

VENTILATION FACTS

September 28, 2020

A variety of concerns have been raised about potential exposure in confined spaces. As a result, we are both practicing social distancing and using face coverings. Here are some ventilation related facts:

1. Airborne particles, both droplets and aerosols, are currently understood to be the primary means of transmission of the SARS-CoV-2 virus.ⁱ Sneezing and coughing produce the most particles, followed by shouting, singing, whispering and talking. Droplets being the larger, heavier particles, they quickly fall to the ground. Aerosols are so small (5-10 microns) that they remain suspended in the air for hours rather than quickly falling. This is the basis for instituting both six foot distancing and wearing face coverings. So called “singing” masks use vents or reduce the layers of material on the sides to permit greater air flow. This defeats the purpose of filtering particles.ⁱⁱ
2. All Heating, Ventilation and Air Conditioning (HVAC) systems recirculate air. Recirculation reduces heating, cooling, and dehumidification costs. An older church gets more fresh air due to leakage, and therefore needs less fresh make-up air from the HVAC system. Newer churches are better insulated and sealed so need more make-up air.
3. Some businesses are now installing HEPA or MERV 13 filters as well as in-line Ultra Violet (UV-C) light disinfection systems to address aerosols, but this is relatively expensive and frequently also requires upgrading of air handling units due to the increased filtration pressure. These systems can be over 85% effective at both particulate removalⁱⁱⁱ and disinfection.^{iv} Although UV-C irradiation has proven effective for bacteria, fungi and viruses in general, there is currently only limited published data about the wavelength, dose, and duration of UV-C irradiation required to inactivate the SARS-CoV-2 virus in HVAC systems.^v
4. Since most Churches aren’t currently employing these upgraded measures, exposure to aerosols may be reduced by both limiting the time people are inside and by increasing the amount of fresh make-up air used.
5. Proximity to others is a key factor in virus transmission. As you get further away from others, the risk of transmission decreases exponentially. Outside, this is largely due to dilution. Inside, with recirculated air, there is less dilution.

6. Finally, as many as 40% of people are asymptomatic for COVID 19^{vi}. Since these people are unaware of being infected and are not generally tested they may be largely responsible for spreading the virus. Without more widespread testing and contact tracing we don't know how the virus in a particular outbreak is being spread. As a result, we must continue to employ more stringent preventative measures, especially for indoor activities.

—prepared by Andrew Kissell and the Work Group on Return to In-Person Worship

ⁱ <https://www.pnas.org/content/117/26/14857>

ⁱⁱ for a study on face coverings with visualization, see <https://aip.scitation.org/doi/10.1063/5.0022968>.

ⁱⁱⁱ <https://www.ashrae.org/technical-resources/filtration-and-disinfection-faq>

^{iv} <https://www.fda.gov/medical-devices/coronavirus-covid-19-and-medical-devices/uv-lights-and-lamps-ultraviolet-c-radiation-disinfection-and-coronavirus>

^v Ibid.

^{vi} <https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html>