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Information About COVID-19, Air Filtration, and Indoor Air Quality

At The Filter Shop, our mission is to deliver clean, healthy indoor air environments. We are considered the leaders in our industry and we understand air filtration and indoor air quality. At these times when people are concerned about human health and the spread of infectious disease, we believe it is important to share the following facts and insights with our customers.

Coronavirus COVID-19 Outbreak

The Coronavirus Outbreak continues to raise concern on a global stage. At the time that this article was written, the novel coronavirus called COVID-19 is the latest coronavirus with over 135,000 reported infections in over 127 countries, leading to over 4,900 deaths. Recently, the World Health Organization (WHO) has classified COVID-19 as a pandemic and upgraded the outbreak risk to "very high" which is now creating a more focused conversation on preventative measures, including the importance of indoor air quality.

COVID-19 Transmission

Human Coronaviruses cause infections in the nose, throat and lungs. While COVID-19 is not 100% fully understood, Health Canada states that Coronaviruses are commonly spread from an infected person by way of:

- respiratory droplets produced when an infected person coughs or sneezes
- between close human contact by shaking hands or touching, or
- touching a surface or object with the virus on it and then touching your mouth, nose or eyes before washing your hands.

Is COVID-19 Airborne?

This is not a simple answer, but critical to the understanding of COVID-19 in the context of indoor air quality and filtration. The Centre for Disease Control, who has been working recently to try and clear up "misconceptions" about Coronavirus states the following: "Coronavirus is transmitted via larger droplets that fall quickly out of the air (for example, after a sneeze). This virus is not airborne."

What this means is that the virus, itself, does not float around through the air. The virus is embedded in the lungs of an affected person and when that person coughs or sneezes, the liquid droplets that fly into the air may have the virus attached to them. If another person is close to the cough or sneeze, the droplets (with the virus attached) can land on the other person and enter their eyes, nose, mouth. If nobody is close to the sneeze or cough, the droplets enter the air but quickly fall to nearby surfaces (within 1-2 meters away) and can then live on that surface for some time. Then if someone else touches that same surface, the droplets (with the virus attached) get onto your hands and if your hands go to your face, the virus may infect you.

Can Better Air Filtration Help?

From an air filtration perspective, the important thing to understand is that the scientific community believes at this time that the infected droplets fall quickly in the air – i.e. they do not float around a room or a building suspended in the air for very long. As such, it appears the likelihood is low that droplets can remain airborne long enough to enter the HVAC system of a building and be circulated through that system and exhausted into another room.

As such, at this time based on what we know about this virus, it is difficult to determine what effect upgrading the filters in your building's HVAC system might have and whether or not this might be an effective additional defense against COVID-19.

However, other viruses such as measles, chicken pox and tuberculosis (TB) can be transmitted through airborne transmission and the World Health Organization is assessing ongoing research on how COVID-19 is spread and will continue to update the public and the scientific community as they learn more about COVID-19.

We are also aware that many of our customers wish to consider any precautions they might be able to take for this evolving situation. To that end, we have assembled some filtration, airborne particulate, and indoor air quality information that may be helpful as you contemplate what sort of additional measures you might consider in your facilities.

About Viruses, Droplets, and other Airborne Contaminants

While some other viruses can be airborne (as discussed above), COVID-19 itself is not known at this time to be airborne. However, the droplets (from coughs and sneezes) that COVID-19 and other viruses attach themselves to range in size from 0.5 – 5.0 microns.

When it comes to examining how effective certain air filters are at capturing different sizes of particles in the air, it is determined by the MERV rating of the filters. The table below contains the MERV Parameters and their corresponding efficiency at filtering specific particle size ranges.

TABLE 1 - ASHRAE 52.2, 2017 MERV Parameter Table

Composite Average Particle Size Efficiency: % efficiency in Size Range, in microns

Standard 52.2 Minimum Efficiency Reporting Value (MERV) Range 1 (0.3-1.0 microns) Range 2 (1.0-3.0 microns) Range 3 (3.0-10.0 microns)

TABLE 1 - ASHRAE 52.2, 2017 MERV Parameter Table

	Composite Average Particle Size Efficiency: % efficiency in Size Range, in microns			
Standard 52.2 Minimum Efficiency Reporting Value (MERV)	Range 1 (0.3-1.0 microns)	Range 2 (1.0-3.0 microns)	Range 3 (3.0-10.0 microns)	Average Arrestance, %
1	n/a	n/a	$E_3<20$	$A_{avg}<65$
2	n/a	n/a	$E_3<20$	$65 \leq A_{avg}<70$
3	n/a	n/a	$E_3<20$	$70 \leq A_{avg}<75$
4	n/a	n/a	$E_3<20$	$75 \leq A_{avg}$
5	n/a	n/a	$20 \leq E_3$	n/a
6	n/a	n/a	$35 \leq E_3$	n/a
7	n/a	n/a	$50 \leq E_3$	n/a
8	n/a	$20 \leq E_2$	$70 \leq E_3$	n/a
9	n/a	$35 \leq E_2$	$75 \leq E_3$	n/a
10	n/a	$50 \leq E_2$	$80 \leq E_3$	n/a
11	$20 \leq E_1$	$65 \leq E_2$	$85 \leq E_3$	n/a
12	$35 \leq E_1$	$80 \leq E_2$	$90 \leq E_3$	n/a
13	$50 \leq E_1$	$85 \leq E_2$	$90 \leq E_3$	n/a
14	**$75 \leq E_1$**	**$90 \leq E_2$**	**$95 \leq E_3$**	**n/a**
15	$85 \leq E_1$	$90 \leq E_2$	$95 \leq E_3$	n/a
16	$95 \leq E_1$	$95 \leq E_2$	$95 \leq E_3$	n/a

For example, a MERV 14 is 90% efficient at filtering particles in size range 2 (1.0-3.0 microns).

What everyone can do to stay safe

While COVID-19 is the present virus of concern, it's not the only virus to cause concern. As an example, the World Health Organization tells us that 250,000 to 500,000 people die from Influenza every year. The most important way to prevent the spread of any infection is to protect yourself through the following sanitary and administrative controls:

- Stay Health
- Get vaccinated if you believe you are at risk of getting infected
- Avoid touching eyes, nose and mouth
- Wash Hands frequently with warm, soapy water or use an alcohol-based (40-60%) hand sanitizer
- When sick, cover your cough and sneezes with a tissue and dispose it (or in your arm) and then wash your hands
- Stay home if you are sick
- Masks are not necessary if you are a healthy individual. It is only recommended to wear a mask if you are experiencing symptoms of an illness that spreads through the air
- Regularly clean surfaces and disinfect surfaces with appropriate cleaners
- Limit frequency & duration of close contact

Additional Considerations for Your Building

We also recognize that some facilities with increasing concern for the safety of their tenants, employees, patients and visitors may wish to consider going above and beyond the regular sanitary and administrative controls for this outbreak. Based on the filtration and particulate data shared earlier, facilities could therefore also consider the following:

• HVAC and building industry standards and best practices clearly state that maintaining a high-quality indoor air environment is important in preventing unnecessary transmission, absorption and inhalation of harmful particulates.

• Upgrading the level of filtration and improving ventilation are strong engineering controls that can ensure a clean, healthy indoor environment. Here are some considerations for air handling units (AHU) and return air handling units (RHU): o For single stage filtration, upgrading filtration from MERV 8 to MERV 13 filtration, where possible, increases overall efficiency on E2 particle ranges (1.0-3.0 microns) by 65 percentage points. o For two stage filtration, upgrading filtration, where possible, to MERV 14 (or better) filtration may reduce the spread of harmful particulate. o Indoor environments can also be improved through ventilation by increasing the ratio of outdoor air compared to recirculated air through a dilution process.

Special Considerations for Healthcare Facilities

Health care facilities (hospitals, laboratories and clinics) are currently the centers responsible for screening, isolating and treating infected patients with transmittable viruses such as COVID-19. The following additional information should be considered in these centers:

• While COVID-19 is a Coronavirus and presumably spread via respiratory droplets which are believed to fall to surfaces before they reach the filter, its still important to review filtration systems to ensure that all filtration systems are inspected for integrity.

• The recommended filtration level to be maintained at healthcare facilities is 2-stage MERV 14 (or better) efficiency for general filtration. Please see Table 1 above to see the difference of efficiency between MERV Values. We encourage you to evaluate your general filtration efficiency levels to this standard for filtration best practices.

• Special care and attention is required for the removal and disposal of spent filters as they may contain biohazardous particles.

• Patients infected with serious/critical symptoms of a virus such as COVID-19 are typically treated in Airborne Infection Isolation rooms (AIIRs) that must be operated under negative pressure and must have a HEPA filtration stage before the air is exhausted or recirculated through a permanently mounted unit or with a portable self-containment unit. Selected HEPA filters must have greater than a 99.97% removal capacity on particles greater or equal to 0.3 microns. HEPA filters must be properly installed, fully sealed and tested in place by a certified technician to standard MIL Std 282, IEST-RP-CC1.4. All HEPA filters must be inspected and leak-tested annually.

• Where HEPA filters are required for critical environments such as AIIRs, ensure that the room has been recently inspected and leak-tested to established standards by a certified professional.

Additional Information Sources:

- World Health Organization https://www.who.int/emergencies/diseases/novel-coronavirus-2019
- CDC USA https://www.cdc.gov/media/index.html
- UNMC update daily https://www.nebraskamed.com/covid19-update
- Douglas County Health Dept. https://dchc.douglascounty-ne.gov/covid-19-information/