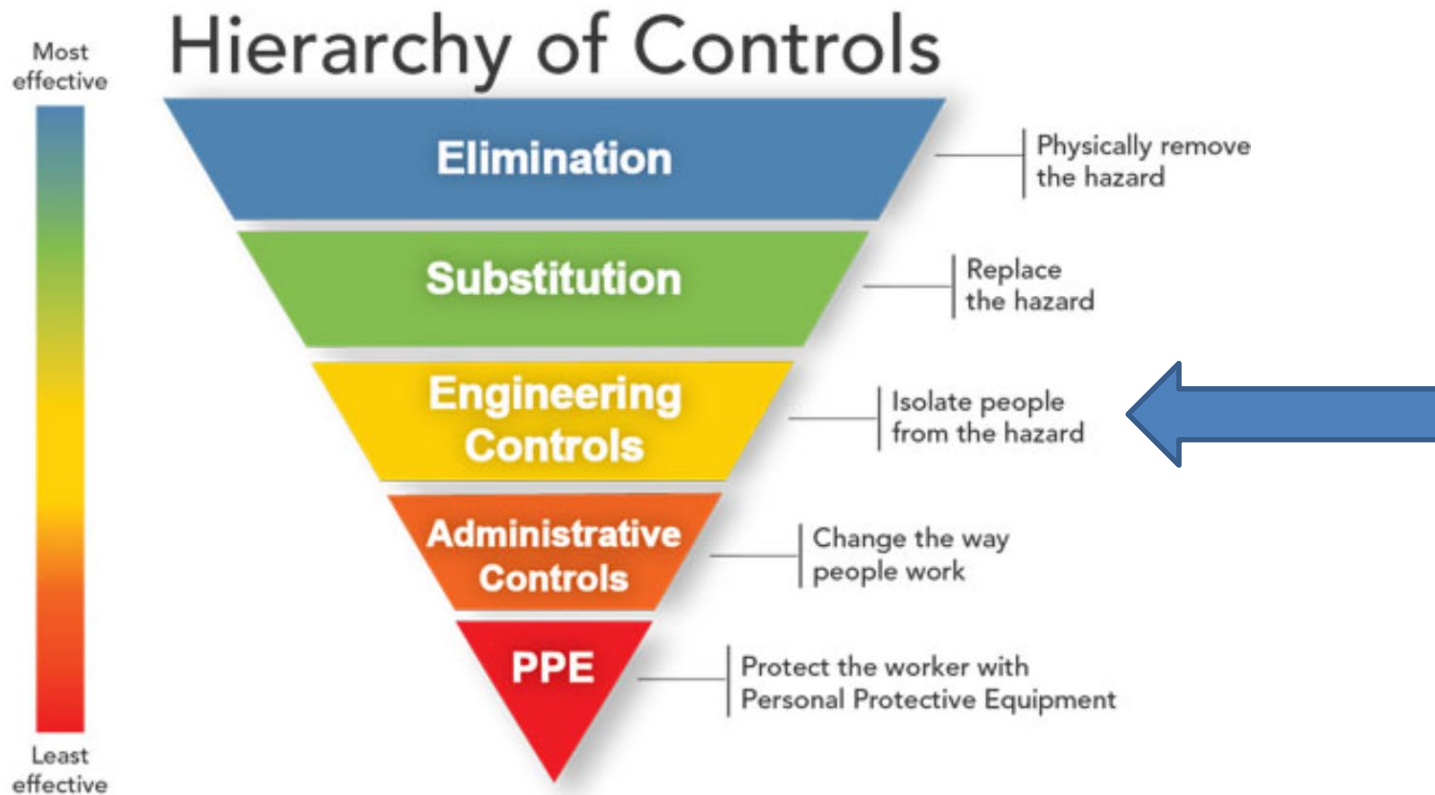


# Use of Engineering Controls to Improve Air Quality

Originally presented January 28, 2022

# Improving Ventilation



Ventilation is considered an Engineering Control and is more effective than PPE in reducing the risk of airborne concentrations.

The idea behind this hierarchy is that the control methods at the top of graphic are potentially more effective and protective than those at the bottom. Following this hierarchy normally leads to the implementation of inherently safer systems, where the risk of illness or injury has been substantially reduced.

<https://www.cdc.gov/niosh/topics/hierarchy/>



# Public Health Guidance

- Follow all current regulatory and statutory requirements and recommendations, including;
  - Vaccination, Masking, PPE, Social Distancing
  - Administrative measures, circulation of occupants, hand hygiene, disinfection of high touch surface areas

# Improving Indoor Air Quality

## Goal

- To introduce as much fresh air as possible
- To filter the air that is recirculating in the building
- To reduce and remove potential airborne contaminants

# Ventilation Basics

- Air Changes per Hour (ACH)
  - A calculation that utilizes the air flow in cubic feet per hour divided by the room volume in cubic feet.
  - Represents the number times per hour that the air in the room changes.
    - More frequent air changes reduces potential contaminants.
  - While air changes per hour are part of the overall heating and cooling or central ventilation system, it is not something that can be modified by a thermostat.
  - Adjusting the air changes per hour requires a heating ventilation and air conditioning (HVAC) engineer or specialist.

# Ventilation Basics

## Joint Committee on Administrative Rules

# ADMINISTRATIVE CODE

**TITLE 77: PUBLIC HEALTH**  
**CHAPTER I: DEPARTMENT OF PUBLIC HEALTH**  
**SUBCHAPTER c: LONG-TERM CARE FACILITIES**  
**PART 300 SKILLED NURSING AND INTERMEDIATE CARE FACILITIES CODE**  
**SECTION 300.TABLE B PRESSURE RELATIONSHIPS AND VENTILATION RATES OF**  
**CERTAIN AREAS FOR NEW INTERMEDIATE CARE FACILITIES AND SKILLED**  
**NURSING FACILITIES**



**Section 300.TABLE B Pressure Relationships and Ventilation Rates of Certain Areas for New Intermediate Care Facilities and Skilled Nursing Facilities**

Area Designation	Pressure Relationship to Adjacent Areas	Minimum Air Changes Per Hour Supplied To Room	All Air Exhausted Directly Outdoors	Recirculated within Room Units
Resident Rm	0	2	Optional	Optional

# Improving the Air Changes per Hour

- Portable air cleaners, air purifiers, air sanitizers, air scrubbers
  - Devices that draw in, filter, and exhaust the room air within in the room
    - Filter with a Minimum Efficiency Reporting Value (MERV) of 13
  - They must be sized for the room.
  - Location in the room is important to the optimal function.
    - The goal is to pull air from the room into the cleaner.
    - Placement should not be directly in front of the room supply vent.
    - Exhaust from the cleaner should not be close to the return supply.

# Improving the Air Changes per Hour

- Ensure the air cleaner is certified by the Association of Home Appliance Manufacturer's (AHAM).
  - AHAM lists all devices they have certified.
  - A Clean Air Delivery Rate (CADR) is assigned to the air cleaner.
  - The CADR will be noted on the device and/or shipping container and can also be found on the AHAM website.

Room Size: 370 ft<sup>2</sup>

Tobacco Smoke CADR: 240

Dust CADR: 240

Pollen CADR: 240

Volts / Frequency: 120V / 60Hz

Show Certificate

<https://www.ahamdir.com/room-air-cleaners/>



# Improving the Air Changes per Hour

- Ensure the air cleaner is certified by the Association of Home Appliance Manufacturer's (AHAM).
  - The higher the CADR, the better the filtration.
  - The CADR is based on use with the highest fan speed.
  - The CADR for smoke applies best for COVID-19.
  - A noise rating may be shown on the device. Lower is better.



Room Size: 370 ft<sup>2</sup>

Tobacco Smoke CADR: 240

Dust CADR: 240

Pollen CADR: 240

Volts / Frequency: 120V / 60Hz

Show Certificate

# Improving the Air Changes per Hour

- Consider use of an air cleaner in the following areas
  - Dialysis
  - Therapy gyms
  - Dining rooms
  - Family lounges
  - Resident rooms
- Limitations
  - Door to the room should be closed for the air cleaner to be beneficial.
  - Room size may dictate more than one air cleaner.
  - Facility electrical demand may be challenged.

# Central Ventilation Air Basics

- The central ventilation system conditions the air supplied throughout the facility.
  - It is basically a big fan that pushes either hot or cold air through the ventilation ductwork.
  - Outside air is brought in through louvers/dampers, filtered, conditioned, and sent throughout the building.
  - Air is then returned through ductwork, filtered, and the process continues.

# Improving Filtration of Central Ventilation Air

- Filters used in ventilation systems are assigned a Minimum Efficiency Reporting Value (MERV).
  - A MERV of 1 has the lowest filter efficiency and a MERV of 16 has the highest.
  - When possible, a MERV 13 filter is recommended for COVID-19 control
    - Some central ventilation systems have pre-filters and final filters. Installing a MERV 13 in the pre and final filter may improve the efficiency to greater than a MERV 13 rating.
    - Using a filter with a lower MERV rating in both the pre and final filter may also improve the efficiency to a MERV 13 rating or greater.

# Improving Filtration of Central Ventilation Air

- Limitations and Cautions

- The fan and filter slot should be used to guide the filter choice.

- Not all filter racks can accommodate a MERV 13 or greater filter.

- The filter should fit snugly without bending or crushing.

- Air should not leak around the filter.

- Fans in central ventilation systems may not be strong enough to push the air through higher MERV filters.

- The filtration capacity of the filters may create more demand on the fan resulting in a decrease in the air supplied.

# Improving Filtration of Central Ventilation Air

- Limitations and Cautions
  - Consult with a Heating, Ventilation, and Air Conditioning (HVAC) engineer or service person before making any modifications.
    - Make changes one at a time and monitor the change before another change is made.
  - Follow manufacturers instructions for use (IFU) to guide filter changes.
    - Higher efficiency filters may not require as frequent changes as lower efficiency filters.
  - PPE should be worn for any maintenance to the central ventilation system, including filter changes.
    - Filters should be bagged at the point of removal and can be managed as regular waste.

# To Do List



- Meet with the facility engineer/maintenance director.
- Confirm that the ventilation system is constantly running.
- Confirm that toilet and shower exhausts are fully functional and always left on.
- Determine what the rating is for the filter on the central air handler or furnace.
- Increase the efficiency of the filter to a MERV 13 if possible.

# Ventilation and Air Quality Appendix

## Common Abbreviations

ACH	Air Changes per Hour
AHAM	Association of Home Appliance Manufacturer's
AHU	Air Handling Unit
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
CADR	Clean Air Delivery Rate
HEPA	High Efficiency Particulate Air
HVAC	Heating Ventilation and Air Conditioning
MERV	Minimum Efficiency Reporting Value



# Ventilation and Air Quality Appendix

## Additional Resources

CDC table for air changes per hour and time required for airborne-contaminant removal by efficiency.

<https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#tableb1>

CDC COVID-19 Ventilation in Buildings

<https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

Online ready only versions of ANSI/ASHRAE Standard 170-2017 Ventilation of Health Care Facilities and ANSI/ASHRAE Standard 62.2-2019 Ventilation and Acceptable Indoor Air Quality in Residential Buildings

<https://www.ashrae.org/technical-resources/ashrae-standards-and-guidelines>

EPA Guide to Air Cleaners in the Home. Available at: [https://www.epa.gov/sites/default/files/2018-07/documents/guide\\_to\\_air\\_cleaners\\_in\\_the\\_home\\_2nd\\_edition.pdf](https://www.epa.gov/sites/default/files/2018-07/documents/guide_to_air_cleaners_in_the_home_2nd_edition.pdf)

ASHRAE Filtration/Disinfection Mechanical Air Filters <https://www.ashrae.org/technical-resources/filtration-disinfection#mechanical>

Consumer Reports What to Know About Air Purifiers and Coronavirus <https://www.consumerreports.org/air-purifiers/what-to-know-about-air-purifiers-and-coronavirus-a1061668554/>