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Wuhan Novel Coronavirus, COVID-19

Prudent Antivirus Measures for Buildings

When infected people cough or sneeze, droplets of various sizes are blown rapidly into the air with larger droplets (100-10 um) falling downward within 10 feet but the small ones (<10 um) can remain suspended for 1.5 hours to 21 days. This is the challenge for the built environment; anticipate the many air paths the small droplets can follow, reduce the infectivity of the environment, and resolve the issues.

Following are some recommendations for reducing the exposure of people in your buildings to viruses.

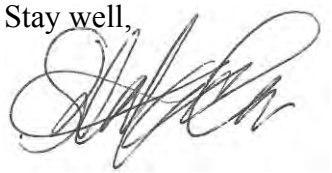
1. Inspect the air handling systems to ensure that the outside air dampers are open allowing fresh ventilation air into the building. This will help to dilute any contaminants inside and reduce the number of airborne infections. Many contractors close the outside air dampers in the Winter to reduce thermal comfort complaints but forget to open them again in the Spring. Set the amount of ventilation air in the building to at least the ASHRAE 62.1-2019 Standard.
2. Increase the amount of ventilation air in the building to beyond the ASHRAE 62.1-2019 Standard during periods of concern up to the maximum the HVAC system can handle to increase the dilution rate of contaminants. Testing has shown that the virus transmission rate rises exponentially as the outdoor air ventilation rate drops.
3. If the facility has a building automation control system, survey the HVAC system to ensure each zone is being delivered the proper amount of supply air, even when air flow is reduced with variable air volume systems. The minimum air flow should be enough to deliver the proper amount of outside air for dilution of contaminants.
4. Keep the air handler cooling coils, condensate pans, and condensate traps clean and functional. Remove breeding grounds for microbial contaminants.
5. If the building does not have an air handler system and depends on open windows for natural ventilation, then open the windows when occupied.
6. Standard air filters can be improved to help trap viruses residing on small particles resulting from droplets drying into droplet nuclei produced from infected people coughing and sneezing. A MERV-13 filter should be efficient enough to remove most of these particles. When more efficient filters are installed the airflow will slow. This effect on airflow should be checked and adjustments made to account for the increased static pressure drop.
7. Air filter management should be adjusted. Replace air filters at least quarterly and adjust the frequency based on how dirty they become. Inspect the filters in place and look for openings allowing the air to sneak around the filter frame or between the filters. Seal the air gaps and tape the filters together. The filter is only as efficient as the air seal of its frame.
8. Check the exhaust air discharges, relief air discharges, and sewer vent pipes to make sure the exhaust air is not being re-entrained into the building through outdoor air intakes and building envelope openings. Consider the wind direction, eddy patterns, and proximity to intake openings.

Code calls for a minimum of 10 to 30-foot separation from contaminant sources depending on its degree of hazard and vertical location. Consult ASHRAE 62.1-2019, APPENDIX B for details.

9. Analyze the whole building air system to ensure that air is being contained in the proper zones to limit the spread of any infection source to its immediate area, e.g., air from one floor should not be transferring through the building structure to another floor.
10. Review the return air paths from the occupied spaces and ensure they are open but make changes to prevent moving return air from one zone through another. The smaller droplets and droplet nuclei from people coughing and sneezing can travel suspended in the air for long distances through the return air pathway and into the HVAC equipment.
11. Sunlight (UV light) is effective at killing viruses. HVAC systems can be outfitted with UVC light systems, which are widely available. UVC light is very effective at killing viruses when the virus is exposed to the light for the appropriate exposure time. Portable UVC light stations or upper ceiling space systems are also available that could be deployed in open office areas to kill airborne viruses.
12. Replace all touch surfaces such as door plates, doorknobs, grab rails, and push bars with those made using unvarnished copper alloys; unvarnished since you want the copper exposed to contact. Copper and its alloys (bronze, brass, cupronickel) have impressive properties for killing bacteria and viruses year after year. The copper ions are effective at rupturing the cell walls and destroying the DNA so the virus and bacteria cannot build up an immunity to it.
13. Make sure all drain traps have water in them in order to seal the trap properly. A bathroom exhaust fan, an air handler, or wind can create a negative pressure and draw contaminated air into clean spaces from a virus source. Routinely dry traps can be filled with water on a regular basis, have a non-evaporative product like Brodi Vapor Block added to cover both water surfaces of the trap, or pour mineral oil or RV antifreeze into the trap. A more permanent solution would be to add a trap priming system for each trap. Dry traps were found to be the cause of a SARS virus outbreak in a residential high-rise in Hong Kong killing 42 people and sickening 329 people.
14. Increase the relative humidity in the building to 45-55% RH. At this humidity range 80% of the droplet nuclei viruses lose their infectivity within 15 minutes (ASHRAE Tech Hour: Occupant Health, Building Energy Performance and Humidity, Stephanie Taylor, M.D, M. Arch). Above and below this range the infectivity rate rises. Do not over humidify (>60%) as this will have less effect on the infectivity rate and lead to mold growth. Also, with colder outside temperatures condensation can occur on the windows and walls if humidity levels are too high. So, use humidity wisely.

Please contact KG Anderson if you have any questions or consult your mechanical contractor or engineer to discuss how these suggestions might apply to your building.

Stay well,



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