Webinar - Best Practices in Molecular Filtration for HVAC Applications

Sept 11, 2024 @ 3 PM ET

SPEAKER

Paula Levasseur, CAFS

LMF Services LLC

NAFA®
National Air Filtration Association


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Association
43rd
National Air Filtration Association
Annual Convention
October 1-3, 2024 Maui, Hawaii
REGISTER NOW
NAFAHQ.ORG

Technical Seminar

Tempe, AZ - Omni at ASU

April 2-3, 2025

NAFA's Guidelines are unlike other organizations' standards.

NAFA Air Filtration Best Practice Guidelines

NAFA - The global source for expertise, education & best practices in air filtration

- Airborne Infections-Healthcare
- Commercial Office Spaces*
- Continuing Care Retirement Communities*
- Higher Education Complexes*
- Indoor Cannabis Growing*
- Indoor Firing Ranges*
- Libraries Archives and Museums*
- Molecular Filtration
- Residential HVAC *
- Schools (K-12)*
- Spray Finishing Particulate
- Technicians on Site*
- Welding Fume Air Filtrations
- All NAFA Guidelines

*Guidelines currently available in Spanish... with more to come.

#CLEANAIRMATTERS

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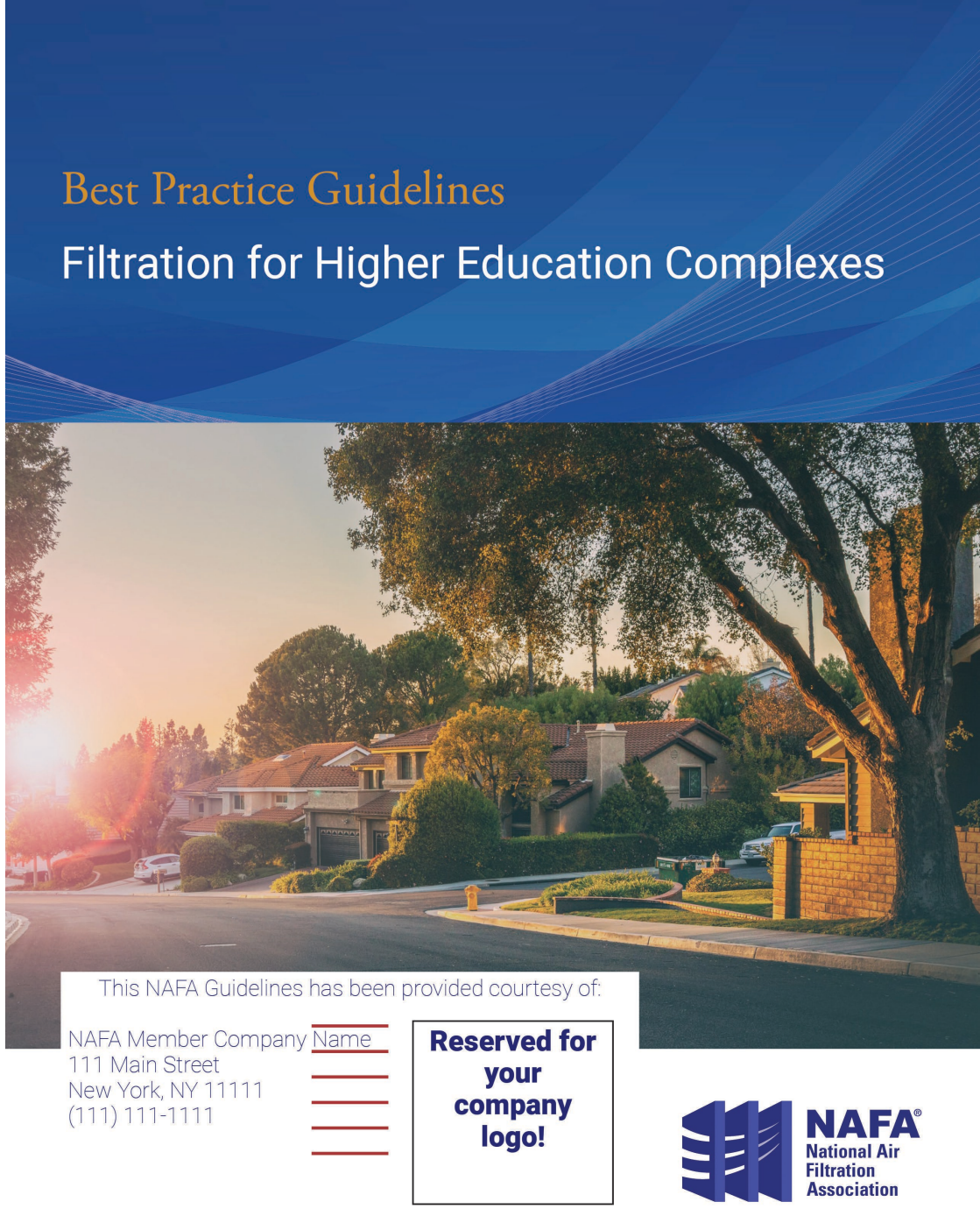
Build Trust with Member Branded Guidelines

Email nafa@nafahq.org for details



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AGENDA

- REMOVAL METHODS
- DESIGN PARAMETERS
- APPLICATIONS
- QUESTIONS

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REMOVAL METHODS

- Adsorption - The process by which one substance is held onto the surface of another.
  - Generally associated with activated carbon
- High temperatures may cause desorption High Humidity can have an adverse effect
- Molecular Weights > 50 and boiling points > 120 F

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Activated Carbon

M W >50 and boiling points >120 F

- Toluene
- Methyl ethyl ketone
- Cylclohexane
- Methylene chloride

Coconut shell carbon

- Methyl methacrylate (nail salon)
- Nerve gases and mustard gases
- Depending upon the compound and its concentration in the air stream it can adsorb up to 33% of it’s own weight

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REMOVAL METHODS

- Chemisorption - The result of chemical reactions on and in the surface of the adsorbent.
  - Irreversible & essentially instantaneous
  - Higher temperatures may increase the reaction rate in chemisorption
  - Humidity is favorable toward the reaction
  - Generally associated with permanganate impregnated media and chemically treated carbons.

Permanaganate Media

- Broad based oxidizer
  - Sulfur dioxide
  - Formaldehyde
  - Hydrogen sulfide
  - Nitric oxide
- Cannot be regenerated

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Impregnated Carbons

Base Impregnated Carbons

Sulfur dioxide
Hydrogen sulfide
Acetic acid
Chlorine - high levels

Acid Impregnated Carbons

Ammonia
Amines

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Specialty Carbons

Sulfur

Mercury removal

TEDA - KI (nuclear grade carbon)

Radioactive iodides

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Design Parameters

- Contaminant(s)
  - Aids in media selection
- Air Volume – Velocity
  - Aids in Filter selection
- Temperature and Humidity

Pressure drop
Removal efficiency required (requested)
Removal capacity required (requested)
Cost
Ease of maintenance

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DESIGN PARAMETERS

Contaminants and concentrations are often unknowns.

Check application guides. Most offer insights in the contaminants present.

Air volume/velocity

These are knowns and are required to determine how many filters are needed and the type of filter to achieve effective filtration.

Temperature and Humidity.

Some media is not effective at high temp and can be adversely affected by humidity.

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Design Notes

- Most systems are designed to provide a 0.07 second residence time. (not applicable in impregnated technologies)
- Pressure drop of bulk media bed does not increase. Pressure drop of combination filters (particulate/molecular) will increase.
- System efficiency decreases with time

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Applications

- Corrosion Control
- Preservation
- Air Quality

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Corrosion Control

Protection of electronic /computer equipment

Pulp & paper mills

Refineries

<u>Contaminants</u>

Hydrogen sulfide

Oxides of sulfur

Oxides of nitrogen

Ammonia

Ozone

Chlorine

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Preservation

Museums

Archives

Libraries

<u>Contaminants</u>

Nitrogen dioxide

Ozone

Sulfur dioxide

Formaldehyde

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Air Quality

Indoor sources

- Building materials
- Office equipment
- Furnishings
  - Carpets
  - Draperies
- Occupants
- Restaurants

Contaminants

- Formaldehyde
- Toluene
- Ozone
- Ammonia
- Other volatile organic compounds
- Nitrogen dioxide

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Air Quality

Outdoor sources

- Vehicular exhaust
- Manufacturing facilities
- Refineries
- Agriculture
- Chemical plants

Contaminants

- Nitrogen dioxide
- Ozone
- Sulfur dioxide
- Chlorine
- Volatile organic compounds (VOC'S)

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Conclusions

Review potential contaminants

- Critical nature
  - Nerve agents vs. Diesel odors

Determine possible media selections

Select filter type

- Efficiency vs. breakthrough
  - End user choice
  - Cost considerations

Keep future maintenance and change

Some information is necessary to insure you get the performance desired.

Molecular filtration is a proven technology to enhance air quality provided the design parameters are followed.

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CONCLUSIONS

Read the NAFA Best Practice Guidelines they were designed to help you make informed decisions.

Both the Molecular Filtration Guideline and the Library Museums and Archives Guideline are great references to download following this webinar.

Download information to follow.

https://www.nafahq.org/best-practice-guidelines/

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