

# Molecular Filtration In Airports



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## BACKGROUND

Over the past decade, and prior to the Corona virus pandemic, global air traffic increased consistently. During the pandemic, global passenger boardings dropped by over 50%. Passenger boardings have bounced back and are now approaching pre-pandemic levels. People are traveling both nationally and internationally to attend business meetings, visit their families and friends, and take much needed vacations. With the addition of several new discount airlines and the corresponding pressure on airline ticket prices, traveling by plane across continents and time zones multiple times a year is no longer limited to wealthy individuals. Due to this increase in air traffic, air pollution has been rising accordingly and the need to manage it with adequate filtration solutions is needed now more than ever.

## CONTAMINANTS IN AIRPORTS

Not only is air traffic increasing, but the variety of air pollutants inside of the airport is also increasing. All aircraft are major contributors to high levels of molecular contaminants inside and outside of the airport, but there are also additional sources of contaminants.



### EXTERNAL SOURCE ONE

Aircraft contaminant sources include engine exhaust, tire wear with the impact of landing and the general weight of the airplanes transporting passengers as they taxi, and refueling vapors.

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### EXTERNAL SOURCE TWO

The buses bringing passengers or flight crews from one terminal to the other or directly to the taxiway and airplane, catering trucks, luggage vehicles, and airplane tugs all release contaminants. The transport of passengers and airport personnel to the airport and adjacent parking lots via taxi, bus, train, and personal automobiles also releases contaminants. These vehicles produce contaminants from tire wear, brake dust, and engine emissions.

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### EXTERNAL SOURCE THREE

There are many contaminants that are generated by non-airport sources. These include the contaminants in the ambient air, adjacent industrial process emissions, and other transportation on nearby roads, waterways, and rail lines.

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# Molecular Contaminants in Airports

These external contaminants are brought into the airport through infiltration, pressure differential, doors and windows, HVAC system intakes, and human foot traffic.

In addition to the obvious external sources of contaminants, many molecular contaminants are generated from within the airport. The internal sources include passengers, cleaning products, food preparation, service animals, building materials, construction, and transportation.

## CONTAMINANTS OF CONCERN

Based on the external and internal sources of contaminants listed above, here below are the typical contaminants found in the air inside of an airport:

SOURCE	MOLECULAR CONTAMINANTS OF CONCERN
EXTERNAL	Hydrocarbons, VOCs, Ozone, CO, CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub>
INTERNAL	VOCs, CO, Formaldehyde, NO <sub>x</sub> , Nuisance Odors

## HOW CONTAMINANTS AFFECT YOUR HEALTH

Molecular contaminants are often referred to as “contaminants of concern.” The main reason for this is they are the contaminants that the molecular filtration system is designed to remove. These contaminants are also concerning when it comes to human health. Besides the rather benign issue of odors being annoying, short-term exposure to the harmful molecular contaminants can aggravate asthma and emphysema symptoms. Long term exposure can decrease the oxygen supply in the blood, aggravate bronchitis, increase blood pressure, and decrease fertility.

## CONTAMINANT CONTROL STRATEGY

**STRATEGY ONE:** Manage the sources of the contaminants by removing them from the building or isolating them from the airport occupants. This is not an easy endeavor because most of the contaminants are generated by the required activities at an airport.

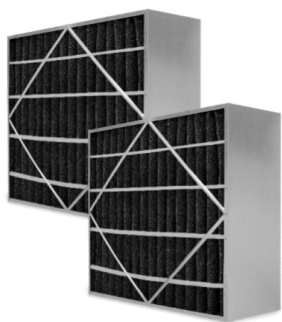
**STRATEGY TWO:** Dilute the contaminants through ventilation. This strategy often requires additional heating or cooling of outdoor air that was otherwise unneeded. **STRATEGY THREE:** Utilize molecular filtration to clean the air of all the contaminants of concern. This is the most cost effective and reliable method for maintaining good indoor air quality.

# Recommended Products

## Two Pass Solutions

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Based on the long list of potential contaminants found in the indoor air at an airport, two passes of chemical media are recommended. The first pass of media should be virgin activated carbon and the second pass should be potassium permanganate impregnated alumina. Since the contaminants and their corresponding concentrations will vary, a two-pass solution will allow each media type to be replaced independently, providing the best utilization of both media types.

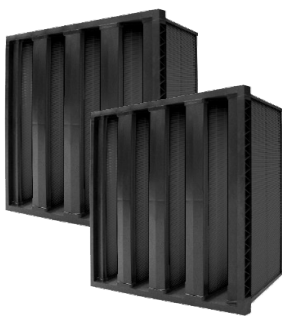


### MC PROCELL 50/50 - GOOD SOLUTION

The MC Procell 50/50 offers both molecular and particulate filtration and offers easy retrofit into existing systems. MC PROCELL 50/50 is offered in both a metal no header version and a metal single header version – this allows for easy interchange with current filters without the costly retrofit of HVAC system.

#### FEATURES

- Single header or box style
- MERV 8
- Up to 580 GSM of chemical media



### MC VB4 HC - BETTER SOLUTION

MC VB4 HC is a V-bank carbon filter that features special honeycomb panels. These panels hold 24 pounds of carbon per 24 x 24 x 12 filter—either 100% 6 x 12 mesh, industrial-grade CTC high-activity carbon, or a 50/50 blend of carbon and potassium permanganate.

#### FEATURES

- Incinerable, plastic frame
- Up to 25 lb of chemical media
- Low pressure drop



### CASSETTES - BEST SOLUTION

MANN+HUMMEL 12 inch and 18 inch cassettes are designed for medium to heavy duty contaminant concentrations. Each cassette contains two, separate media beds in a v-shape configuration to provide longer residence times with lower pressure drop.

#### FEATURES

- All plastic with recyclable frame
- 12x12x12 with a 3 inch bed depth and 1 ft<sup>3</sup> of media
- 6x12x18 with a 1 inch bed depth and 0.5 ft<sup>3</sup> of media

# Recommended Products

## Single Pass Solutions

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When it is either cost prohibitive to utilize two passes of chemical media or there is a space constraint, a single pass of a blended chemical media is an acceptable solution. Recommended molecular filtration products that are available with a 50/50 blend of the recommended chemical media include:

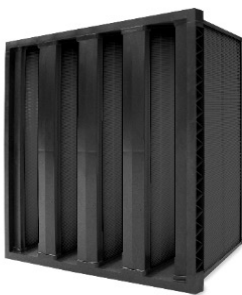


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# Recommended Products

## Retrofit Solutions

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In some cases, the molecular filtration solution must be retrofit into the existing HVAC system. This usually requires replacing an existing particulate filter with a combination particulate and molecular filtration product. For these retrofit applications, the recommendations are:



### MC PRIME SERIES - GOOD SOLUTION

MC Prime Series carbon pleat filters are specifically designed to remove unpleasant odors and gaseous pollutants entering a buildings HVAC system, neutralizing target molecular or gas phase contaminants prior to air distribution.

#### FEATURES

- Available in 1", 2" and 4" depths
- MERV 7, 8, 10, and 13 available
- 200 - 500 GSM of chemical media



### MC TL SERIES - BETTER SOLUTION

MC TL Series filters are thin line filters that provide both molecular and particulate filtration. Their thin profile, just 2 inches and 4 inches deep, allows easy use in current HVAC systems without the need for expensive modifications.

#### FEATURES

- Available in 2" and 4" depths
- MERV 9
- Plastic frame



### MC PROCELL 15 - BEST SOLUTION

The MC Procell 15 filter is a molecular filter that offers MERV 15 particulate efficiency - all with low resistance and easy retrofit into current HVAC systems. The MC Procell 15 is offered in a variety of frame styles - single header and no header box style - this broad offering of frame styles allows for easy and convenient retrofit into most all housing/holding frame configurations.

#### FEATURES

- Single header or box style
- Up to 645 GSM of chemical media
- MERV 15

MANN+HUMMEL is committed to continual product development - all descriptions, specifications and performance data are subject to change without notice. MANN+HUMMEL products are manufactured to exacting criteria - there can be a  $\pm 5\%$  variance in filter performance.