |
| Replace fixed-speed fan motors with variable-speed fan motors | A variable speed motor provides enhanced control of the airflow and allows for a minimum setting that produces lower-speed airflow | \$150 to \$350 per fan motor, plus labor to install |
| Open minimum outdoor dampers as much as 100 percent           | Indoor air recirculation is eliminated   | \$0   |

| <b>HVAC Measure</b>  | <b>Rationale</b>  | <b>Installation Cost Range</b>        |
|--|---|---------------------------------------|
| Upgrade air filters to a minimum efficiency rating value (MERV) of 13 (or the highest compatible with the filter rack) | Commercial HVAC systems' air filters are often MERV-8, which do not trap particles from respiratory droplets—MERV-13 filters can trap 85 percent of particles from 1.0 to 3.0 microns in size | \$40 per filter                       |
| Add humidity to HVAC system  | Respiratory droplets do not travel as far in environments with a healthy indoor air humidity between 40 and 60 percent  | \$150 per unit, plus labor to install |
| Run HVAC system 24 hours per day, seven days per week  | Continuous air circulation enhances the filter's ability to remove airborne contaminants  | \$0                                   |
| Use portable room air cleaners with high-efficiency particulate air (HEPA) filters                                     | The HEPA filter captures over 99.97 percent of particles 0.3 microns in size  | \$250 to \$1000 per unit              |
| Install ultraviolet (UV) technology within the HVAC system   | The UV light deactivates the pathogen. UV light is often installed at the air conditioning coil and/or within the ductwork.   | \$1000 to \$2000 per unit installed   |

| <b>Non-HVAC Measure</b>    | <b>Rationale</b>  | <b>Installation Cost Range</b> |
|----------------------------|---|--------------------------------|
| Ultraviolet-C (UVC) lights | UVC lights emits light at a wavelength that disinfects air, surfaces, and objects | \$125 to \$800 per unit        |

**Sources:** Balgeman et al. 2020; Schoen 2020; ASHRAE n.d.; Newman 2020; Turn on the Blue, n.d.

Most of the measures, except for the fixed-speed fan motors replacement, will lead to an increase in electric or gas bills. The HVAC system becomes less energy efficient as filtration improves, because the system must work harder to push the same volume of air through higher MERV filters. Additionally, the HVAC system must use more energy to condition (i.e., heat or cool) outside air than recirculated air. Finally, UV technology requires electricity to operate.

## Resources

- The American Society of Heating, Refrigerating and Air-Conditioning Engineers. n.d. "Frequently Asked Questions." *ASHRAE*. Accessed August 17, 2020. <https://www.ashrae.org/technical-resources/frequently-asked-questions-faq>
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