S1.5.2 - *Healthcare Acquired Infections (HAIs), Coronavirus, and Filtration Efficiency*

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Air quality has profound health implications in all indoor environments where the U.S. population normally spends most of their time. Specifically, indoor air can expose workers to noxious chemicals, particulates, and a variety of infectious agents as well as pollen and other allergens. Emerging pathogens, such as some viruses, bacteria and fungi have also been detected in indoor air, with a strong potential for airborne dissemination and contamination. The quality of indoor air is therefore a prominent public health concern that requires a clear understanding of the transmission processes for the development and implementation of targeted infection prevention and control measures. World-wide outbreaks of coronavirus-caused COVID-19 and severe acute respiratory syndrome (SARS), H5N1 bird flu, and H1N1 novel influenza have caused a substantial health impact to the population and have increased public concerns for the spread of viral disease. The global pandemic caused by the novel coronavirus SARS-CoV-2, which causes the disease known as COVID-19, has changed the world in ways no one could have imagined. There is much more to learn about this emerging global threat, however, there are some aspects of the virus that are known. The main route of transmission of the virus is thought to be through respiratory droplets expelled when

sneezing, coughing, or even talking. Therefore, there is a strong desire to mitigate risk to the general population. Standard CDC and WHO recommended practices of washing hands and face masks provide the best solutions for direct population protection. As there are still current challenges with assessing all the transmission modes of COVID-19 there are base lines of previous work on air filtration engineering controls in regard to viruses and other microbes. With the goal in mind of evaluating coronavirus filtration efficiency if the transmission mode becomes aerosolized and into an HVAC system, AAF's Biological Research Department launched a study utilizing a safe surrogate for the SARS-CoV-2 virus in order to evaluate the virus removal efficiency of several filters ranging in MERV ratings of MERV 14-16 in relation to standard increases in filter efficiency levels. Air samples containing surrogate virus were collected upstream and downstream from the filters. Air samples were collected and tested with an optical particle counter to count total particles and were also collected with an Anderson Cascade Impactor able to separate particles by size (approximately 0.3 to 10 microns). Then the samples were tested by quantitative reverse transcription polymerase chain reaction (RT-PCR) and a fluorometer to estimate mass. For each particle size, the particle size removal efficiency was calculated. The results showed that under the conditions of the study, filter efficiency for SARS-CoV-2 surrogate virus was comparable to filter efficiency using KCl particles (ASHRAE 52.2 standards). In addition, the efficiency of particle removal was similar across the methods used (optical particle counter, fluorometer or PCR).

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Nikki Sasher works for AAF Flanders focusing on Biological Safety and Research specializing in R&D biological research projects where bio-aerosol science and molecular biology are utilized. For 10 years, Nikki has held positions in applied microbiology and food science; specializing in quality assurance, food safety, and defense, and environmental, clinical, and food & industrial microbiology. Nikki has utilized her expertise; working in both global

R&D and industrial settings. Nikki graduated from Middle Tennessee State University in 2013, with a Bachelor of Science in Microbiology and from Kansas State University in 2018 with a Master of Science in Food Science. Nikki has been an active participant in organizations such as the American Society of Microbiology, the American Association for Aerosol Researchers, the Institute of Food Technologists, AOAC International, ABSA International, and the University of Minnesota Swine Disease Eradication Center.

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