Environmental Health & Engineering, Inc.
180 Wells Avenue, Suite 200
Newton, MA 02459-3328
TEL 800-825-5343
781-247-4300
FAX 781-247-4305
www.eheinc.com

Winter Holiday Ventilation Tips to Reduce Spread of COVID-19

Environmental Health & Engineering, Inc. (EH&E) provides this ventilation tip sheet in support of the Massachusetts Department of Public Health (MDPH). The goals of this document are to provide ventilation strategies for Facility Managers of long-term care (LTC) facilities to reduce the spread of COVID-19 during the winter holidays.

EH&E understands that Facility Managers are interested in ventilation improvements related to the following scenarios:

- Increased visitors during the holiday seasons
- Facility-wide holiday events
- Cold weather impacting the ability to increase outdoor air delivery, keep windows open, and hold activities outdoors

This tip sheet is intended as a quick reference focused on winter ventilation in Massachusetts and is not inclusive of all strategies to reduce the spread of COVID-19. The recommendations provided here are informed by heating, ventilating, and air-conditioning (HVAC) guidance from relevant authorities including the U.S. Centers for Disease Control and Prevention (CDC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).[1,2] ASHRAE also provides detailed guidance specific to residential healthcare facilities.[3]

Upgrade HVAC Filtration

- Where possible, increase the level of filtration in air handling systems to a Minimum Efficiency Reporting Value (MERV)-13 or greater if existing air handling systems permit. An assessment of the current filtration coupled with air handling unit performance information can be used to determine whether the existing fan systems can overcome the additional pressure drop of the new filters while still maintaining appropriate air flow.[4,5,6]

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1 https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html
2 https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf
3 https://www.ashrae.org/technical-resources/residential-healthcare
4 https://www.airfilterusa.com/resource-center/air-filter-pressure-drop-faq
5 https://vertexeng.com/insights/hvac-system-considerations-in-the-covid-19-era-part-3-increasing-filtration/
6 https://www.secondnature.com/blog/pleated-filters-will-not-damage-your-hvac-system-by-decreasing-airflow

- If MERV-13 filters cannot be installed because of fan limitations or physical limitations, consider increasing the filtration in the air handling system to the maximum available or possible.

- **Cost, Availability, and Effort:** The cost of MERV-13 filters depends on filter dimensions and the quantity purchased. For a filter size of 16x20x1, MERV-13 filters cost approximately $7 to $17 per filter. This compares to a price of $5 to $11 for MERV-8 filters. Energy costs may increase slightly with a higher-rated filter. Availability of MERV-13 filters was low early during the pandemic, but stock has since improved. Specialized sizes may be difficult to acquire. Some labor is required for sourcing and installation.

Install Portable HEPA-Filtered Units

- Place portable high efficiency particulate air (HEPA)-filtered units in event spaces to provide additional filtration and continuous recirculation. Also consider adding HEPA-filtered units to areas without mechanical ventilation occupied by multiple residents/visitors/staff.
- Select a HEPA-filtered unit that has a clean air delivery rate certified according to the Association of Home Appliance Manufacturers (AHAM) or a similar rating agency.
- ASHRAE also provides detailed technical information on selection of portable filtration units: https://www.ashrae.org/technical-resources/filtration-disinfection
- Placement and quantity of the units depends on the individual room and the device specifications; refer to manufacturer instructions.
- AHAM provides a database of air cleaners that can be searched by room size: https://www.ahamdir.com/room-air-cleaners/
- **Cost, Availability, and Effort:** Units typically range from about $200 to $600, depending on size, capacity, and quality. There is also a small cost for increased energy use. Various models of these units and their replacement filters are currently in stock at commercial and retail stores. Minimal time is required for sourcing, placement, and operation.

Inspect and Maintain HVAC Systems

- Inspect HVAC system components to verify proper function. Inspection should include the following elements:
  - Fan belt(s) are appropriately tensioned to ensure full airflow is provided to space(s).
  - Confirm outdoor air and other damper linkages are fully connected and operational.
  - Ensure heating and cooling coil valves and valve actuators are connected and operational.
  - Check for dirt/dust accumulation on air filters and replace filters as needed.
  - Inspect HVAC system air filters and replace with new filters if deemed necessary.

  - Inspect air filter installation and ensure filters are properly fitted and have little to no bypass around filter banks.
  - For HVAC systems with heat recovery wheels, check to make sure there is no leakage and cross-contamination. Consider deactivating these wheels until a service technician checks the operation and condition.

- **Cost, Effort, and Availability:** Inspections can be labor-intensive and may require purchasing/repairing parts, though maintained systems will run more efficiently. Supply chain issues could impact availability of specific parts.

Choose Mechanically Ventilated Spaces

- When planning for events and gatherings, prioritize the selection of spaces that offer mechanical ventilation over those with only natural ventilation or no ventilation, when possible.
- Occupancy of spaces should be limited based on supplied ventilation, setting, and room size. Ventilation of resident activity and dining spaces should meet a minimum of 4 air changes per hour of outdoor air.[7]
- **Cost and Effort:** There is no cost, but this option requires scheduling coordination and communication with Administrative team.

Adjust Occupancy Schedules

- Special events may result in the occupancy of a space outside of typical operating hours. Modify building automation system (BAS) occupancy schedules as needed to fit event schedules. Start HVAC systems two hours before occupancy of event spaces and turn them off two hours after events end.
- Confirm occupancy schedules for HVAC systems and review timer set points and programmed operating schedules in the BAS. Modify the occupancy schedule as needed to fit the current occupancy schedules for the facility.
- Shared restroom exhaust systems are recommended to be operated continuously.
- **Cost and Effort:** This strategy requires labor to assess/adjust schedules, as well as energy costs for additional runtime.

[7] ASHRAE Standard 170-2017 -- Ventilation of Health Care Facilities, Table 7.1. https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20errata/standards/170_2017_a_20200901.pdf

SUMMARY

The five key winter ventilation strategies for LTC facilities described in this document are summarized in the following Table 1.

Table 1 Summary of Key Winter Ventilation Strategies

Recommendation	Cost and Effort
Upgrade HVAC Filtration: • Select MERV-13 filters for air handling systems.	Approximately $7 to $17 per filter plus labor to install filters.
Install Portable HEPA-Filtered Units: • Place portable HEPA units in gathering spaces, especially those with low ventilation.	About $200 to $600 per unit plus energy costs. Labor needed to select, place, and operate units.
Inspect and Maintain HVAC Systems: • Ensure proper function of HVAC components.	Labor intensive, with the possibility of purchases for repairs.
Choose Mechanically Ventilated Spaces: • For gatherings, select spaces that offer mechanical ventilation when possible.	No cost. Minimal labor for interdepartmental coordination.
Adjust Occupancy Schedules: • Run HVAC systems in gathering spaces from two hours before occupancy through two hours after occupancy.	Requires some labor and may increase energy costs.

HVAC heating, ventilating, and air conditioning
MERV Minimum Efficiency Reporting Value
HEPA high efficiency particulate air

CONSIDERATIONS

Note that the purpose of this document is to provide high-level ventilation guidance. This tip sheet does not cover administrative and programming recommendations to reduce spread of COVID-19, which would include keeping group activities short (30 to 45 minutes) and letting spaces air out for at least 15 to 30 minutes between group uses. Refer to the following useful resources from CDC for information on topics, some of which are not specific to long-term care facilities:

- Retirement and Shared Housing
- Small and Large Gatherings
- Event Planning FAQs
- COVID-19 Guidance for Adult Day Services Centers
- Infection Control for Nursing Homes
- COVID-19 Recommendations for Older Adults
- How to Protect Yourself

Additional considerations may be needed on a case-by-case basis for residents and staff with specific medical conditions.

EH&E appreciates the opportunity to collaborate with MDPH on these best practice recommendations; these are by no means requirements for your facilities.