Best Practice Guidelines

Filtration for the Residential HVAC Industry

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Why NAFA Guidelines?

The National Air Filtration Association (NAFA) provides "Best Practice Guidelines" to help supplement existing information on air quality management through proper filtration. While many organizations recommend "minimum" air cleaning levels, NAFA publishes best practices based on the expertise of its membership, combined with research from governmental, medical, and scientific communities. This guideline offers recommendations for achieving optimal air quality while considering the energy and environmental impact of data center HVAC systems.

For a complete explanation of principles and techniques found in this guideline, visit www.nafahq.org to purchase the NAFA Guide to Air Filtration.

Technicians and/or Contractors Servicing the Residential HVAC Industry, *v2, 2026*

NAFA guidelines provide advice on achieving the cleanest air possible based on the design limits of existing HVAC equipment and with consideration of the impact on energy and the environment. Our guidelines are created and updated to collect and supplement existing information. However, we go beyond the "bare minimum," publishing best practices based on the experience and expertise of our membership, as well as current mandates and research provided by governmental and scientific communities.

For a more complete explanation of principles and techniques found in this guideline, visit www.nafahq.org to purchase the *NAFA Guide to Air Filtration*. If you have any questions or comments about this publication, please contact NAFA Headquarters.

A special thank you to the following member contributors:

Lead Author:
Kevin Delahunt, CAFS
BGE Indoor Air Quality Solutions

Contributors:

Benny Aycoth, CAFS, NCT
Tex-Air filters

Kevin James Barry, CAFS
Second Nature Brands, Inc.

Michael Beier, CAFS
CFM Global LLC

Randy Brannen, CAFS, NCT II
Kleen-Air Filters

Bob Buckley, CAFS
Aero Filter, Inc.

Michael Corbat, CAFS
Rensa Filtration

Tom Justice, CAFS, NCT
Zene

Paula Levasseur, CAFS
LMF Services LLC

Roberta MacGillivray, CAFS, NCT BGE
Indoor Air Quality Solutions

Patrick Rosenthal, CAFS, NCT II
Tex-Air filters

About Us

Our Mission:
The National Air Filtration Association (NAFA) mission is to be the global source for expertise, education & best practices in air filtration.

What can NAFA membership do for you?
NAFA brings together air filter and component manufacturers, sales and service companies, and HVAC and indoor air quality companies. By becoming a member, you can:

- Meet with industry thought leaders
- Strengthen your network
- Share best practices
- Receive up to date industry information
- Access professional development, certification and education

Be a part of something bigger
As a NAFA member, you are a part of a support system that shares the common goals of supporting industry growth and creating healthier communities. Following the coronavirus pandemic, we are more aware than ever of the important role that our members play in a well society. We know that our work is important to maintaining healthy, happy communities.

Benefits of Membership

As a member of NAFA, you'll have access to a host of benefits that offer networking, learning, and advertising opportunities. Here are just a few of our most popular benefits:

- Annual conferences and webinars
- Professional development programs (CAFS and NCT Level I & II certification)
- Air Media magazine
- Best practices guidelines
- Clean Air Award recognition program
- Library of resources, manuals, seminars, and training.
- NAFA advertising and sponsorship programs
- Exposure through NAFA social media and a listing on the NAFA website
- NAFA volunteer and leadership opportunities

...and more!

Click here to become a member today!

CAFS & NCT Certifications

Educate your team
Attract new customers
Be known as a leader in your industry

Now more than ever, customers seek professionals with the credentials for quality assurance and knowledge to ensure that their complex needs will be met. Addressing this concern, NAFA offers two certification programs to increase the level of education and professionalism in the industry.

The NAFA Certified Air Filter Specialist (CAFS) program
CAFS is the first education and certification program offering an extensive examination on the principles, methods and applications of air filtration. It differentiates professionals who have demonstrated a high level of professionalism and a thorough, up-to-date understanding of air filtration technology. The CAFS exam is pass/fail, and is based on the NAFA Guide to Air Filtration.

NAFA Certified Technician (NCT) Program
This open-book exam is based on the NAFA Installation, Operation, and Maintenance of Air Filtration Systems manual. This program was designed to increase the knowledge of technicians, facility managers, and building owners.

Both certifications are renewable on an annual basis pending successful completion of continued education requirements. While the exams are open to members and nonmembers alike, test fees are dramatically reduced for members. To find out more about the cost, study aids, test dates/locations, and requirements, visit the weblinks below.

CAFS information page

NCT information page

Minimum MERV Requirements

In reference to the NAFA Best Practice Guidelines, MERV recommendations refer to the baseline filtration efficiency levels that HVAC air filters should meet to achieve effective indoor air quality and protect building occupants, equipment, and systems. MERV (Minimum Efficiency Reporting Value) is a standardized rating determined by ANSI/ASHRAE Standard 52.2 that quantifies a filter's ability to capture airborne particles of varying sizes.

The recommendations set forth by the NAFA Best Practice Guidelines are produced by intense research into industry-wide best practices from accredited organizations such as (but not limited to) ASHRAE, ANSI, EPA, ISO, and Industry Experts. The Guidelines Committee research, compiles, and analyzes this data, along with their own Industry Experiences to produce a comprehensive document.

NAFA's objective is to go beyond minimum standards set by other organizations. For example, In many commercial and institutional settings, NAFA's best practice recommendations typically call for a MERV 13 air filter to effectively remove fine particulate matter (PM2.5) that can impact occupant health and harm sensitive equipment performance. Lower MERV rated filters (e.g., MERV 8) may be acceptable for pre-filtration stages, or less demanding environments, but NAFA's best practices strive to elevate performance above these basic minimums.

By specifying appropriate MERV requirements tailored to system design and environmental conditions, NAFA guidelines help industry professionals make informed decisions that improve indoor air quality, increase occupant wellbeing, and support HVAC system operation and longevity.

MERV Statement: Version 1, May 2026

Purpose, Scope and Background

1 PURPOSE

This best practice guideline establishes air filtration for the removal of particulate and gaseous contaminants for the protection of the Heating, Ventilating, and Air Conditioning (HVAC) equipment and components, as well as providing comfort and a healthy environment for the occupants and visitors of a residential property. The recommendations in this guideline are considered by the National Air Filtration Association (NAFA) to be "best practice" in contrast to "minimum standards " as put forth by other organizations. It will help guide qualified HVAC service technicians, manufacturers, contractors, and end users with the necessary information to make an informed decision when procuring, installing, and maintaining filtration products for the residential market.

2 SCOPE

This best practice guideline will address filtration products, installation, and maintenance practices for the various air handling systems that are used in the majority of residential properties. It will take into consideration health, comfort, equipment protection and tenant retention as factors involved in the filtration decisions.

For the purpose of this guideline, we will concentrate on single, multi-family, and low-rise multi-family residences. High rise apartments and condominiums are not specifically addressed in this guideline as the HVAC equipment in these buildings tend to be commercial in design and would follow closely the recommendations in NAFA's Guideline for Commercial Office Spaces.

3 BACKGROUND:

The quality of air in a residential building has a significant impact on human health and comfort. Poor indoor air quality (IAQ), as referenced in ASHRAE Std. 62.1-2025: "Ventilation for Acceptable Indoor Air Quality," can lead to discomfort, ill health, and building related illness, making IAQ an important environmental health issue. The number of complaints related to IAQ has increased with the trend towards tighter sealed buildings, energy conservation, the growing use of synthetic materials, the increase in office and home equipment (photocopiers, laser printers, and computers), cleaning products, outdoor air pollution, and not the least, the increased awareness of the public to the symptoms and effects of poor IAQ. Contaminants that present specific problems in residential properties include: plant and animal allergens, gasses and odors, bio aerosols (viruses, bacteria, fungal spores), and particulate, specifically 2.5 micrometers in size (PM2.5). Exposure to a high concentration of fine particles in the PM2.5 range can cause short term health effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose and shortness of breath. Research has shown that long term exposure to PM2.5 has been associated with increased rates of chronic bronchitis, asthma, heart disease, reduced lung function and increased mortality. People with breathing and heart problems, children, and the elderly are particularly at risk.

BACKGROUND (CONTINUED):

PM2.5 can be attributed to outdoor sources, specifically the burning of fossil fuels, as well as from indoor activities, such as, smoking, cooking, burning candles, and functioning fireplaces.

Filtration is often expressed as a key component for a healthy indoor environment; however, the only mandatory reference to filtration performance is in ANSI/ ASHRAE Standard 62.2-2025 "Ventilation for Acceptable Indoor Air Quality in Residential Buildings:" "Mechanical systems that supply air to the dwelling unit through ductwork exceeding 10 feet (3m) in length and through a thermal conditioning component, except evaporative coolers, shall be provided with a filter having a designated Minimum Efficiency Reporting Value (MERV) 11 or better when tested in accordance with ANSI/ASHRAE Standard 52.2 Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size, or a minimum particle size efficiency of 53% in the 1-3 micron range in accordance with AHRI Standard 680, Performance rating of Residential Air Filter Equipment."

4 THE CHALLENGE

The minimum filtration level of MERV 11, as referenced in ASHRAE Standard 62.2, provides a 65% removal rate of the PM2.5 size particle, which is a key component of the air quality in an occupied space. Another way to look at this is that 35% of the PM2.5 particles will exit the MERV 11 filter. NAFA's recommendation of MERV 13 has an 85% removal rate of the PM2.5 particle with a penetration of 15%, providing a particulate load reduction entering the occupied space by more than half. To improve IAQ in residential properties, and to meet NAFA's minimum filtration recommendations, as detailed in this guideline, requires more than replacing the current filter with a higher MERV product. The goal needs to be system performance which will require a synergy of all the HVAC components. In addition to a quality filtration product, the ideal residential system should have a dedicated outside air source supplied directly to the air handler system, filter hardware that will eliminate the chance of air bypassing the filter system, sufficient filter system area and depth to accommodate newer filter technology, fans capable of overcoming the increase in resistance to higher efficient filters, and control features that allow the home occupant the ability to realistically evaluate the condition and service life of the filter based upon pressure differential and the quality of the air supplied to the occupied space. These technologies and concepts are currently available in commercial systems and could quite easily be made available to the residential market. The public demand for improved IAQ in residential properties is there and needs to be embraced by all facets of the HVAC industry.

NAFA Best Practice Recommendations

The residential property of today is often more than just a space for living and more complex than properties of the past. People are spending more time indoors, as well as more time working from the home. Specialized mechanical equipment is required for servicing these situations and the unique activities associated with them. The following mechanical equipment are the most common types found in residential properties.

SYSTEM APPROACH

1 FURNACES

Forced air furnaces are permanently installed appliances that provide heated air through ductwork to interior spaces. The most common heat sources are natural gas, electricity, and heating fuel. A forced air furnace is equipped with a blower/ fan that draws air into the heat exchanger through a filter and then distributes heated air through the ductwork to the interior spaces. Additional equipment can be added that enables a forced air furnace to humidify, dehumidify and cool the air. NAFA recommends a MERV 13 or better filter* for residential furnaces. A MERV 13 filtration system will provide an improved removal efficacy of the targeted PM2.5 particulate than less efficient traditional products.

2 UNITARY AIR CONDITIONERS (UAC)

In forced air systems the same ductwork can be used for both heating and cooling. Split system central cooling is the most widely used forced air system. Condensing units are installed on a non-combustible pad outside the dwelling. UAC units are factory-made systems that normally include heat/cool coils, fan, motor, humidification, filtration, and ventilation components. NAFA recommends a MERV 13 or better filter* for residential UAC systems. A MERV 13 filtration system will provide an improved removal efficacy of the targeted PM2.5 particulate than less efficient traditional products.

3 FAN COIL UNITS:

Fan coil units are small unitary systems that provide a combination of heating or cooling to condition a space. The units can sometimes be supplied with outdoor air dampers for ventilation. In a residential space, fan coils are often used to supply conditioned air to the entire property. NAFA recommends a MERV 13 or better filter* for residential fan coil systems. A MERV 13 filtration system will provide an improved removal efficacy of the targeted PM2.5 particulate than traditional products.

4 HEAT PUMPS

Heat pumps for residential applications are normally centrally ducted unitary or split systems. Heat is taken from one source and transferred to another. Heat pumps are capable of heating in the cooler months and cooling in the warmer months. NAFA recommends a MERV 13 or better filter* for residential heat pump systems. A MERV 13 filtration system will provide an improved removal efficacy of the targeted PM2.5 particulate than traditional products.

** Increasing filter performance can possibly have an adverse effect on system operation as well as increasing energy consumption. Refer to the section "Monitoring of Airflow and Pressure Drop" for additional information and/or consult with a qualified NAFA Certified Air Filter Specialist (CAFS) or HVAC technician.*

5

ROOM AIR CONDITIONERS / MINI - SPLIT SYSTEM / DUCTLESS SPLIT SYSTEM

These units are often used for single room cooling applications and do not normally have a filter as a component of the system. If a filter is included it is generally a permanent washable filter. Follow the manufacturer's recommended guidelines for filtration and maintenance.

Other forms of heating residential spaces such as radiant heat, hydronic (hot water baseboard), and steam radiant can provide comfortable and controlled heating spaces but do not allow for the introduction of outside air for ventilation, nor are they capable of filtering, humidifying, dehumidifying or cooling the air

ADDITIONAL AIR CLEANING DEVICE OPTIONS

To improve air quality in residential spaces consider any of the following air cleaning technologies which can be deployed as stand-alone units.

Ultraviolet Germicidal Irradiation (UVGI) is an air purification system that is gaining popularity in the residential market. Successfully used for years in the commercial and health care industry, UV-C light effectively reduces the transmission of airborne germs, bacteria, mold, viruses, and fungi by disrupting the micro- organism's ability to replicate. UVGI is effective as surface kill on a coil or airborne via an in-duct system. UV lamps are usually installed in the return duct or downstream of coils in the supply duct. For best results, use in combination with a particulate filter.

Gas Phase filtration addresses the need for removal of airborne molecular contaminants (odor/chemicals). This requires a different approach than particulate filtration in that gas phase filters are designed for the removal or elimination of molecular contaminants. Gas phase filters for residential applications might look similar to particulate filters but are quite different in design, specifically the treatment or type of media used in the filter. An example of a gas phase product is a carbon-impregnated filter. Ideally, a gas phase system would still require a particulate filter for protection. A combination particulate and gas phase single filter or dual stage filter system would be necessary. Most residential HVAC systems can only accommodate low pressure drop filters which limits the selection for effective gas phase filters. It is best to contact a NAFA CAFS to help with the selection of the gas phase filtration system.

Room Air Cleaners are self-contained filtration packages incorporating a single, or multi-stage filter system along with a blower/fan to draw in dirty air and disperse filtered air back into the space. Effectiveness of these units relies on the capacity in cubic feet per minute (CFM) of the fan/blower, the quality of the filtration media, and the integrity of the filter holding device. There are a myriad of products on the market making, in many cases, unsubstantiated performance claims. A buyer beware attitude needs to be taken by the consumer.

Electronic Air Cleaners/Electrostatic Precipitators (EAC) are packaged filter systems attached to the furnace duct work. In the first stage, or ionizing section, particles in the airstream are given an electrostatic charge. In the second stage the charged particles are removed from the airstream by oppositely charged collector plates. Electronic air cleaners can be very effective on fine particulate but are prone to the creation of ozone. "Ozone is harmful for health and exposure to ozone creates risk for a variety of symptoms and diseases associated with the respiratory tract" (Koran et al. 1989; Touloumi et al. 1997; Bell et al. 2004). EAC units require diligent maintenance of the ionizing wires and collector plates to maintain performance. EAC units cannot be tested by ANSI/ASHRAE Standard.52.2-2025 and therefore, do not have MERV data associated with performance. For these reasons, NAFA does not recommend the use of EAC units in residential applications.

Installation, Operation & Maintenance

"Evolving complexity and increasing operating costs demand that equipment and systems providing thermal comfort and beneficial IAQ be properly maintained to achieve energy efficiency and building owner's reliability requirements." - ASHRAE 2019 handbook – HVAC Applications

Installation of Filters and System Integrity

Filtration in the majority of residential applications has not received a level of importance equal to the benefits associated with proper use. As filters increase in efficiency, the importance of the fit of the filter cannot be understated. The recommended MERV 13 filter in this document will not provide MERV 13 system performance if the tracking or holding apparatus does not securely seal the filter in place effectively preventing unfiltered air to bypass the filter. Maintaining the integrity of the filter system is vital for the efficacy of the HVAC system and imperative for air filtration performance, because unfiltered air by-pass is a key contributor to poor IAQ. After each filter installation, the system, including filter frames, fastening devices, caulking, and gaskets must be checked to ensure that there are no possible leaks or gaps in and around the filters. Any repairs must be made at this time. A positively-sealed filtration system will prevent unfiltered air bypass and maintain system integrity.

When changing or modifying the model or design of a filter system, consult the manufacturer's specifications of the air handling system. Consideration must be given for size, fit, media area, airflow rate, and initial and final pressure drop of the new filter system. NAFA further recommends consulting with a mechanical engineer, or HVAC technician, prior to making any modifications to your HVAC system.

Maintenance

Good operating procedure should include a monthly inspection of filters, filter frames, fastening devices, caulking, gaskets and ductwork. Removing and replacing damaged or defective filters, gasket, and duct insulation will keep unfiltered air from bypassing the filter system. As a rule of thumb, filters should be changed based on manufacturers' recommendations, or minimally twice annually, at the beginning of the heating and cooling cycles. Filters often need to be changed more frequently due to outdoor air conditions and/or particulate loads generated in the occupied space. Operating the fan on a continuous basis can also increase the change frequency. Keeping the coils and blower free from dirt and debris by filtration will improve airflow, increase system efficiency, reduce electrical consumption, and maintain overall system integrity. In summary, good maintenance will keep the HVAC system in proper working order and will provide the building with air that is not only conditioned, but also cleaned with a reduction in contaminant levels.

As a supplement to manufacturers' guidelines, see NAFA's Installation, Operation and Maintenance of Air Filtration Systems Manual.

Installation, Operation & Maintenance

(Continued)

Monitoring Air Flow and Pressure Drop

Particulate filters in an HVAC system increase the resistance to the flow of air, gradually reducing the volume of air supplied to the occupied space. This increase in resistance is referred to as "pressure drop" or "differential pressure." A newly installed filter will have an initial pressure drop specific to that product.

As the filter loads with dirt, the pressure drop increases resulting in a reduction in supply airflow. This pressure drop can be measured with a pressure sensing device such as a Magnehelic® gauge or a digital electronic pressure drop indicator.

Measuring the change in pressure drop can help monitor airflow and provide an indicator of filter life and suggested replacement (often recommended as twice initial pressure drop). When a filter reaches its recommended pressure drop reading it should be replaced. Leaving a filter in place after this point can reduce air volume, increase operational and energy costs, and could damage the HVAC system.

Most gas phase filters do not increase in pressure drop over their service cycle if they are installed downstream and protected by a particulate filter. Some particulate media when impregnated with sorbent will increase in pressure drop, however, it is not indicative of service life of the sorbent. Service life of a molecular filter is a function of types and concentration of contaminants, and filter design. It is important to note that as the media life decreases so does the efficiency of the molecular filter. Molecular filters are often recommended for change-out before sorbent is 100% spent and NAFA would recommend replacement on at least an annual basis.

Disposal

Both particulate and molecular filters should be disposed of in a careful and safe manner in accordance with all local, state and federal regulations. NAFA recommends that technicians performing the work be certified to NAFA Certified Technicians (NCT) standards.

Summary

This guideline identifies what NAFA considers as the "best practice" recommendation for filtration in residential properties. It looks at a system specific approach to improve indoor air quality and equipment protection in single, multi- family, and low-rise multi-family residential buildings. It raises awareness of the filter as one element in the HVAC system by emphasizing the importance of the filter hardware, proper installation, and good maintenance practices. It also issues a challenge to the HVAC industry to provide the best and latest technology in filtration and IAQ solutions.

Installation, Operation & Maintenance

(Continued)

Clean Air by Design

Extraordinary events such as wildfire smoke and the Covid 19 pandemic have created a heightened awareness for cleaner air and better filtration in the built environment. People expect to feel safe and healthy in the buildings where they live, learn, work, and play. Today the industry is challenged to meet new guidelines and standards for healthier buildings that were never designed physically, nor mechanically, to meet these recommendations.

At NAFA we understand the challenge and suggest the following recommendations:

- Over designing HVAC filter banks to accommodate more filters at higher efficiencies without increasing energy demand.
- Adding extended spaces within the mechanical systems for deploying additional banks of filters during extraordinary events such as wildfire smoke, or ASHRAE's Risk Management Mode.

We acknowledge that these recommendations are not always feasible with existing mechanical systems but know that they can be accomplished when designing new HVAC systems and replacing/retrofitting older ones. We have learned from past extraordinary events that we need to plan for them to properly keep people healthy, safe, and productive and the best time to do this is at the design phase.

You care about the environment and your community.

You care about the financial success of your business.

You care about the improved health, wellness and satisfaction of your customers.

Indoor air quality matters.

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GLOSSARY

AHRI: Air-conditioning, Heating, and Refrigeration Institute.

Air Filter/Air Cleaning: A device used for the removal of particulate or gaseous impurities from the air. AHU: Air handling unit. Describes the unit or units supplying a building with conditioned air. It can be described as the lungs of a building.

ANSI: American National Standards Institute. ANSI is the voice of the U.S. standards and conformity assessment system, ANSI empowers its members and constituents to strengthen the U.S. marketplace position in the global economy while helping to assure the safety and health of consumers and the protection of the environment.

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers. An international organization that sets standards and guidelines for the heating, ventilating, air conditioning, and refrigeration industry.

ACH: Air changes per hour computed by taking the cubic area of a space and dividing by the volume of air per hour supplied to it.

CAFS: C*ertified Air Filter Specialist. Is an accreditation granted by NAFA to those who pass an exam on air filtration.

CFM: Cubic feet per minute describes volume of air.

FPM: Feet per minute describes velocity of air. FPM is always positive and always measured in one direction.

HEPA: High Efficiency Particulate Air filter. HEPA describes a filter that achieves a minimum of 99.97% efficiency on 0.3 micrometer particles or similar challenge.

HVAC&R: Heating, Ventilating, Air Conditioning and Refrigeration**.**

Makeup Air: Air supplied to a space for the purpose of replacing exhausted air from a space.

MERV: Minimum Efficiency Reporting Value; Refers to the lowest efficiency of a filter when tested in accordance with ANSI/ASHRAE Standard 52.2 2025.

NAFA®: Registered acronym for the National Air Filtration Association, the trade association for air filter manufacturers and distributors, worldwide.

OSHA: Occupational Safety and Health Administration. OSHA is the group that is charged with enforcement of health and safety legislation.

Sorbent: A substance that has the property of collecting molecules of another substance by sorption.

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Disclaimer

The information contained in this guideline is intended for reference purposes only. NAFA has used its best efforts to assure the accuracy of information and industry practices. NAFA encourages the user to work with a NAFA Certified Air Filter Specialist (CAFS), to ensure that these guidelines address user specific equipment and facility needs. Issues regarding health information, including COVID- 19, may be superseded by new developments in the field of industrial hygiene or by new information revealed by experts in science/ medicine. Users are therefore advised to regard these recommendations as general guidelines and to determine whether new information is available.

Send questions to: nafa@nafahq.org