



» While filter maintenance continues to be a significant issue, paying attention to small details during installation is also critical to ensuring filter efficiency.

# FILTERING DOWN TO THE NITTY-GRITTY

Attention to small but important details in HVAC air filter installation can make big performance differences to IAQ, energy conservation, and labor/disposal costs.

BY STEPHEN W. NICHOLAS, CAFS, NCT II

More than ever before, people today are aware of the quality of the air they breathe. With the latest air filter testing standard revisions, HVAC professionals can now select air filtration products for specific application requirements. These applications can range from K-12 school classrooms to hospital operating rooms, and everything in between.

ANSI/ASHRAE Standard 52.2-2017<sup>1,2</sup> identifies filter performance versus various particle sizes ranging from 0.3 micrometers to 10 micrometers. They are grouped into three particle size ranges; E-1 (0.3-1.0 um) E-2 (1.0-3.0 um) E-3 (3.0-10 um). Efficiency is expressed in percentage. For example, a MERV-13 filter would have 90% or greater removal efficiency in the E-2 range of 1.0-3.0 micrometers. Determining the contaminant size of indoor particulates,

and then selecting the removal efficiency desired, will make the determination of what MERV number would be best suited for that specific application<sup>3</sup>.

To give an idea of how small one-micrometer actually is, it is equal to approximately 1/25,400 in. The ANSI/ASHRAE Std. 52.2 method of test (MOT) provides the information needed to select a filter that would be most effective on specific sized contaminants. The information is reported using a single numbering system. The initial clean filter efficiency is reported as the Minimum Efficiency Reporting Value (MERV). According to the newly revised ASHRAE Standard, filtration efficiency should be upgraded to the highest MERV number based on the HVAC system's capacity. Also addendum (e) and (f) are the latest to be included in the Standard<sup>4</sup>.



**Why is the**  
**WATER SABER PRO**  
**The Professionals' Choice?**  
**That's Easy...**

IT'S GREAT FOR DECARBONIZING BOILERS TOO!

LIFETIME WARRANTY

*"Work Smart, Not Hard"*

MADE IN THE USA

[www.WaterSaber.com](http://www.WaterSaber.com)

Circle Reader Service No. 81



## IAQ/HVAC air filtration standards

At the request of ASHRAE, the National Air Filtration Association (NAFA) has recently published a NAFA user's guide for ASHRAE Standard 52.2-2017, *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. An example from the guide is a section on ANSI/ASHRAE Standard 62.1-2016 called *Ventilation for Acceptable Indoor Air Quality*. This section discusses the requirement of a MERV 8 filter to be installed upstream any condensate-producing device or wetted surface, such as cooling coils, direct expansion coils or humidification equipment<sup>5</sup>.

It is important to note that both ASHRAE Standards referenced above are ANSI-approved<sup>3</sup> and are written in regulatory language, or what the industry refers to as code language. These Standards can be adopted by any Authority Having Jurisdiction (AHJ), such the Southern Building Code, International Building Code, or State Building Codes, etc., and they are written in mandatory/code language that is enforceable in a court of law. For example, should have a MERV 8 filter vs. shall have MERV 8 installed upstream wetted surfaces<sup>5</sup>.

However, if the filters selected for a specific application requirement are not properly installed or maintained, then all the performance specifications literally go out the window. Simply put, if the filter hardware/frames or housing leaks, the air filtration performance will drop off significantly. Here are key installation steps to help ensure proper filter installation and performance:

1. The filter must be installed with the proper filter holding clips.
2. Gasket material may be required on individual filters, filter frames or tracks, and definitely on doors to ensure an air-tight seal. In order for the filters to be effective, contaminants must be forced to pass through the air filter without bypass. Air will follow the path of least resistance, therefore it is critical to seal the system properly.
3. Filter gauges are also necessary to measure airflow resistance or pressure drop across the filter bank. It is important to read the equipment manufacturer's installation procedures to ensure correct location of the upstream and downstream static pressure



⤴ **Regular measuring, monitoring and managing helps HVAC air filtration systems operate efficiently and effectively.**

taps. If the pressure drop is not being measured with an air filter pressure differential gauge, then the system cannot be monitored properly. And if it is not properly monitored, how can the HVAC air filtration system's performance be effectively managed?

4. Consider using the 3-M approach to effectively: 1. Measure 2. Monitor 3. Manage. Using this simple approach will ensure an HVAC air filtration system is operating efficiently and effectively.

## Air filtration training

NAFA has developed a Certified Technician professional development program, along with a textbook titled "The Installation, Operation and Maintenance of Air Filtration Systems." It is tailored to meet the needs of HVAC contractors, technicians, facility managers and building owners. After completing training and successfully passing a written national exam, the participants should have a thorough knowledge and fundamental understanding of air filtration maintenance. Signing a Code of Ethics completes the requirements to be a NAFA Certified Technician (NCT). Certification renewal is conducted annually by obtaining necessary continuing education units (CEU) credits.

## Conclusion

The NCT program will expand the knowledge of facility managers and individuals responsible for IAQ or energy reduction and facility sustainability. It is attention to the little details that make a big difference in system operations and performance. With NCT training, the proper skillsets will be taught to effectively implement the 3-M system of measuring, monitoring and effectively managing an HVAC air filtration system. The benefits include contaminant control/reduction with better overall IAQ, energy conservation, as well as lowering labor and disposal costs. These sustainable results can be accomplished by technicians that have successfully completed the National Air Filtration Association Certified Technician Program. It is time take the operations and maintenance of HVAC air filtration systems seriously. 🌬️

### References:

<sup>1</sup>ANSI American National Standards Institute

<sup>2</sup>ASHRAE Standard 52.2-2017

<sup>3</sup>ASHRAE Handbook Fundamentals Ch.11.4 Fig 3

<sup>4</sup>Addendum (e) and (f)—(e) Requires entire test procedure prescribed for the designation of MERV to be used by the Standard. (f) Covers 11.3 to include all test data in the summary report during the test runs and shall be formatted to Fig 11-1d.

<sup>5</sup>ANSI/ASHRAE Standard 62.1-2016

Stephen W. Nicholas, CAFS, NCT II, Air Industrial Technical Services, LLC Consultant to the HVAC air filtration industry. He is a Past President of NAFA and the Boston ASHRAE Chapter. Nicholas has served on several NAFA and ASHRAE national committees. For more information regarding the NAFA professional development/certification program contact [www.nafahq.org](http://www.nafahq.org). Nicholas can be contacted at [nicholas@airinds.com](mailto:nicholas@airinds.com) or 978-265-1702.

# You don't have to do this to stand out.

Just get NATE-Certified.



## NATE makes it easy.

Follow our clear path to  
HVAC success in four easy steps.

1

0-6 months experience:  
Take the Ready-to-Work Test

2

6-12 months experience:  
Take the HVAC Support Test

3

2+ years experience:  
Get NATE Certified—Take the Core & Specialty Test(s)

4

5+ years experience:  
Take the Senior Level Efficiency Exam

If you are a technician or manager in the HVAC business and you want an edge on the competition, take a step up with North American Technician Excellence (NATE).

NATE is the leading certification organization in the HVAC industry. Each year our certification program offers a clear path to success for more than 30,000 technicians.

**Call us!** We're here to help.

**877-420-6283**

Email us at [asknate@natex.org](mailto:asknate@natex.org)

or visit [natex.org](http://natex.org)







» While filter maintenance continues to be a significant issue, paying attention to small details during installation is also critical to ensuring filter efficiency.