

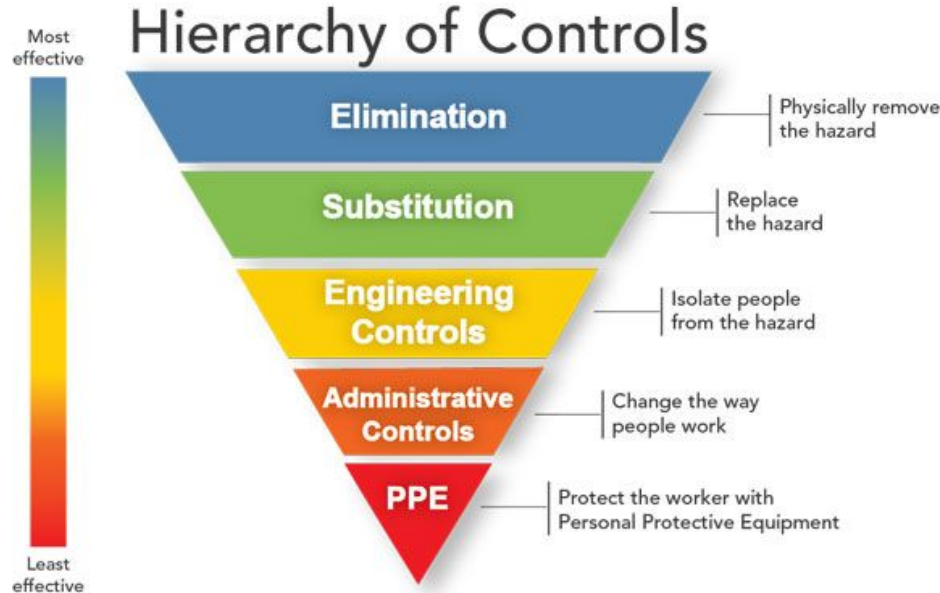
Utah Chapter

Reopening Guidance during COVID-19

Adapted primarily from ASHRAE and the CDC.
This guide is intended primarily for commercial use.
Advice may not be applicable to medical or home settings.

Revision Date: June 26, 2020

Keeping workers safe with appropriate controls



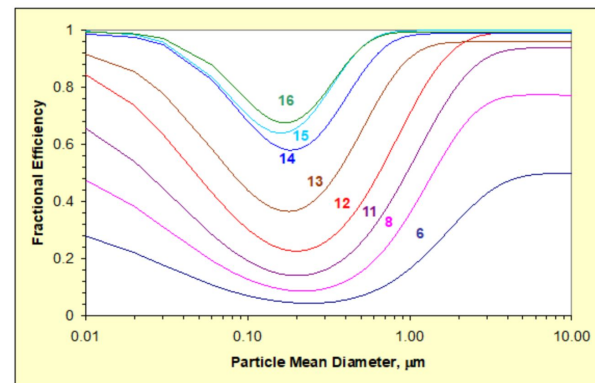
- The most effective way of staying safe is to stay apart (elimination). As work resumes to normal, this is no longer possible.
- The next step is to implement engineering controls, especially in the HVAC system, to minimize risk. This can happen before a building reopens.
- Administrative controls and PPE will also be important as the pandemic is best managed from all fronts.

MODIFYING EXISTING HVAC INSTALLATIONS

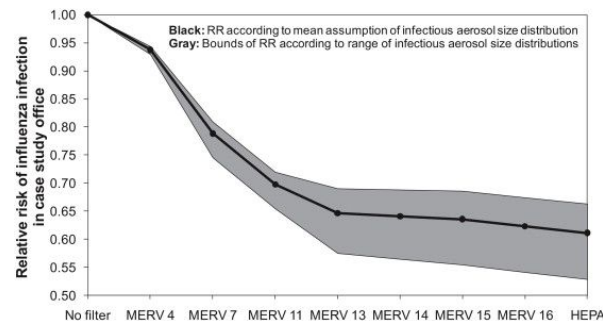


Filtration

- Use MERV 13 or highest compatible filter
 - ASHRAE states that MERV 14 and higher is preferred
 - Seal gaps and edges between filters to limit bypass
 - Handle filters with appropriate PPE during disposal
 - Place used filters in an airtight bag or sanitize before disposal
- Disable heat or enthalpy wheels if they cannot be fitted with HEPA filters
 - These types of devices may contaminate outside air
 - Other energy recovery devices, such as run around coils, plate heat exchanges, and heat pipes can continue to operate
- It is not necessary to clean air ducts or replace air filters more than normal



Note: Numbers in graph represent MERV values.



Outside Air (OSA)

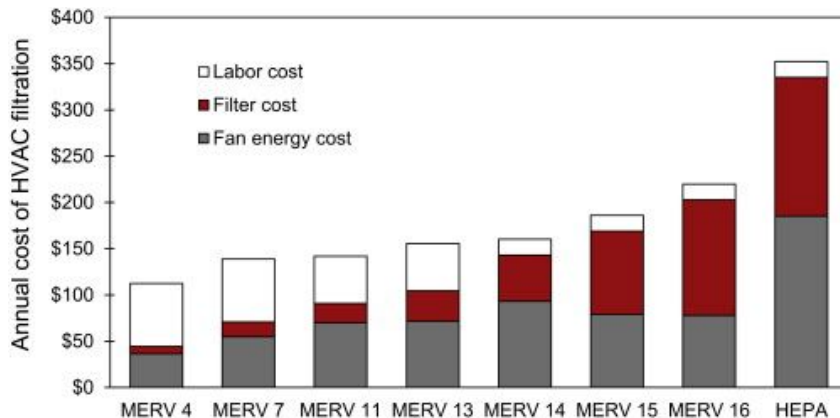
- Run on maximum OSA during occupied hours if feasible
 - ASHRAE recommends 100% OSA during occupied hours if the system is capable
 - Consult a mechanical engineer before modifying the HVAC system
- Add a flushing sequence with maximum OSA two hours before and after occupancy
- Open outdoor air dampers to 100%
- Run on minimum OSA during unoccupied hours
- Disable Demand-Controlled Ventilation (DCV)
 - This can be accomplished by setting the CO₂ setpoint to 400 ppm
- Run ventilation system 24/7 if possible

Humidity

- Prioritize OSA over humidity
- Humidity has little effect on the how long the virus survives
- If possible, keep humidity between 40% and 60%
 - Decreasing the humidity can keep the virus airborne for longer
 - Increasing the humidity can encourage the growth of microbes and mold
- Reducing economizer operation or adding equipment is not recommended
- Adhere to ASHRAE Standard 62.1
 - <https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2>

Cost Implications

- Upgrading to MERV-13 from MERV-7 results in a relatively small 12% annual filtration costs
- Running HVAC 24/7 will result in a **65% increase in runtime**
- Running on 100% OSA will significantly increase cooling and heating demand
 - Cooling demand may increase by more than **70%** on Utah's hottest days
 - Heating demand may increase by more than **150%** on Utah's coldest days, which may be more than many buildings can handle
- Contact an HVAC engineer to establish the capabilities and potential expenses of your HVAC system



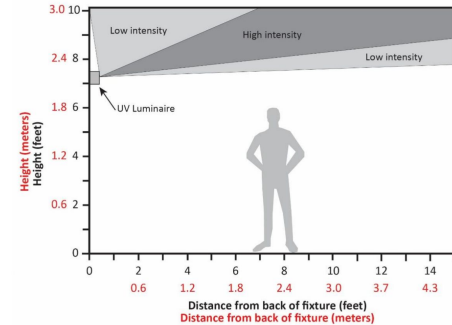
ADDITIONS TO THE HVAC SYSTEM



Ultraviolet Germicidal Irradiation (UVGI)

- Low-wavelength (254 nm) UV light, referred to as UV-C or GUV, inactivates viral, bacterial and fungal organisms
- Multiple delivery systems, depending on the usage case
 - Upper-air disinfection
 - In-duct air disinfection
 - In-duct surface disinfection (ie heating and cooling coils, drip pans)
 - Portable room decontamination
- Upper-air lamps are most useful in areas with poor airflow and high occupancy
- In-duct installations may be used to augment air filtration
- Refer to the Illumination Engineers Society (IES) COVID-19 FAQ

- <https://media.ies.org/docs/standards/IES-CR-2-20-V1-6d.pdf>



Illuminating
ENGINEERING SOCIETY

Other technologies

- Many portable air purifiers are either untested or ineffective
 - Social distancing is more effective; adding portable devices should only supplement
 - In elevators where social distancing is not possible, consider portable HEPA air purifiers
 - For guidance, see certified air cleaning devices from the California Air Resource Board
 - <https://ww2.arb.ca.gov/our-work/programs/air-cleaners-ozone-products/california-certified-air-cleaning-devices>
- ASHRAE does not yet recommend monopolar or bipolar ionization systems
 - While promising, these systems lack peer-reviewed evidence
 - Some systems also generate significant levels of ozone
- Electronic filters have been documented to range from relatively ineffective to very effective in reducing particles
 - When used, it is critical to wipe the wires in electrostatic precipitators frequently
- Sorbent beds are not efficient at removing particles (including viruses) from airstreams

Cost Implications

Upper Air UVGI Cost Estimates			
Units	1	10	50
Install Cost	\$3,500	\$16,000	\$62,500
Annual Recurring Costs	\$660	\$2,000	\$7,200
Annualized over 15 years	\$900	\$300	\$225

In-Duct UVGI in Supply Air	
Dollars per ten thousand square feet of building space	
Install Cost	\$400
Annual Recurring Cost	\$800
Annualized over 15 years	\$800

- Upper Air UVGI is the safest and most effective system, offering up to a 24 air changes per hour equivalent in a per-room basis
- In-duct UV systems are similar in cost and performance to adding an additional MERV-13 filter
- Portable air filtrations units typically cost a few hundred dollars or less with minimal recurring costs, but only deliver 1-2 air changes per hour equivalent

ADMINISTRATIVE MODIFICATIONS



Make and communicate a safety plan



- Create a safety plan following CDC, ASHRAE and local government guidelines
- Implement as many physical distancing implementations as possible
 - Consider testing employees' temperatures
- Create a plan for disinfecting high contact surfaces
- Disable zonal fans, such as ceiling fans, floor fans and desk fans
- Open windows where appropriate
- If possible, install toilet seat covers in restrooms and flush while covered
 - The virus can be aerosolized through flushing

Physical distancing

- HVAC is important; physical distancing is more effective
- Maintain social distancing of 6 feet (2 meters) or more
- Close areas of high contact, like break rooms and common areas
- Wash hands frequently and supplement with hand sanitizer
- Wear a mask while in public, including the workplace
- Work from home as much as possible, minimize contact with others
- Use video conferencing and phone calls where possible
- Sanitize surfaces with chemical cleaners (refer to EPA List N) frequently

○ <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>



RESOURCES





- Interim Guidance for Businesses and Employers Responding to Coronavirus Disease 2019 (COVID-19)
 - <https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html>
 - This interim guidance acts as a general guide for business owners and employees to develop safety plans and best practices. The focal points are in minimizing risks for employees, establishing appropriate business operations and maintaining a healthy work environment
- COVID-19 Employer Information for Office Buildings
 - <https://www.cdc.gov/coronavirus/2019-ncov/community/office-buildings.html>
 - This article acts as a guide for business and building owners. The article focuses on creating a safety plan for business operations, modifying building operations such as HVAC, and how to prepare employees for a return to work



- Building Readiness

- <https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf>
- This guide can help make sure that a building is ready to be reopened, especially if it has been unoccupied for some time during quarantine or shelter in place

- Commercial Guidance

- <https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-commercial-c19-guidance.pdf>
- This article can be used to develop best practices for returning to operation during COVID-19 in most commercial buildings

- Filtration and Disinfection

- https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-filtration_disinfection-c19-guidance.pdf
- ASHRAE offers additional guidance for updating air filters and taking other measures to disinfect air and surfaces



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- Visit the state website frequently for local business requirements
 - <https://coronavirus.utah.gov/>
 - <https://coronavirus.utah.gov/business/workplace-resources/>
- The Utah Department of Health hosts more information as well as posters and signage to place in building to help maintain safety
 - <https://health.utah.gov/disparities/coronavirus.html>
- Visit the Utah AEE site for updates to this presentation and additional resources
 - <https://utahaee.com/>