



ASHRAE®

ΕΛΛΗΝΙΚΟ ΠΑΡΑΡΤΗΜΑ



PURAFIL

FIRST IN CLEAN AIR™



The Use of ASHRAE Standard 62.1

Achieving your IAQ and Energy Conservation Goals



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FORWARD

- ASHRAE Standard 62-1989, "***Ventilation for Acceptable Indoor Air Quality***" was approved by the ASHRAE Standards Committee on March 1, 1989 and approved by the Board of Directors on June 29, 1989.
- In 1997 the ASHRAE Board of Directors converted Standard 62-1989 to continuous maintenance.



ASHRAE Definition of Acceptable IAQ

“Air in which there are no known contaminants at harmful concentrations as determined by cognizant authorities and with which a substantial majority (80% or more) of the people exposed do not express dissatisfaction.”

INTRODUCTION

- IAQ is a function of many parameters

- **Outdoor air quality**

- Automobile / diesel exhaust
- Various gases, vapors and smoke
- Smog



- **Interior sources**

- Building materials and furnishings
- Surface coatings
- Indoor activities
- Human occupants



INTRODUCTION (2)

- An important challenge today is how to improve and maintain IAQ in buildings while, at the same time, reducing their overall energy consumption.
- One cannot discuss the issue of IAQ without giving some attention to the role that energy conservation measures may play.



INTRODUCTION (3)

- Ventilation standards and mechanical codes have evolved to address both IAQ and energy conservation.
- Air cleaning technologies have developed to provide healthy and comfortable indoor environments.
- There are ever-increasing numbers of applications for both particulate and gas-phase air filtration in HVAC system designs.
- Selecting and specifying the appropriate control strategies requires special consideration.

INTRODUCTION (4)

- **Air cleaning** – for both particulate and gas-phase contaminants - can be **a critical component in achieving acceptable Indoor Air Quality** as well as implementing energy conservation measures with ASHRAE Standard 62.1-2007.



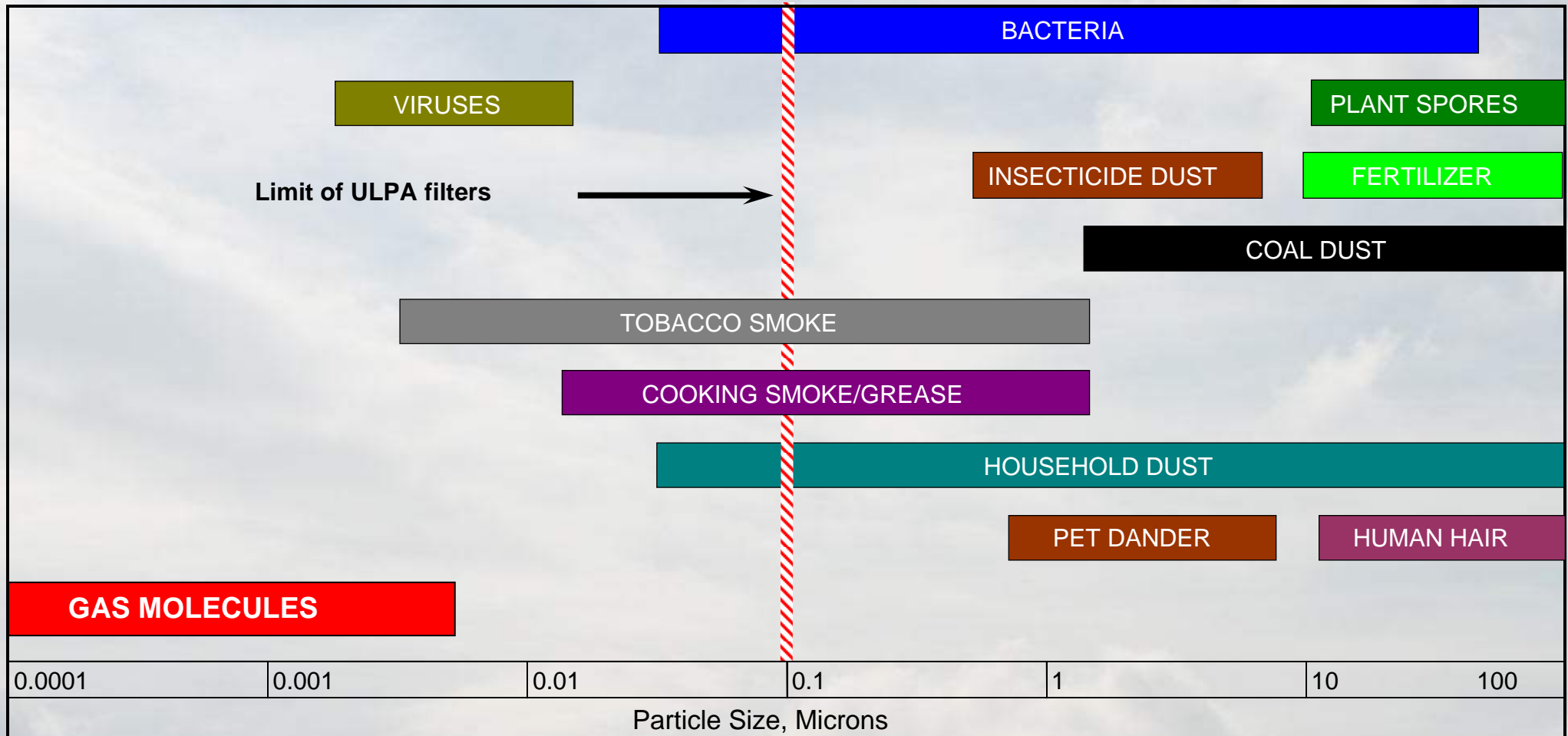
WHAT IS GAS-PHASE CONTAMINATION?

- Solids (Particulates) - 0.003 to 100 microns
 - Dust, Smoke
- Liquids (& vapors) - 1 to 9 microns
 - Vapors, Aerosols
- Gases - 0.0003 to 0.007 microns
 - Hydrogen sulfide (H_2S), Chlorine (Cl_2), Formaldehyde ($HCHO$), Sulfur dioxide (SO_2), Nitrogen dioxide (NO_2)



WHAT IS GAS-PHASE CONTAMINATION? (2)

Particulates vs. Gases – Relative Sizes



CONTROL STRATEGIES

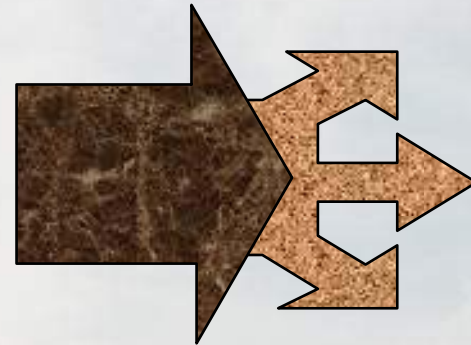
- **Source Control**

- Remove the source(s) of contaminants



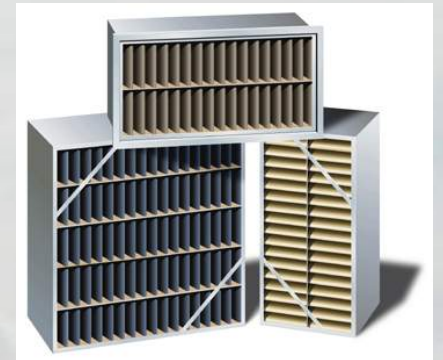
- **Ventilation Control**

- Introduce clean air into the space



- **Removal Control**

- Control contaminants by physical or chemical means



CONTROL STRATEGIES (2)

- Most ventilation/dilution air would come from outside the building.

To achieve an acceptable level of contaminant control economically, often a combined strategy of

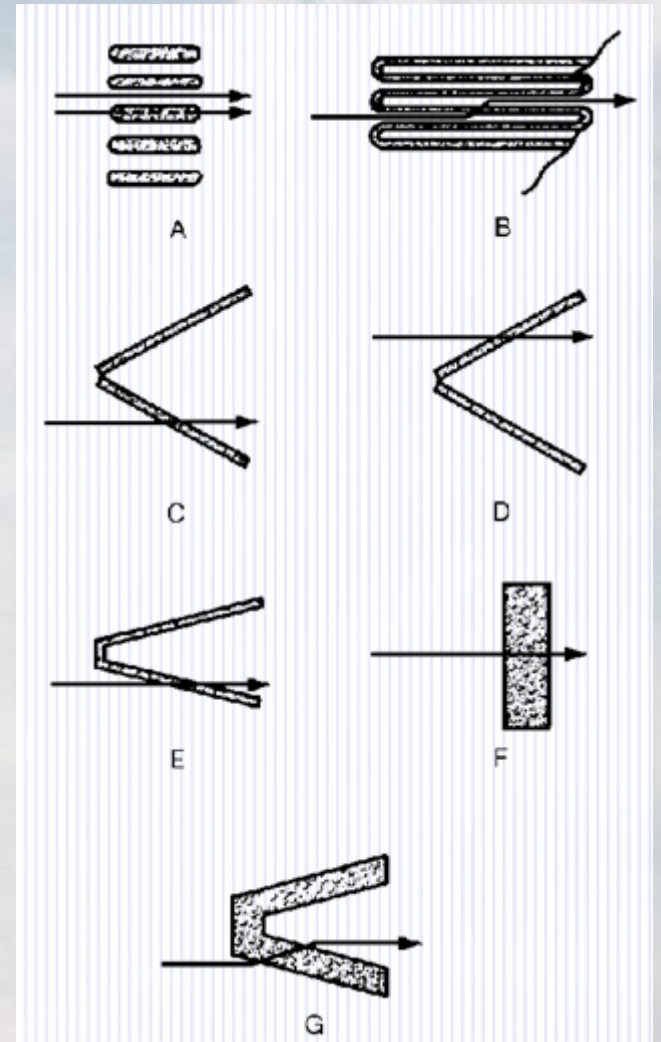
SOURCE,

DILUTION,

***and* REMOVAL CONTROL**

may be required.

AIR FILTRATION SYSTEMS



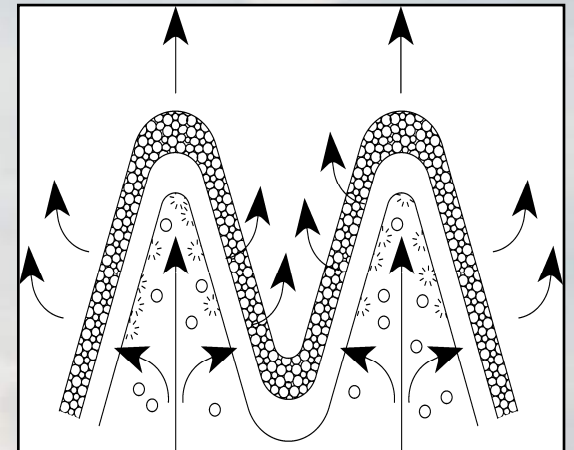
GAS-PHASE AIR FILTRATION USES

- Removal of gases and odors.
- Protection for people, equipment and historical artifacts.
- Provides for energy conservation.

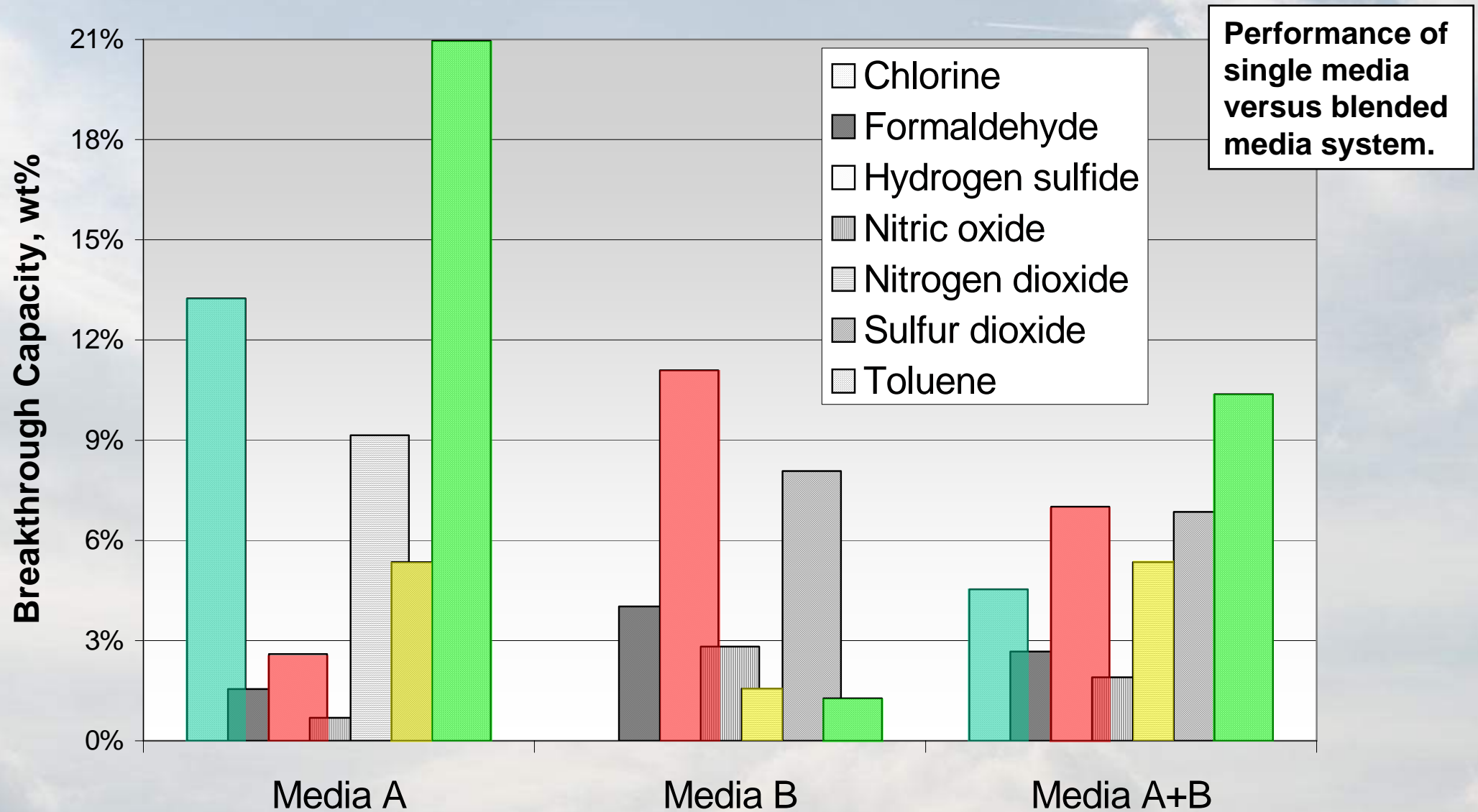


GAS-PHASE AIR FILTRATION MEDIA

- Granular activated carbon (GAC)
- Manufactured media
 - Permanganate-Impregnated Alumina
 - Caustic-Impregnated Activated Carbon + Alumina
 - Acid-Impregnated Activated Carbon
 - Blended Media
- Adsorbent-loaded nonwoven fiber media



GAS-PHASE AIR FILTRATION MEDIA (2)



MEDIA SELECTION CONSIDERATIONS

- Many plain and chemically-active media are commercially available.
- Independent verification of media performance under specific or actual use conditions may be required.
- Scientific/public domain literature.
- Manufacturers' literature.

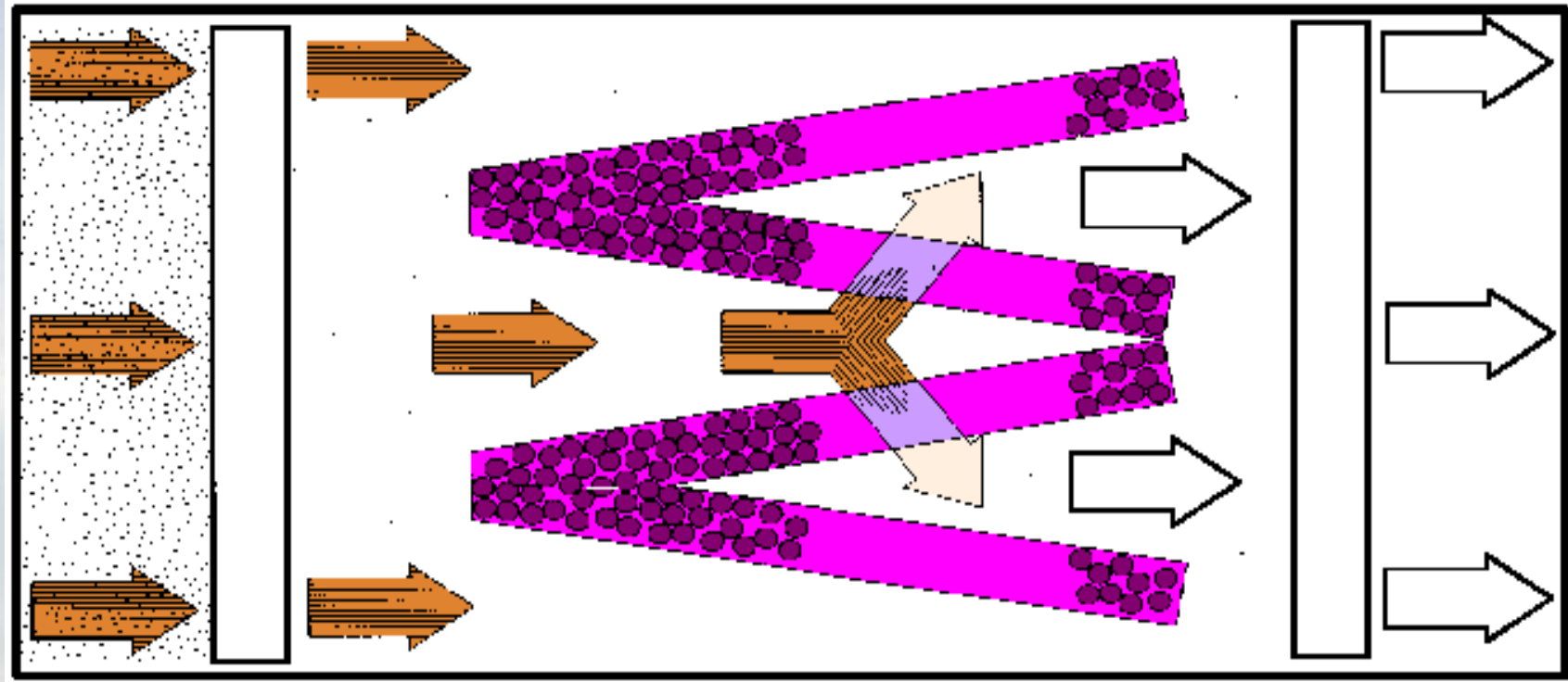


MEDIA SERVICE LIFE

- Often referred to in terms of removal efficiency.
- Media life analyses (MLA).
- Computer models can provide estimate of usage.



GAS-PHASE AIR FILTRATION SYSTEMS



Particulate
Prefilter

Gas-Phase
Filter

Particulate
Final Filter

GAS-PHASE AIR FILTERS

- Media Technology

- Loose Granular
- Extruded
- Adsorbent-Loaded
- Nonwoven Fiber
- Bo
- Slu
- Imp



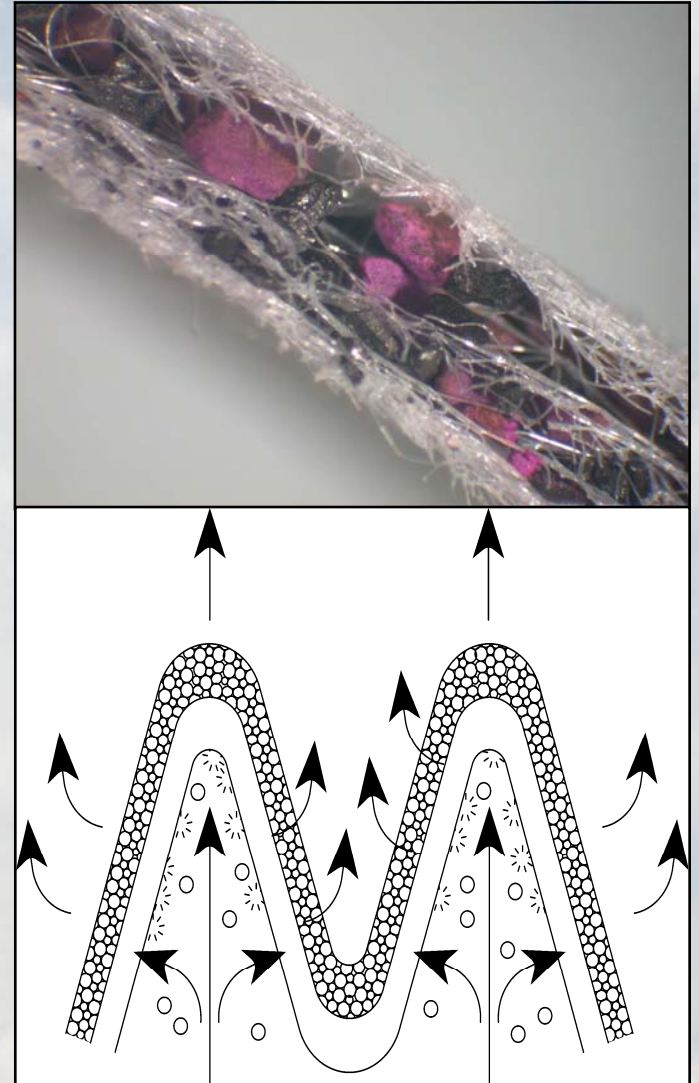
- Filter Types

- Flat Panels
- Pleat Panels
- Deep Pleats
- V-Banks
- Beds & Trays
- Honeycombs
- Pockets



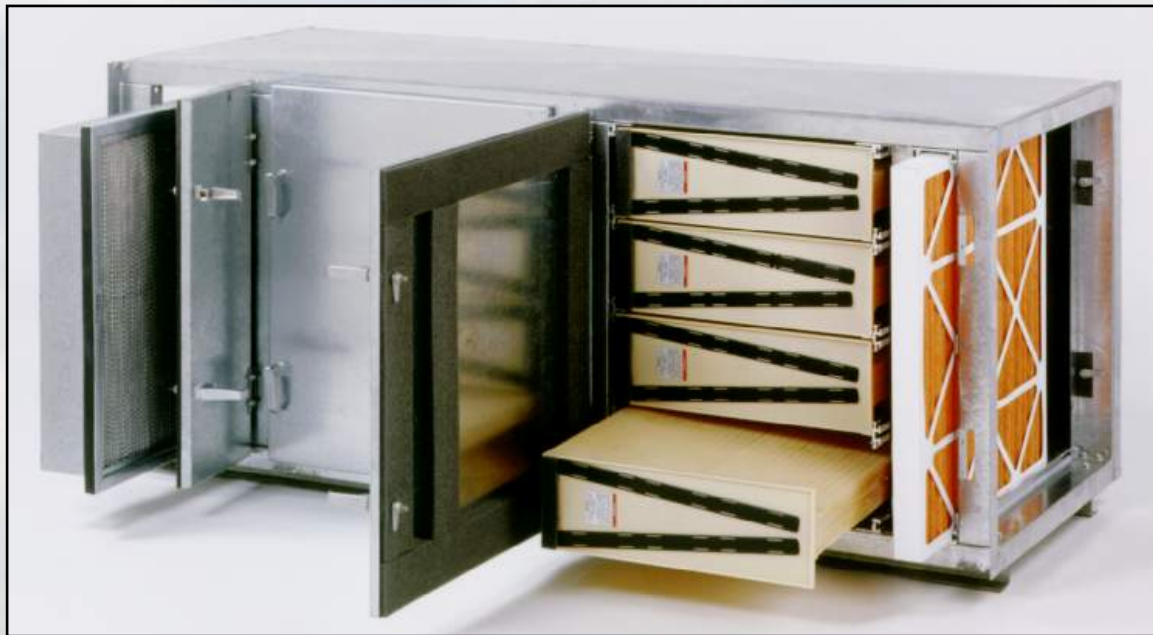
GAS-PHASE AIR FILTERS (2)

- Adsorbent-loaded non-woven fiber media filter.
- True “combination filter” merges particulate and chemical filtration into one product.
- Single-pass chemical removal efficiencies of 95-99+% possible.
- Rated particulate removal efficiencies of MERV 6-15 (30-95%) available.



GAS-PHASE AIR FILTRATION SYSTEMS

- Side-Access Equipment
- Front / Rear Access Cells



GAS-PHASE AIR FILTRATION APPLICATIONS



Examples of Air Handling Units with Air Cleaning



APPLICATIONS - GENERAL

- Gas-phase air filtration systems are used in commercial applications for:
 - *Improving indoor air quality (IAQ)*
 - *Improving worker productivity*
 - *Reducing energy costs*
- Most common type of equipment employs the gas-phase air filtration media in disposable or refillable modules or trays in side or front-access systems or as adsorbent-loaded nonwoven filters.

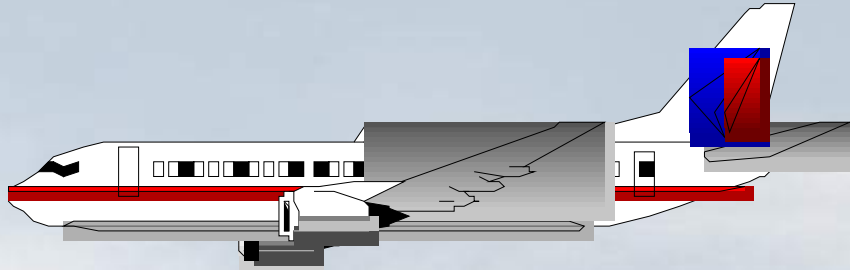
APPLICATIONS - HOSPITALS

- **The Problem** - patient/staff discomfort, disinfectant odors, anesthetic gases, automobile/diesel exhaust, high energy use.
- **Contaminant Gases** - organic chemicals, ammonia, amines, chlorine, formaldehyde, isofluorane.
- **Sources** - patient rooms, operating rooms, laboratories, cleaners/disinfectants, exhaust/recirculation air.



APPLICATIONS - OVERVIEW

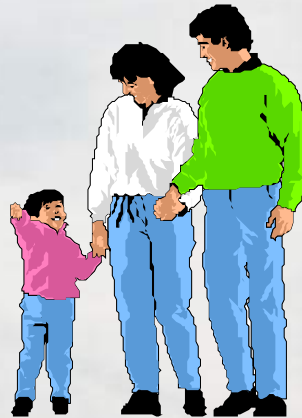
- Airports



- Museums, Archives, Libraries



- Recreation Facilities



- Animal Labs



ASHRAE STANDARD 62



1973

1981

1989

1-2001

1-2004

1-2007

ASHRAE Standard 62.1-2007

Ventilation for Acceptable Indoor Air Quality

- Since 2001, Standard 62.1 has been **written to be code-enforceable containing only mandatory language.**
- **Users Manual**
 - First published in 2005, updated in 2007.
 - Provides information on how to use and apply Standard 62.1 with practical examples of compliance.
- **Developing Advanced IAQ Guideline on ventilation & IAQ.**
 - 65% draft complete, 90% draft ready for review and comment by June 2008.

ASHRAE Standard 62.1-2007 (2)

Ventilation for Acceptable Indoor Air Quality

- IAQ is based upon subjective criteria.
 - ***Comfort not health !!***
- Ventilation Rate Procedure (VRP).
 - ***Minimum acceptable outdoor air quality !!***
 - ***Requires air cleaning for ozone !!***
- IAQ Procedure.
 - ***Allows a balance to be struck between IAQ and energy conservation.***

Example 1 - Movie Theater, New Construction

- An engineer applied the IAQ Procedure in the construction of a movie theater where air cleaning (filtration) and recirculation would be used in an effort to reduce the outdoor air below the 20 cfm per person prescribed by the VRP.
- A reduction in the amount of outside air also meant that less air would have to be tempered by the HVAC system.

Operational savings of \$15,000/year.

Example 2 - Office Building Renovation

- An office building built in the mid-1970s was being renovated for a new owner.
- The IAQ Procedure was recommended and a cost/benefit analysis was performed.

Item	Amount
Cost Avoided:	US \$300,000
Energy Savings (\$/yr):	US \$10,400
Media Replacement (\$/yr):	+ (US \$21,000)
Annual Operation:	<u>+ (US \$11,000)</u>
Time to Equalization:	28 years

Example 3 - Lecture Hall, New Construction

- Design considerations...
- For all of the contaminants of concern, 5 cfm per person provided space concentrations less than the target concentrations and therefore complied with the requirements of the IAQ Procedure.
- **Summary of savings for reduction of conditioned outside air.**

Capital Equipment Savings: \$8,643.00
Operational Savings: \$1,136.00 / year

SUMMARY AND CONCLUSIONS

- The Indoor Air Quality Procedure may be used as an alternative to the Ventilation Rate Procedure.
- The IAQ Procedure provides a direct solution for reducing and controlling contaminants.
- The IAQ Procedure is often neglected as a method for complying with the ventilation requirements of the standard.

SUMMARY AND CONCLUSIONS (2)

- Whereas the VRRP on assuring acceptable indoor air quality, the IAQ Procedure provides a way to reduce HVAC system operating costs while still providing a healthy environment.
- The IAQ Procedure can allow for a more cost-effective solution to providing good air quality since all design strategies may be considered and compared.
- In times when energy conservation is at the forefront of many peoples' minds, the IAQ Procedure should be considered as a proven option to achieve these goals.

SUMMARY AND CONCLUSIONS (3)



Applying the IAQ Procedure shows that using as little as 5 cfm/person of outdoor air can reduce the total space contaminant concentration to levels low enough to be below published guidelines, provide **BETTER** indoor air quality, and meet the requirements of ASHRAE Standard 62-2001-2007.





Questions

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