

Infectious Disease Response

Residential Ducted HVAC Systems

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) developed the *Airborne Infectious Diseases* Position Document that describes the use of HVAC systems to prevent the spread of viral disease.¹ The document was last updated in February 2020. This white paper is meant as a summary of ASHRAE's document and other affiliated industry standards. For more detailed information, readers should reference the technical resource documents at <https://www.ashrae.org/technical-resources/resources>.

The common cold (rhinoviruses) and influenza (e.g. H1N1) can be transmitted by airborne aerosol, droplets, or direct contact. HVAC systems can have a positive effect on limiting airborne and droplet transmissions. Coronavirus (e.g. COVID-19), similarly is transmitted via droplets and direct contact and therefore best practice is to ensure HVAC systems are installed, maintained and serviced to mitigate the transmission of infectious disease.

Indoor Air Quality

Johnson Controls offers a variety of products that are specifically designed to improve the quality of air in the home and have been tested and approved for use with our residential systems.

Information Websites

- ASHRAE: <https://www.ashrae.org/file%20library/about/position%20documents/airborne-infectious-diseases.pdf>
- Center for Disease Control (CDC): <https://www.cdc.gov/coronavirus/2019-ncov/index.html>

Essential Elements of Healthy Indoor Air

Air Purity

Filtration: Recirculating air through a whole home filtration system can help reduce airborne particles by capturing them in the filter.

Ultraviolet Emitters: UVC energy an effective inactivation method for surface and airborne biological contaminants.

Humidity Control

Maintaining proper humidity level can reduce number of airborne particles.

Ventilation

Supplying clean air from outdoors will displace/dilute contaminated air.

Filtration

Recirculating air through a whole home filtration system can help to reduce airborne particles by capturing them in the filter. When viruses and bacteria become airborne, the HVAC system has the potential to transmit them to other spaces around the home. Therefore, effective home filtration designs incorporate filters to remove and trap the particles in the filter media where they naturally deactivate overtime. Keeping the HVAC system on the constant fan setting will maximize the amount of a home's air that is filtered.

Most residential filters for mechanical systems are rated on a Minimum Efficiency Reporting Value (MERV) scale (1-16). The ASHRAE 52.2 standard testing method determines the filter efficiency and MERV rating.

Efficiency on particles (0.02 to 0.3 μm) can be estimated up to 90% on a MERV 16 filter. Lower MERV levels would have lower efficiency.

Johnson Controls offers a lineup of high efficiency filters with MERV ratings including MERV 16, MERV 13 and MERV 11.

Patented Self-Seal™ technology assures minimal filter by-pass and maximum filter efficiency.

Electronic Air Cleaners (EAC's) like the **Model HEAC3000T** are not rated on the MERV scale since the testing criteria are different. The Model HEAC3000T is very effective at capturing ultra-fine particles similar in size to many viruses. Particles pass through an ionizing field, become positively charged and are attracted to the filtering media where they eventually dry out and become desiccate inert.

Action Items

Be sure to replace air filters per manufacturer's specifications.

Ultraviolet Germicidal Irradiation

UVC has been proven to kill microorganisms, given the proper dosage. Typical application of UVC is to irradiate the cooling coil on an HVAC system. This prevents microorganisms from growing on the surface of the coil. Effectiveness on moving air is highly dependent on the intensity of the UV light and the velocity of the passing air and can be increased through the best practices indicated in the UVC installation instructions.

Johnson Controls offers UVC kits in single and dual light packages.

Action Items

UVC lights should be replaced every 9000 hours. This is approximately one year of service.

Humidity Control – Both Humidification and Dehumidification

Maintaining proper humidity levels can reduce number of airborne particles by preventing human nasal passages from drying out and capturing small particles. Keep the home's Relative Humidity between 40% & 60% (RH Range).

Viruses are least viable within the RH Range by minimizing large droplet evaporation and preventing small particle formation.

Action Items

For best performance, we recommend that you replace the Humidifier Pad in your humidifier at least annually. See individual model instructions for additional maintenance.

Ventilation

Supplying clean air from outdoors will displace/dilute contaminated indoor air. Homes equipped with a ventilation system have fresh air from the outdoors introduced through the HVAC system using a preset control strategy. Running a home's exhaust fans can also help remove airborne particles.

AIR FILTERS

S1-HEAC3000T	Hybrid media electronic air cleaner
S1-TM11PAC16252	MERV 11 16x25
S1-TM11PAC20202	MERV 11 20x20
S1-TM11PAC20252	MERV 11 20x25
S1-TM13PAC16252	MERV 13 16x25
S1-TM13PAC20202	MERV 13 20x20
S1-TM13PAC20252	MERV 13 20x25

UV LIGHTS

S1-YUVCS120	Single Bulb 120V
S1-YUVCS220	Single Bulb 220V
S1-YUVCD120	Dual Bulb 120V
S1-YUVCD220	Dual Bulb 220V

DEHUMIDIFIERS

S1-CVD070T01	70pt/day dehumidifier
S1-CVD095T01	95pt/day dehumidifier
S1-CVD130T01	130pt/day dehumidifier

HUMIDIFIERS

S1-BP4000MT	Drainless bypass humidifier
S1-BP5000MT	12gal/day small bypass humidifier
S1-BP6000MT	17gal/day large bypass humidifier
S1-FP7000MT	18gal/day fan-powered humidifier
S1-STEAM8000T01	23.3gal/day steam humidifier

References

- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). *Airborne Infectious Diseases*, Position Document. Atlanta: ASHRAE, approved January 19, 2014; reaffirmed February 5, 2020.
- . *Energy Standard for Buildings Except Low-Rise Residential Buildings*, ANSI/ASHRAE/IES Standard 90.1-2019. Atlanta: ASHRAE, 2019.
- . *Thermal Environmental Conditions for Human Occupancy*, ANSI/ASHRAE Standard 55-2017. Atlanta: ASHRAE, 2017.
- . *Ventilation for Acceptable Indoor Air Quality*, ANSI/ASHRA Standard 62.1-2019. Atlanta: ASHRAE, 2019.
- . *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*, ANSI/ASHRAE Standard 62.2-2019. Atlanta: ASHRAE, 2019.
- Institute of Environmental Sciences and Technology (IEST). *HEPA and ULPA Filters*, IEST PR-CC001.6. Arlington Heights, IL: IEST, 2016.