

## AIR FILTRATION

### Introduction:

As a result of indoor air quality issues the public recently acquired a heightened awareness of the importance of clean air.

It is the function of air handling systems to provide clean air to occupied spaces. This is accomplished by providing outside air; and by filtering all the air that is supplied to an occupied space.

### Types of Air Impurities:

Complete air cleaning involves the removal of three major substances: Inert particles, micro-organisms, and gaseous pollutants (including odors). Inert particles include soot, smoke particles, silica, clay, decayed animal and vegetable matter, lint and plant fibers. Microorganisms include pollen, plant spores, molds, bacteria and viruses. Gaseous pollutants include formaldehyde, nitrogen dioxide and carbon monoxide.

### Air Handling Systems and Filter Types:

Filters are installed as part of an air handling system, which generally consists of a combination of filter banks, heating coils, cooling coils and fans. Air is cleaned as it is pushed (or pulled) through the filters by the fan. Several filter types are available:

- 1" or 2" flat fiberglass (Throwaway) filters (10% efficiency)- An inexpensive "pre-filter" usually utilized upstream of a higher efficiency final filter. Will catch large particles only.
- 4" Pleated Pre-filters (30-40% efficiency)- Used to catch large and medium size particles; more effective than the fiberglass filter. A higher quality "pre-filter" upstream of a medium-to-high efficiency final filter. Often adequate alone for standard commercial and industrial spaces without special clean air requirements.
- "Extended Surface" Bag Filters 15" to 36" deep (65% to 95% efficiency)-An excellent final filter which traps dusts, fumes, bacteria, pollens and molds. Useful for environments, such as hospitals and laboratories, which require clean air. These filters have a very large dust holding capacity.

- High Efficiency Particulate Filters ("HEPA") (99.97% to 99.99% efficiency)- Highest quality media type final filter utilized to provide extremely clean air to special spaces (Laboratories and Critical Medical Facilities); or to capture extremely harmful substances (such as toxic biological substances). Capable of capturing viruses and particles down to .01 microns (one hundredth of a millionth of a meter).
- Activated Carbon Filters-Utilized to remove odors, mold, smog and polluting gases (CO, formaldehyde, NO2).
- Electronic Ionization Filters-This filter electrically charges particles into positive "ions", which are attracted to surfaces with opposite polarization. Effective in capturing dust and controlling bacteria, mold, odors, formaldehyde and gas phase contaminants.

### Typical Occupancies and Filtration Types:

The following are various building occupancies in which people work, and typical filtration setups.

Occupancy	20% Fiber	30% Pleat Bag	99.97% HEPA	Carbon	Electronic Ionization	Filter Configuration
Residence	x				x	One or both
Office Bldg		x				
Nursing Home		x		x		30% and Carbon
Hospital		x	x			30% and 95% Bag
Lab-General		x	x			30% and 90% Bag
Lab-Clean Rm		x	x	x		30% and 65% Bag and HEPA Supply Air
Lab-BioToxic		x	x	x		30% and 90% Bag Supply Air; 30% and HEPA Exhaust Air
Morgue		x	x		x	30% and Carbon and 95% Bag

In all cases, Code mandated outside air must be provided, and the particular contaminants present or generated in each space must be evaluated, prior to final selection and arrangement of filtration systems.