



## APPLICATION NOTE

### Introduction to Air Filtration

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The purpose of air filtration is to remove contaminants from the air. So the first step in selecting an air filtration system is to understand the contamination – what it is and how it is harmful. Ideally, the contamination level should be measured and an acceptable limit specified.

Examples of contamination are as follows:

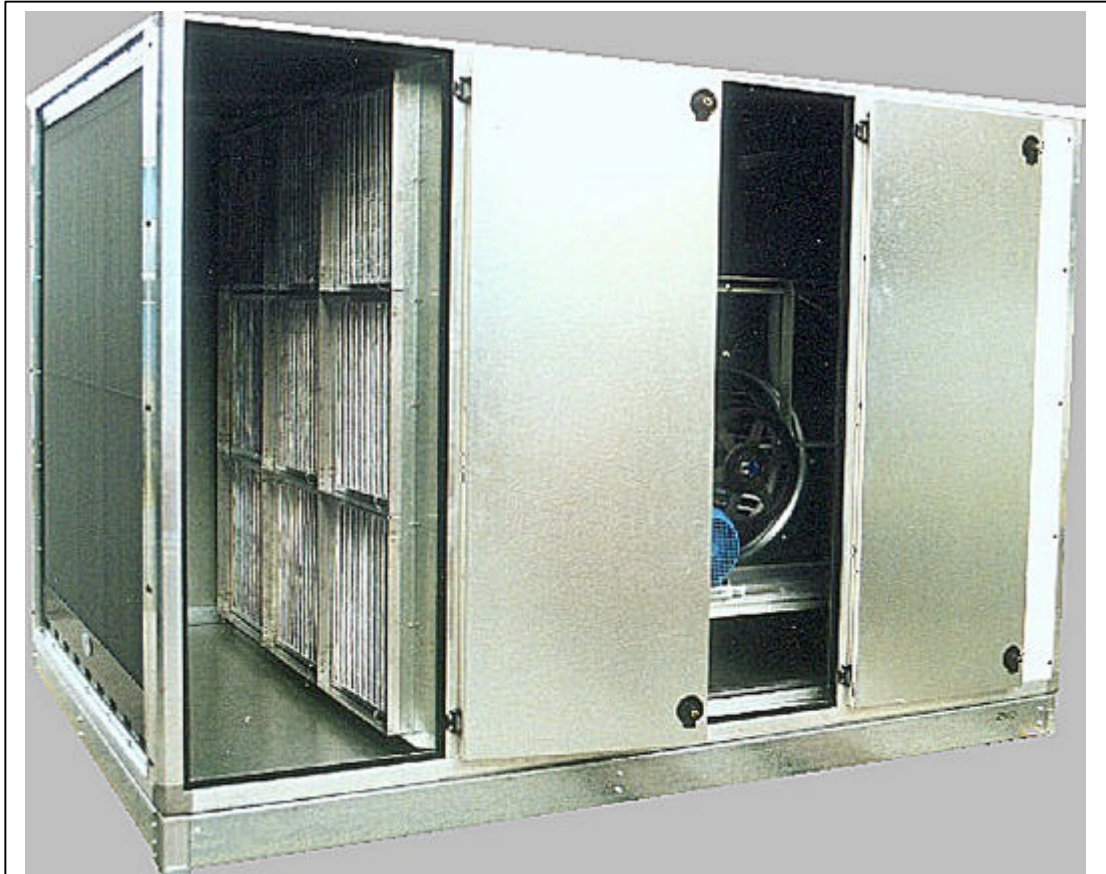
1. Rainwater ingress into the air system, which can corrode ducting and fans, leak through into occupied areas and lead to amplification of fungus and moulds.
2. Dust, dirt, pollen, bacteria and mould, which can accumulate on air-conditioning cooling coils and reduce the coil's efficiency and life expectancy.
3. Bacteria, yeasts and moulds which can cause produce to deteriorate or become contaminated.
4. Odours/gases which can affect the quality of food or other produce.

The second step is to define the area to receive filtered air. Filtration costs money and the cost depends on the airflow which depends on the space (volume) to be served. It is often cost-effective, for example, to provide localised filtered air at the critical process stages.

At this stage the appropriate filtration can be selected and the system designed. Some systems will be fairly standard and can be designed by a local air-conditioning company. Others will require a mechanical consultant and/or an air filtration specialist. Make sure the system designer is experienced.

Even a good air filtration design can fail to perform because of poor installation. In a good installation, the air passes through the filters and not around the filters! Bypass is often a major problem that is more critical for higher efficiency filters. If an acceptable contamination level has been defined, it can be measured after the system is installed to determine whether the system works. Alternatively, the installed system efficiency can be measured by an air testing laboratory.

Finally, allow for system maintenance. If the air filters are doing their job, they will be collecting contaminants and “loading”. (The best filter is not one that never needs changing!) Particulate filters tend to let less air through as they load until they block up. Adsorption filters (for gases and odours) get “saturated” and then begin to let the gases through. Budget for regular inspections and for filter replacements.



Air intake system complete with Air-water separators and fine bag-filters

<b>Contaminant</b>	<b>Effects</b>	<b>Filters</b>	<b>Main Options</b>
Water: Rain Sea-spray	<ul style="list-style-type: none"> <li>• Air system corrosion</li> <li>• Reduction in air system performance</li> <li>• Microbial amplification</li> </ul>	Louvres or the more efficient air-water separators	Aluminium (preferred) or plastic
Insects	<ul style="list-style-type: none"> <li>• Direct product contamination</li> <li>• Introduction of other microbial contamination</li> </ul>	Insect screens or coarse filters – G2 or better	Washable or disposable Durability – e.g. galvanised steel or stainless steel.
Coarse Particles (> 3 Microns) Dust & dirt Most auto emissions Spores, Pollen	<ul style="list-style-type: none"> <li>• Reduction in air system performance</li> <li>• Fast loading of finer filters</li> <li>• Fungal contamination</li> </ul>	Coarse filters rated G1 – G4	Washable or disposable Durability – e.g. galvanised steel or stainless steel. Flat panels or bag-filters
Fine Particles (0.5 - 3 Microns) Bacteria, Smoke Insecticide dust Droplet nuclei (sneeze)	<ul style="list-style-type: none"> <li>• Microbial contamination</li> <li>• Staining</li> <li>• Adverse lung effects</li> </ul>	Fine filters rated F5 – F9	Bag filters (lowest cost) or rigid filters (more compact, best for variable volume systems)
Sub-Micron Particles Bacteria, Virus	<ul style="list-style-type: none"> <li>• Microbial contamination</li> </ul>	HEPA filters (High Efficiency Particulate Air)	Duct mount or terminal mount (preferred for air supply to cleanrooms)
Gas or Odour Volatile organic compound Acid gas	<ul style="list-style-type: none"> <li>• Discomfort</li> <li>• Food quality / taste</li> <li>• Corrosion</li> </ul>	Adsorption filters	Activated carbon or activated aluminium or other adsorbent. Wet scrubber