

WHITE PAPER

CLEANER is smarter

How Air Intake Filters Save Time,
Money and HVAC Equipment

PERMATRON®



MANY BUILDING SUPERVISORS OR MANAGERS DON'T REALIZE THE IMPORTANCE OF PROPER AIR FLOW.

But the costs of ignoring optimal airflow can be substantial—to staff productivity and health, to technology, and to the HVAC system itself. Fortunately, improper air flow, in addition to related HVAC issues, can be eliminated with the use and care of air intake filter screens. These provide reliable, relatively inexpensive, air flow protection. But before we delve into air intake screens, let's see why optimized air flow in commercial buildings is so important.

THE HEALTH COSTS OF IMPROPER AIR FLOW

Long, indoor workdays can lead to numerous health issues related to poor air ventilation and quality. According to OSHA (U.S. Department of Labor, Occupational Safety and Health Administration), poor indoor air quality can cause fever, coughing, shortness of breath and asthma. It can also lead to more serious health problems such as lung cancer and heart disease. Many of the shorter-term issues can be characterized under the relatively broad subject of *Sick Building Syndrome*. Sick Building Syndrome, an illness marked by headaches and respiratory problems, is “the main cause of absence from work and low efficiency of staffs and employees” according to the U.S. National Library of Medicine.

With the rise of COVID-19, the spread of communicable diseases as a result of poor ventilation has gained increased attention. As reported by the Environmental Health Committee, “Infections, such as influenza, SARS and M. tuberculosis (TB), have been clearly shown to have airborne disease transmission potential.” COVID-19 is no exception.

While better ventilation cannot eliminate the risk of airborne transmission of the virus alone, the EPA recommends facilities increase “ventilation with outdoor air and air filtration as part of a larger strategy that includes social distancing, wearing cloth face coverings or masks, surface cleaning and disinfecting, handwashing and other precautions.” An article from the National Air Filtration Association agrees that “filtration in building heating, ventilation and air conditioning (HVAC) systems can be a part of an overall risk mitigation approach.”



THE PRODUCTIVITY COSTS OF IMPROPER AIR FLOW

Numerous studies show that poor air quality also hinders employee performance. Workers in environments with poor air quality or inadequate circulation are often sluggish, complain of being tired, and may make decisions slower and with more errors. On the other hand, good air quality can boost performance. A study completed by Harvard and Syracuse Universities showed cognitive ability doubled in buildings with “green building conditions.” This was defined as buildings with higher rates of ventilation and reduced volatile organic compounds.

Just a relatively small amount of poor air quality can be detrimental. As reported by the U.S. National Library of Medicine (in a report titled, *The Effects of Indoor Air Quality on Performance and Productivity*) decreased employee productivity due to poor air quality can occur even “at pollutant levels that had no measurable effects on the perception of air quality by the occupants themselves.”

An article published by the *Harvard Business Review* (in a report titled *Air Pollution is Making Office Workers Less Productive*) reports that “particulate matter is small enough to be absorbed in the bloodstream” and exposure may be directly associated with lower intelligence and diminished performance. According to the report, “the negative impact of pollution (both indoors and outdoors) on productivity may be greatest in higher-skilled jobs” such as those involving computers.

THE HIGH-TECH EQUIPMENT COSTS OF IMPROPER AIR FLOW

Mold, fungus and bacteria are not only harmful to people, but to machines. They can grow unchecked in humid and unventilated areas, infecting equipment and greatly reducing its longevity. Indoor contaminants can also corrode circuitry including circuit boards (especially in older machines), as well as solder joints and conductive passageways. Furthermore, improper airflow can create “hot spots” that are harmful to sensitive equipment, which often work best in cool, dry conditions. Hot spots are especially problematic in Data Centers, although they can occur in any building interior that lacks good airflow.

KEEPING HVAC SYSTEMS RUNNING

HVAC systems are complex, but the concept is fairly simple. Draw in air, condition it, and then redistribute, recycle or exchange it within an environment. This all works quite nicely, assuming the airflow isn't blocked. That's when problems can start.

To maintain proper airflow HVAC units need to be kept clean and free from damage. That may seem obvious, but remember that components of the HVAC system are outdoors on the roof where they are out of sight and “out of mind.” Sitting up there, usually without any sort of protection, leaves them vulnerable to hail, as well as high winds and storms, pests and airborne debris. With all these outside elements creating potential obstacles, it's quite a marvel that these units work as well as they do!

Cottonwood is a particularly frustrating problem. Generated by the poplar tree and common in many areas of North America, the cottonwood debris season lasts from May thru early August. Dense airborne cottonwood may necessitate frequent, even weekly, HVAC air intake fin and coil cleanings. But every season poses its own threats. For example, during late autumn, trees drop their leaves, much of which blows around and seems to eventually end up inside HVAC equipment.

HERE ARE THE MAIN THREATS THAT RESTRICT HVAC AIR FLOW:

Airborne debris clogging equipment air intakes

Fin damage from hail and storms—the outside fins on the machine can become dented and pressed against each other, restricting the flow of air

Condenser coils damage—these are needed to facilitate the transfer of heat from the refrigerant to the outside air

Prematurely dirty air filters that force equipment to work harder and run longer, resulting in higher energy costs, equipment breakdown, and reduced equipment longevity

Torn or damaged filters, often the result of moisture or environmental exposure, which may be unable to capture contaminants at all

But ongoing care, cleaning and upkeep will lower HVAC energy costs, as well as repair costs and more.

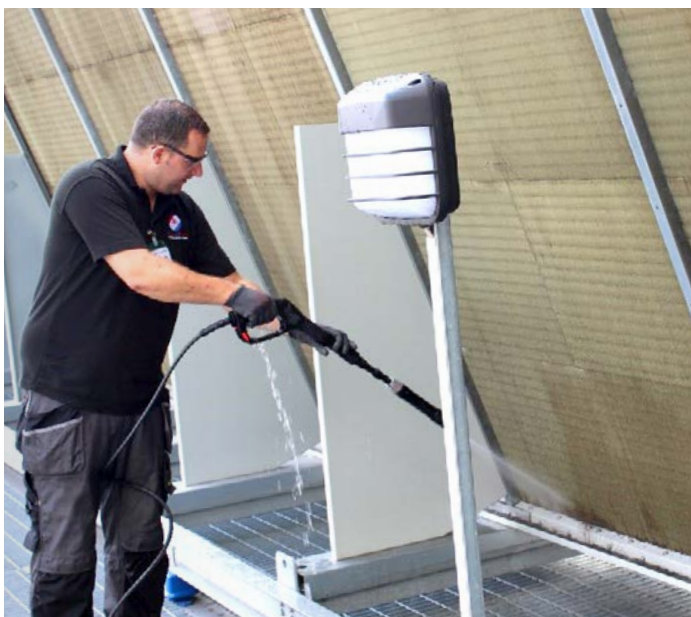


THE HIGH COST OF HVAC CLEANING

If only upkeep was simple and inexpensive. Unfortunately, it is often neither. One problem is access: rooftop equipment can be inconvenient to reach.

Even in cases where rooftop access is relatively easy, rooftops often lack a convenient water supply. A typical coil cleaning can use 90 gallons of water just to flush out the chemicals—so the lack of hoses and water makes cleaning a system challenging, and almost impossible when cleaning multiple units (and that's assuming they aren't in an area with water shortages). The cost of water can be high—in some areas water costs are higher than that of electricity. Also, some regions must adhere to strict EPA guidelines on chemical runoff. This makes rinsing a bit more complicated than merely aiming a hose. To make things even more challenging, high-pressure cleaning can damage the aluminum fins, especially if using untrained labor.

But don't even think about cleaning an HVAC unit without water. Some cleaning solutions, such as coil cleaners, are corrosive and damage equipment over time if not thoroughly rinsed. With all these obstacles HVAC coil cleaning, which is usually a two-person job, can take hours per unit.



Filter screens can be especially helpful when used in protecting high quality HEPA filters. These filters are designed to arrest fine particles as small as .01 microns, which include COVID-19 particles.

AIR INTAKE SCREENS (AND NETTING) TO THE RESCUE

Fortunately, many of these issues can be greatly reduced with a pre-filtration solution, like custom air intake screens (also referred to as cottonwood filter screens). These air intake filters are attached to the outside of an HVAC unit where they act as the first line of defense in keeping larger particles, bugs, cottonwood and other debris out of the equipment.

Filter screens can be especially helpful when used in protecting high-quality MERV 13+ and HEPA filters. These filters are designed to arrest fine particles as small as .01 microns, which include COVID-19 particles. In fact, cities like New York now require highly efficient MERV-13 filters in many buildings with heavy pedestrian traffic. Replacing and disposing of these filters can be expensive and time consuming—some municipalities insist they be treated as biohazards. Fortunately, according to the Department of Health and Human Services, pre-filters have been shown to extend HEPA filter life by at least 25%, and up to 900%. This can result in significant cost savings.

Hail guards, or hail netting, are also worthwhile investments. According to the National Weather Service, hail causes more than one billion dollars in annual damage in the United States alone. Rooftop units don't have much protection from hail, which can plummet down to earth at incredible speed and be five inches in diameter or greater. Cut-to-fit hail guard netting can reduce risk of air intake damage for just 10% of the cost of one repair.

PREVENT PROBLEMS WITH **PREVENT**[®]

While there are many air intake screens, the Permatron PreVent[®] system is simply the best, delivering long-lasting and proven HVAC equipment protection. PreVent filter screens are not only made with high-quality UV protected black polypropylene media, but they are the only filter screen featuring our powerful, patented MagnaMount[®] earth magnets. With them, or our Model R magnetic mount strips, screens can be installed in minutes, without any drilling or tooling. The filters can be removed for periodic maintenance just as easily, although they won't need to be removed often—PreVent filter screens can be cleaned in place by brushing them down. In addition to extending equipment life, some companies have lowered their HVAC maintenance costs up to 2/3 by installing PreVent filters. Taking the time to install a screen such as a PreVent filter on rooftop RTUs, cooling towers, cooling fans, or any other equipment can end up saving a company a lot of time, and even better—a lot of money.





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