

## Infectious Diseases and Airborne Transmission Prevention

Infectious diseases such as COVID-19, can spread through direct contact (person to person), indirect contact (touching an inanimate object) and airborne particles. Infected particles can become airborne through coughing, sneezing, talking and even breathing. These particles can travel up to 3 feet away before falling and smaller particles can stay in the air for hours and travel longer distances.

Many studies have been conducted with various infectious diseases in the hopes of finding ways to eliminate the spread of infectious diseases through airborne transmission. One finding in these studies is that by increasing ventilation air (outside air) into an area where there is an individual infected by an infectious disease, it has been proven to decrease the potential of airborne transmission of the infectious disease to other individuals. The introduction of more uninfected air into the infected area causes dilution of the contaminated air and decreases the likelihood of infection to an uninfected individual by decreasing the number of infected particles in the air. This dilution strategy is effective at decreasing infections however, when individuals are less than 7 feet from an infected individual, dilution has been found to be ineffective. Table 1 shows additional strategies to prevent infectious disease through airborne transmission.

Increasing a buildings outdoor air rate above ASHRAE 62.1 guidelines can be one way to prevent the spread of infectious diseases through airborne particles. Although helpful in preventing infectious diseases, increasing outside air to a system can cause an increase in load to the system. **Energy recovery devices are a great way to decrease the load on the unit, by utilizing heat transfer between the exhaust airstream and the outside air stream to reduce the load on the coil.**

Another dilution strategy would be to utilize 100% outside air as supply air to the space and exhausting 100% of the air out of that same space. In this situation an energy recovery wheel is an ideal solution to help lower the load on the unit. Thermotech is providing (25) Twenty-Five 18 foot diameter wheels to a new Hospital Project in Philadelphia utilizing this concept.

Studies have found that airborne transmission decreases in moderate humidity (about 50%) and increases in low (<40%) and high humidity (>80%). The theory is that the moderate humidity causes the virus cells to evaporate before they can fall onto a surface or causes them to decrease to a size too small for individuals to inhale. Other theories suggest that dry air can destroy an individual's nasal mucosa, which acts as a defender to the nose and removes foreign objects and mucus, thus making a person more susceptible to infection.

In all situations, a purge is recommended to prevent the transfer of particles from the exhaust airstream to the outside airstream. For the most accurate way to design your wheel systems and purge angle determination, go to [www.thermoselectpro.com](http://www.thermoselectpro.com) and request your version of Thermotech's cloud based selection software that is accessible on all your devices!

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**The Industry Standard in Energy Recovery**

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**Table 1** Airborne Infectious Disease Engineering Control Strategies: Occupancy Interventions and Their Priority for Application and Research

Strategy	Occupancy Categories Applicable for Consideration*	Application Priority	Research Priority
Dilution ventilation	All	High	Medium
Temperature and humidity	All except 7 and 11	Medium	High
Personalized ventilation	1, 4, 6, 9, 10, 14	Medium	High
Local exhaust	1, 2, 8, 14	Medium	Medium
Central system filtration	All	High	High
Local air filtration	1, 4, 6, 7, 8 10	Medium	High
Upper-room UVGI	1, 2, 3, 5, 6, 8, 9, 14	High	Highest
Duct and air-handler UVGI	1, 2, 3, 4, 5, 6, 8, 9, 14	Medium	Highest
In-room flow regimes	1, 6, 8, 9, 10, 14	High	High
Differential pressurization	1, 2, 7, 8 11, 14	High	High

Note: In practical application, a combination of the individual interventions will be more effective than any single one in isolation.

\*Occupancy Categories:

1. Health care (residential and outpatient)
2. Correctional facilities
3. Educational < age 8
4. Educational > age 8
5. Food and beverage
6. Internet café/game rooms
7. Hotel, motel, dormitory
8. Residential shelters
9. Public assembly and waiting
10. Transportation conveyances
11. Residential multifamily
12. Retail
13. Sports
14. Laboratories where infectious diseases vectors are handled

This article's information was provided by the ASHRAE document cited below:

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