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YOUR ESSENTIAL GUIDE

Indoor Air Quality and Your Business

Part One: Understanding the science of air purification

On the heels of a global pandemic, health, hygiene, and safety are in the spotlight in everything we do. At the center of the conversation: air. Specifically, indoor air quality (IAQ).

Your employees and customers are now beginning to take notice of the air in the places where they live, work, learn, and play. Is your business taking the necessary steps to provide the safe, pure, clean air they expect? Where do you begin?

In this two-part eBook series, Ambius experts explore and explain the science behind IAQ and air hygiene to help you make the best decisions for your business. Let's begin with Part One that covers the science behind it including: consumer perceptions, the basics of IAQ, and the threat of airborne pathogens.

When you have questions along the way, our team is ready to help – we're just a phone call or a few clicks away.

Speak with an expert today.
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The healthier normal: air takes the spotlight

Indoor air quality has always been a critical health and safety consideration for buildings. However, the global pandemic and the airborne spread of the novel coronavirus has elevated the conversation. Awareness of its importance is rapidly increasing, both for building operators and occupants.

OCCUPANTS

49%

are uneasy about adjusting to in-person interaction once the pandemic ends.[1]

68%

of the global workforce does not feel completely safe working in their employers' buildings – and nearly 1 in 4 would quit before returning to an unsafe worksite.[2]

60%

of workers would take a lower-paying job if it offered better air quality and more hygiene-aware colleagues.[3]

76%

of consumers say that a "rating system" similar to restaurant health department scores for IAQ of buildings would give them confidence in the safety of a building.[4]

OPERATORS

41%

of schools in the U.S. need to update or replace their heating, ventilation, and air conditioning (HVAC) systems to improve air quality.[5]

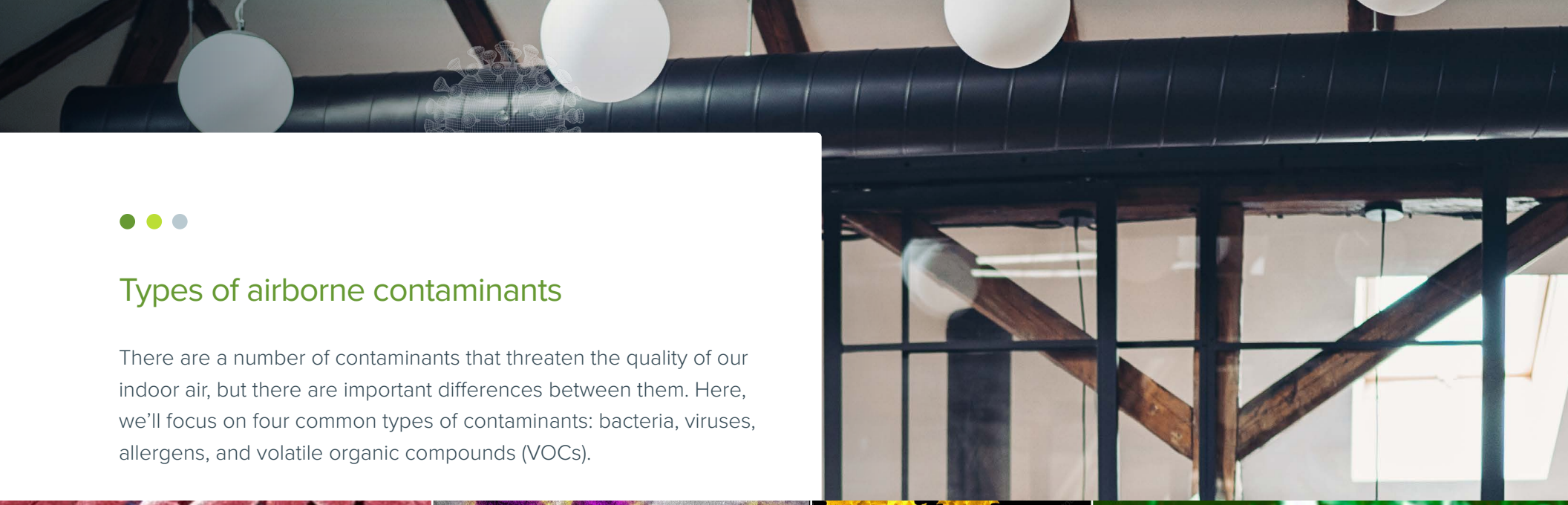
77%

of facility operators plan to enhance HVAC solutions to fight COVID-19 in the workplace.[6]

49%

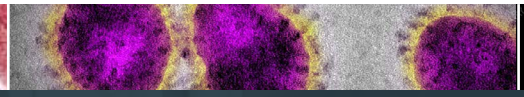
report that their people's well-being and mental health is their top priority in their spaces in 2021.[7]

1. American Psychological Association, "Coronavirus stress: Majority of Americans never imagined pandemic would last this long," March 2021. Accessed March 19, 2021.
2. Honeywell, "Honeywell Survey Reveals 68% Of Surveyed Workers Do Not Feel Completely Safe In Their Buildings," January 2021. Accessed March 19, 2021.
3. Ambius, "Workplace well-being: returning to work," February 2021. Accessed February 28, 2021.
4. Carbon Lighthouse, "Consumers to drive U.S. economic recovery:: 91% say indoor air quality critical in fight against COVID-19," October 2020. Accessed March 19, 2021.
5. U.S. Government Accountability Office, "K-12 EDUCATION: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement," June 2020. Accessed October 1, 2020.
6. Facility Executive, "The Pandemic And The New Focus On Indoor Air Quality," March 2021. Accessed March 19, 2021.
7. Ambius, "7 Strategies for Smarter, Healthier Spaces" webinar flash poll, March 2021.



Types of airborne contaminants

There are a number of contaminants that threaten the quality of our indoor air, but there are important differences between them. Here, we'll focus on four common types of contaminants: bacteria, viruses, allergens, and volatile organic compounds (VOCs).

BACTERIA

- Microscopic, invisible to the naked eye
- Considered living; they can survive and multiply outside of a host
- Many bacteria live inside of mammals, but are shed through everyday actions
- We transfer bacteria from us to surfaces around buildings that we inhabit
- Common sickness-inducing bacteria: *E. coli* and *Salmonella*

VIRUSES

- Microscopic, infectious molecules, not visible without a microscope
- Not living organisms; need to infect a host cell to grow and replicate
- Some can survive outside of host cells for a period of time, but will ultimately die
- When viruses infect humans and other animals, they can cause serious illness
- Common viruses: influenza virus, norovirus, rhinovirus (common cold), coronaviruses

ALLERGENS

- Can be microscopic or visible, typically airborne
- Can provoke an immune response: watery, itchy eyes; scratchy throat; sneezing; feeling bad
- Many allergens are seasonal
- Common airborne allergens: pollen, dust, airborne fur, dander

VOLATILE ORGANIC COMPOUNDS (VOCS)

- A range of chemicals that permeate into the air due to their high vapor pressure
- Man-made and naturally-occurring
- Present in outdoor air drawn into buildings
- Some VOCs can be harmful and are regulated in indoor environments
- Other VOCs can be released by things we use every day: cleaning products, furniture, carpeting and flooring, paints, appliances
- Common VOCs: benzene, acetone, ethanol, formaldehyde, toluene

Coronavirus terminology

In casual conversation, many people use terms such as coronavirus, SARS-CoV-2, and COVID-19 as interchangeable, but there are important technical differences between them.

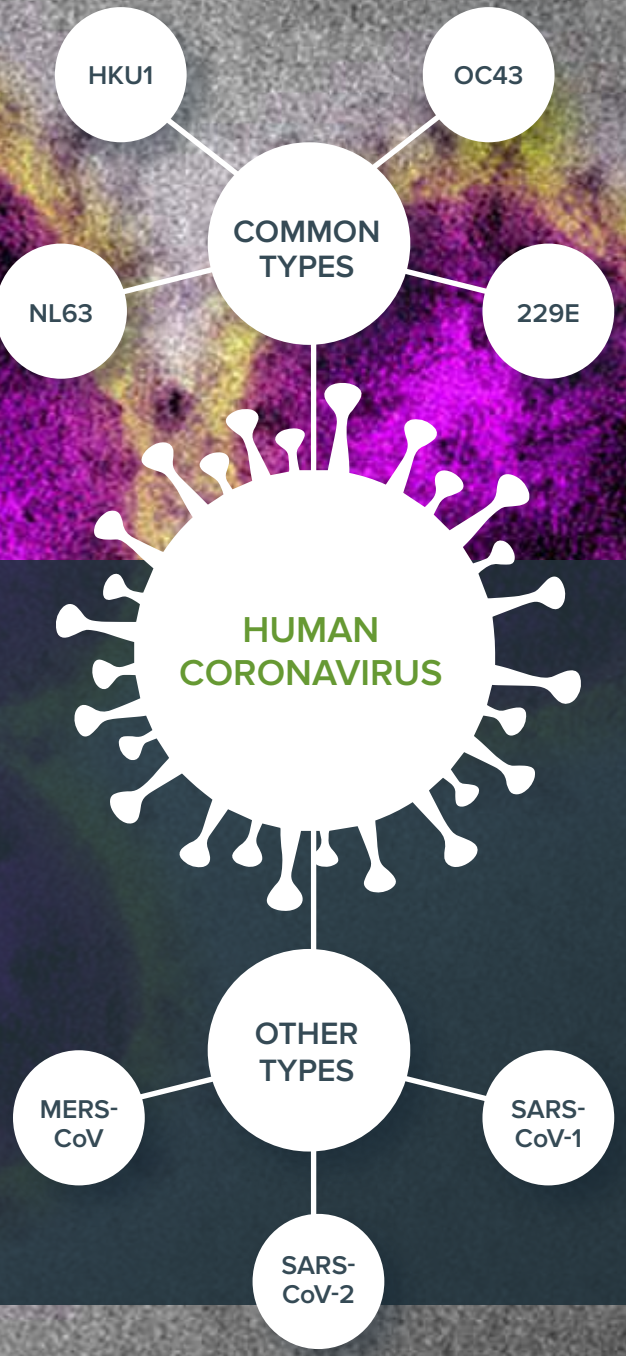
Coronavirus
A broad term for a specific family of viruses; corona is describe the “crown” or spike-like surface. Many viruses in this family are not able to infect humans, but there are a group of seven that are called “human coronaviruses.” The earliest coronaviruses were discovered in the 1960s.

SARS-CoV-2
The specific human coronavirus that has caused the current global pandemic.

Novel coronavirus
The “novel coronavirus” is SARS-CoV-2. “Novel” is a scientific term used to indicate something new. The virus was officially named SARS-CoV-2 by the International Committee on Taxonomy of Viruses on February 11, 2020.

COVID-19
The illness that develops as a result of infection with the SARS-CoV-2 virus; similarly, the influenza virus causes influenza the disease.

Enveloped virus
A virus particle that has a lipid bi-layer surrounding itself. This layer protects the virus as it travels from host to host. The layer is made up of fats, which are easily penetrated and make the virus susceptible to being killed when outside of its host. Washing with soap and water or properly using disinfectants are enough to inactivate the virus.



How airborne germs spread in enclosed spaces

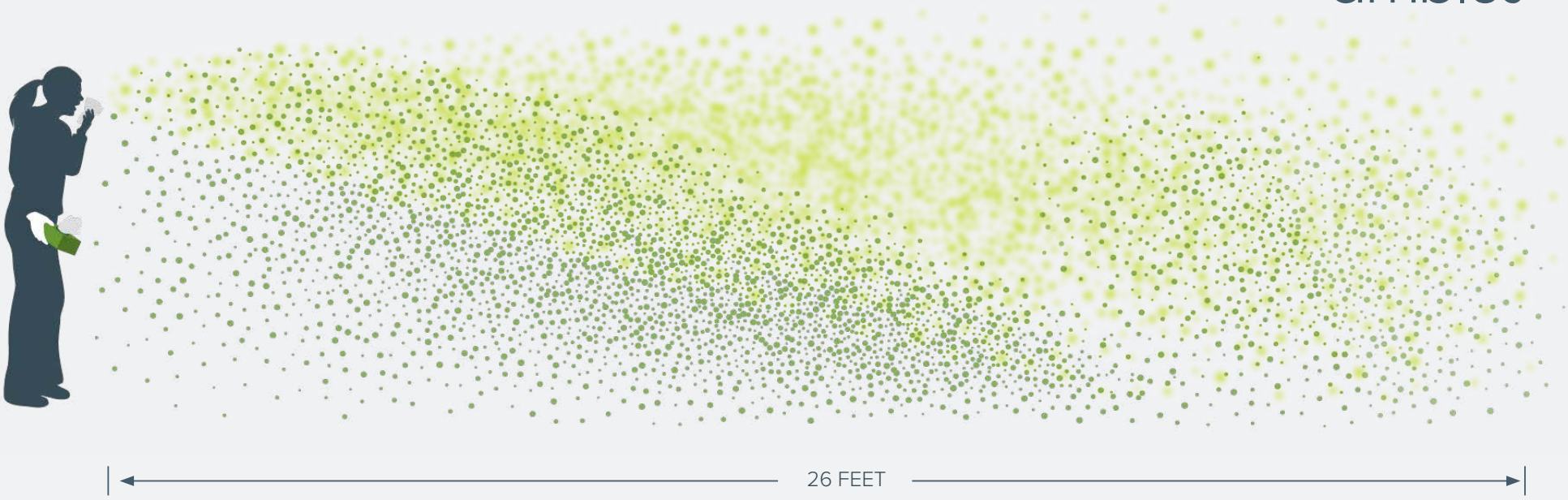
Pathogens such as SARS-CoV-2 spread in three main ways; when we:

1. Touch contaminated surfaces
2. Breathe contaminated air
3. Have close contact with someone that is infected

Viruses and other pathogens can be carried via saliva, mucus, and sputum in respiratory droplets and aerosols. When an infected person exhales, talks, coughs, or sneezes, they can emit virus particles into the air in the form of droplets.

Droplets can land on surfaces and people. Extremely small particles do not immediately sink to the floor, and instead can be carried on air currents across several feet or even yards before landing on surfaces.

The model shown on the next page shows how far these droplets can travel after a person coughs.



AIRBORNE CAPACITY OF DROPLETS AND AEROSOLS

100 microns or larger

Heavy respiratory droplets, fall quickly to the ground or other surfaces

4 - 100 microns

Smaller droplets and larger aerosols, can remain airborne for up to 30 minutes

3 microns or smaller

Smaller, lighter aerosols, can linger in the air for hours

The evolution of an airborne threat

As the pandemic evolved, understanding of how SARS-CoV-2 spread also evolved.

While initial research centered on the idea that droplets expelled by people when they sneeze, cough, or talk were one of the primary forms of transmission, the original consensus was that these droplets are relatively heavy and would quickly fall to the ground or surfaces below after being expelled. Therefore, at the start of the pandemic, there was a concentrated focus on reducing surface transmission.

However, in July 2020, 239 medical experts petitioned the World Health Organization (WHO) to change its guidance on SARS-CoV-2 and its transmission. These medical experts pointed to evidence that shows smaller, lighter aerosols containing the virus can be expelled through the simple acts of breathing and talking. These aerosols can remain afloat in the air for longer periods of time than the heavier droplets – for hours, in fact. As a result of this evidence, WHO changed its position to say that airborne transmission of SARS-CoV-2 in indoor locations with poor ventilation “cannot be ruled out.”

2020 studies leading up to this conclusion illustrated that air conditioning and ventilation systems, similar to those found in restaurants, offices, and schools, can help spread coronavirus to people seated a distance from an infected person.

Given this information on airborne transmission, and the heightened attention to the role that ventilation and air purification/cleaning systems can play in preventing the spread of the virus, in October 2020, the U.S. Centers for Disease Control and Prevention (CDC) also updated its guidance on preventing transmission, stating:

> **“Some infections can be spread by exposure to virus in small droplets and particles that can linger in the air for minutes to hours. These viruses may be able to infect people who are further than 6 feet away from the person who is infected or after that person has left the space.”**

As part of its prevention guidance, the CDC now recommends that spaces be well and properly ventilated. It continues to update this guidance for workplaces, including a specific point around the use of “portable high-efficiency particulate air (HEPA) fan/filtration systems to help enhance air cleaning” in high-traffic areas.

As scientists and public health experts continue to learn more about SARS-CoV-2 and other emerging pathogens, guidance will likely continue to evolve. However, one thing is for certain: indoor air quality is now firmly entrenched in the conversations around health, hygiene, and safety.

As clean air (blue arrows) moves around your space, it can become contaminated (red arrows). Adding portable, free-standing, particulate air purifiers at strategically placed locations is one way to improve the quality of indoor air in your space or building.

In addition to adding air purifiers, social distance design measures in conjunction with air hygiene may further enhance health and safety protocols at your business.

IMPROVING INDOOR AIR QUALITY

Now that we have addressed the basics of IAQ and the growing concerns around airborne transmission of COVID-19, the next step is learning how you can to improve IAQ to protect people and create healthy spaces to live, work, and play.

Part Two of this Ambius eBook series is your essential guide to understanding air purification strategies. In it, Ambius reviews:

- Turning buildings into healthy, thriving environments
- Mitigation strategies for indoor air quality in a pandemic era
- Understanding filtration
- Filter designations
- 6 qualities to evaluate in an air purifier
- Additional air purifier functionalities
- The advantages of working with experts

CAN'T WAIT FOR PART TWO?
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A LAYERED APPROACH

There is no silver bullet to managing the spread of coronavirus. Instead, to successfully combat this enemy, we need to use a layered approach of different hygiene solutions, such as:

- Cleaning and disinfection of surfaces
- Wearing appropriate PPE (face coverings or masks)
- Addressing indoor air quality
- Social distancing design
- Increased handwashing and the availability of hand sanitizers
- Scenting for cleanliness and ambiance

Hygiene360™

A healthy business begins with a healthy building. Ambius is leading the way in designing smarter, healthier spaces. As a trusted partner, we've been proud to help organizations positively benefit people in commercial spaces for more than 50 years.

Now, as businesses face their biggest health challenge in 100 years, we have assembled a global coalition of expertise from our family of companies, including a century-old hygiene leader and a 30-year pioneer in the operational and customer experience assessment industry.

The culmination is Hygiene360, a layered approach focused on healthy building strategies to minimize risk and improve long-term health and well-being. Discover the Ambius difference:

- Highly trained, in-house design and service experts across North America with an average tenure of 10.5 years
- Full-service, consultative approach
- Tailored solutions specific to your business goals and brand standards
- Part of the world's leading hygiene services company in over 45 countries worldwide
- Your single-source solution for savings, consistency, convenience, and peace of mind

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