

Questions from Mitigating Pathogen Transmission – Session Three (11-4-2020)

1. Without actively measuring the Outside Air in a Multi-speed or VAV System, we cannot ensure that we have the proper ventilation at part load. -- Correct?

Response: Correct. ASHRAE 62.1-2019 ventilation guidelines would require monitoring OSA supplied to a building:

- *(Par. 6.2.1.1) Breathing Zone Outdoor Airflow: "The outdoor airflow required in the breathing zone of the occupiable space or spaces in a ventilation zone shall not be less than the value determined in accordance with Equation 6.1." To be able to verify the intent of the standard validating the percentage of OSA at all point loads across the operating range of the system is required.*
- *(Par. 6.2.5) Variable Load Conditions: "Ventilation systems shall be designed to be capable of providing not less than the minimum ventilation rates required in the breathing zone where the zones served by the system are occupied, including all full-and part-load conditions."*

We read ASHRAE's language to mean: an HVAC system must be able to monitor and CONTROL OSA percentages in the mixed air supplied to a building under all load conditions to meet Standard 62.1's ventilation requirements at the breathing zone.

2. Displacement can cause comfort issues, as well, like cold feet. Correct?

Response: If not correctly applied/installed, that is correct, as can typical mixed air diffusers. Improper design, product use, or installation will cause comfort problems in any system. However, unlike conventional HVAC systems that design to a 55F DB temperature at high velocity, displacement ventilation systems supply 63-68F DB supply air at low velocity reducing the risk of thermal discomfort at the lower levels of a conditioned space. Research has demonstrated that an occupant in a thermally stratified space does not detect a temperature variation, i.e., cold feet, warm head, providing the thermal gradient from head to foot does not exceed 5F degrees.

3. MERV 13 / 14 Filters are not designed for Aerosol control, right?

Response: Correct: Neither MERV 13/14 filters are tested below 0.3 microns. Pathogens range greatly in size from .01um to 100um. The most dangerous to the human respiratory system is in the .01 to 0.5um size as they can easily get to the deepest part of the lungs.

- Small aerosol particles smaller than 5 µm in aerodynamic size are most likely to remain airborne for indefinite periods (unless there is removal due to air currents or dilution ventilation), and to be deposited in the lower respiratory tract.
- Infection control guidelines have stated that most respiratory infections are transmitted by respiratory droplets—i.e., particles larger than 5–10 µm in size. Airborne transmission has been attributed to only a few pathogens, notably *Mycobacterium tuberculosis*, via infectious droplet nuclei that are particles sized 5 µm or smaller. The use of airborne infection isolation rooms and respirator masks has been recommended only to protect against airborne transmission.

4. Doesn't ionization make the clumping of particles bigger so that filtration is more effective? So putting them upstream of filters would be better?

Response: For particle and pathogen control, GPS should be installed AFTER the filters. Placing the ionization unit before the filters will remove the ions from the air right away. They need to go into the space where they can conglomerate with the particles in the room. Some fall out of the air, and the lighter ones get returned to the system to be trapped in the filter.