



A Professional's Guide to Indoor Air Technology

The COVID-19 pandemic has skyrocketed awareness around indoor air quality, putting pressure on site managers, administrators, and other professionals. Assuming responsibility for **ensuring clean air in workplaces, shopping centers, offices and more** has become one of the most important aspects of site management, and with such a dizzying array of options, it's hard to cut through the noise and determine what system is the best fit for a particular institution or business.

Beyond COVID, **poor indoor air quality** is linked to a myriad of negative phenomena. An [EPA report](#) clearly links poor quality office air to more employee sick days, and a marked plunge in employee efficacy. The EPA also reports that [bad indoor air in educational institutions](#) means worse academic performance, increased absenteeism, and health issues ranging from mild to serious.

Fortunately, an **air purification system** can help you mitigate the risks and significantly improve indoor air quality at your site. This guide will help you learn about different types of indoor air purification technologies, including how they work, their efficacy and coverage, advantages and disadvantages, and how to choose the right fit for your site, be it a school, office, or even a hospital.

ON-SITE INDOOR AIR MANAGEMENT

AN UNPRECEDENTED
CHALLENGE

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Common technologies - an overview

As indoor transmission is far more common than outdoor, many have serious concerns around infections in schools, offices, and other public spaces. The longer people sit together in enclosed spaces, the higher the chances for a virus outbreak. The threat is especially potent when it comes to crowded spaces with large numbers of people from different households.

There are a number of technologies which can help remove various airborne pollutants, including biological contaminants like pollen, dust, viruses, bacteria, and other particulate matter from the air.

However, it's important to remember that not all technologies are created equal - some are able to neutralize a wide range of pollutants and even help reduce odors, while others are ineffective at snagging molds and other biological contaminants.

Filters

Filter-based air purifiers mechanically force air through filters to remove airborne pollutants. There are two main types of filters: HEPA and standard. **Standard filters contain holes**, in which larger airborne contaminants get stuck, preventing them from recirculating throughout the room. **HEPA (high efficiency particulate air) filters** contain microscopic holes that can effectively trap airborne particles as small as 0.3 microns (μm).

Advantages

Filters are effective, easy-to-use air cleaners that are often reasonably priced. Think of air filters as your first line of defense against airborne contaminants. They're great at trapping large floating pollutants, like chunks of dog hair, or dust and dirt.

Challenges and drawbacks

Filter systems are high maintenance, requiring frequent hands-on replacements (approximately once every six months). The [U.S. Department of Energy](#) says that routinely replacing or cleaning an air conditioner's filters is critical – otherwise, “clogged, dirty filters block normal airflow” and reduce a system's efficiency.

Because they are typically mechanical and fan-based they can be **very noisy**. Depending on the filter, they are usually **less effective for biological contaminants**, although HEPA filters have been proven effective against some viruses.

Efficacy and coverage

HEPA and standard filters work in one room only, and they're not particularly effective at reducing odors or the presence of biological contaminants. They are generally not the best solution for larger spaces.

Ionizers

These systems release an electric charge that attracts contaminants. Airborne particles stick to plates within the device, removing them from the room's air circulation. The most common ionizer systems are **Negative ions** and **Bipolar ions**.

While their method of air purification differs slightly, both Negative ions and Bipolar ions **manipulate ions in the air** to create a charge (similar to static electricity) that stops various airborne pollutants from continuing to circulate throughout a space.

Advantages

Ionizers are particularly adept at stopping pathogens. Bipolar ionization, in particular, is **super effective** against SARS, norovirus, and some flu strains. Interestingly, a **meta-analysis** of research around air ionizers between 1957 and 2012 found a remarkable correlation between the use of ionizers and lessened symptoms of depression in people.

Challenges and drawbacks

Air ionizers can lose efficacy and “clump” together. While **research** published in the journal of Electrostatics called "Efficiency of ionizers in removing airborne particles in indoor environments" has found that ionizers are effective at removing particles from the air, the success rate of the technology plunges with distance. This means that they typically need to be used in collaboration with other methods (like filters) for effective coverage.

Efficacy and coverage

Most air ionizers are only effective at removing airborne pollutants in close proximity, and they're not great for VOCs (volatile organic compounds) or odors. They're not recommended for use in larger spaces.

UV-Based

Leveraging **Ultra-Violet (UV) light**, these systems neutralize and sterilize contaminants that come into contact with the system's light. The **Food and Drug Administration (FDA)** ranks UVA rays as having the longest wavelengths, followed by UVB, and then UVC.

The most common UV air purifying technologies are PCO with UVGI or UV LED, UVGI, and AHPCO. UV-based air purifiers are hyper effective at **germicidal irradiation**, making them a solid choice for spaces with a larger number of biological contaminants.

Advantages

UV-light based systems are highly effective at neutralizing airborne pollutants. Some **recent initiatives** have shown that UV light may be effective against some pathogens, including the coronavirus. A number of UV systems have been found to cleanse pathogens present on **surfaces**.

The main question is if those contaminants need to be in direct contact with the UV light - more on that later.

Challenges and drawbacks

UV light systems can be **high maintenance**, with high-priced bulbs that can be difficult to replace. Additionally, this technology eliminates airborne biological contaminants, but not dust, smoke, or other particles that would be neutralized by a simple air filter.

Efficacy and coverage

Similarly to air ionizers and filter systems, **UV air purifiers are not an ideal solution** for larger **spaces** more than one room. Most particles need to be in the direct line of the light's “sight” in order to be neutralized, or pass through the chamber itself, where the UV bulb is contained.



H2O2 (DHP)

Hydrogen peroxide (H2O2)

treatments utilize water molecules already in the air, converting them into cleansing H2O2 at levels far lower than 1 ppm according to OSHA. Hydrogen peroxide is a commonly used disinfectant, found in everything from mouthwash to first aid kits, and small amounts are safe for human inhalation.

Advantages

The [CDC](#) lists **hydrogen peroxide** in particular as a compound with powerful germicidal, bactericidal, virucidal, and fungicidal properties. Despite its strength and efficacy, it's considered a safe and mild cleansing agent that can be used to purify air in a public space or home.

Challenges and drawbacks

H2O2 can be super effective at neutralizing everything from bacteria and molds to viruses. It can be less effective against particulate pollution and usually has only a small impact on surfaces.

Efficacy and coverage

Generally speaking, **H2O2 (DHP) systems are extremely effective** for larger spaces more than one room. **Hydrogen peroxide systems are ideal for large spaces and safe for adults and kids.**

Choosing the right system

In order to pick the right system for your site, it's critical to **analyze your needs** and compare and contrast how different methods best suit your requirements.

There are 3 main questions that can help you get started.

1. Do I have the time and budget for a system that requires maintenance, replacement and contentious upkeep?
2. Do I want a system that will take up space or a more advanced technology that can easily utilize existing systems?
3. How much space do I need to purify?

Keep practical considerations in mind.



With certain systems requiring intense maintenance, decide how much time and effort you're willing to spend on that **upkeep**.

Systems that are strictly **ionizer or filter-based can clean the air in one room only**, so you'd need to invest in multiple one-room systems throughout your site. This is likely not cost-effective, so a solution that can fit into your existing HVAC system will save you money.

IAQ technology comparison table

| Criteria to consider when choosing an IAQ solution | UV-based | Air ionizers | Filters | TADIRAN AIROW |
|--|----------|--------------|---------|---------------|
| Efficacy against airborne pathogens - viruses, bacteria and mold | ● | ● | ● | ● |
| Efficacy in inaccessible areas | ● | ● | ● | ● |
| Efficacy against airborne particles | ● | ● | ● | ● |
| Efficacy against pathogens on surfaces | ● | ● | ● | ● |
| Efficacy in a large space (more than 1 room) | ● | ● | ● | ● |
| Zero Maintenance | ● | ● | ● | ● |
| Fits into an existing system (does not take up additional space) | ● | ● | ● | ● |



PATENTED TECHNOLOGY



OZONE FREE



ZERO MAINTENANCE



LONG LASTING



OPERATING INDICATOR



PLUG & PLAY

Our recommendation

Whether it's for a school, an office, a hospital, or other public indoor space, Tadiran's **TADIRAN AIROW** may be an ideal solution for your active air purification needs. Because this H₂O₂ system can be directly installed into the ducts of existing central HVAC system, it distributes pathogen and allergen-zapping hydrogen peroxide throughout the entirety of a site.

TADIRAN AIROW was used in the world's only **real-time, live experiment** in a movie theater. Researchers discovered that even in a crowded cinema, the

hydrogen peroxide system neutralized airborne contaminants by nearly 90 percent. In **FDA-cleared lab tests**, the TADIRAN AIROW has been proven to eliminate viruses, bacteria and mold at up to 99.999%.

If you'd like to learn more about the best hydrogen peroxide air treatment solution for your indoor air quality, **get in touch with us!** We'd love to guide you in your search, show you how it works, and work with you on a solution that's the perfect fit for your space.