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New measurements help you compare
Air filters, save money.

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(St. Petersburg, FL) A well dressed woman stood in the aisle of a Home Depot recently, studiously reading the back of a brightly colored furnace filter package. "I read in a magazine article that this one is supposed to be really good, but all this data is confusing. "

Welcome to the world of home air filtration in the 21st century. Over the past several years, government at several levels has warned of tight buildings, mold and general indoor air pollution. Savvy marketers recognized the scent of profit in those warnings and flooded the market with a wide assortment of products, all promising respite from the airborne menace. A recent consumer publication rated 54 different models...and those were just the ones that made the cut.

Like the woman in Home Depot, we're all leery of the competing hype. So just how bad is the indoor pollution and who can we trust to get rid of it?

Indoor pollution is perhaps not greater today, but it is definitely more contained than it used to be. Buildings are tighter now, so pollutants continue recycling in our living space. Smoke from cooking, pet dander, VOC's from building materials, mold and a host of other impurities. Additionally, new laser particle counters now give us a better idea of the makeup of that indoor pollution, right down to specific particle sizes.

So how well do each of the competing filters remove this airborne garbage? Some publications try to separate the truth from the hype with independent studies, publishing their findings in product reviews. As useful as those product reviews may be, they are by and large written by people who mean well but lack in-depth knowledge needed to rate overall performance.

Enter MERV

MERV, or Minimum Efficiency Reporting Value, is fruit of the ASHRAE 52.2 standard and testing protocol. This independent rating system was created by the American Society of Heating, Refrigerating and Air Conditioning Engineers. It tells with a simple rating scale exactly how well a specific filter performs in comparison to others.

There are 16 levels of MERV and the higher the level, the more and smaller particles the filter catches. That simple. The chart below shows the MERV levels and the values for each level.

The standard is the result of years of study, comparing the actual reporting efficacy of filters in a variety of applications, including hospitals, universities, semi-conductor manufacturers,

automotive and others, even aerospace. This new standard measures the filtering capability of literally hundreds of filter types with a concise and simple reporting method.

ASHRAE test standards have been used for decades by commerce and industry. The relatively late introduction of these standards to the retail market is perhaps because earlier standards would have been confusing to the average homeowner. So until recent years, what was perceived as the “best” filter in retail stores was the one which could tell the best story with creative writing. But with its simple sixteen levels, MERV offers a way for consumers to truly rate filters by an equal, professional and independent measuring standard, insuring best value for dollars spent.

Even greater accuracy ahead.

A proposed addendum to ASHRAE test standard 52.2 may have a profound impact on “electret” filter ratings as early as next year. After 52.2 was implemented in 1999, complaints that electret filters don’t perform as well in real life as in controlled laboratory tests led to a proposal to “precondition” these types of filters so they could be rated on their true minimum efficiency as MERV implies.

The implications are huge. Currently the 1” depth residential pleated air filter market represents over \$700 million in retail sales. Of those, approximately 50% use electret filtering media. The result of the preconditioning would be to reduce the MERV of 1” electret filters by at least one level.

MERV means Minimum Efficiency Reporting Value and implies that a filter will never perform at a level lower than the assigned rating. Most air filters show an increase in filtering ability throughout their use cycle. That is because collected dust itself becomes a filter of sorts. An exception is the electret filter which relies on an “electrostatic” charge to achieve its relatively high rated performance. These filters may actually show a decline in filtration performance throughout their use life, simply because of the declining effect of the electret “charge.”

The preconditioning of electret filters would amount to exposing them to a generated potassium chloride nanoparticle aerosol. It is believed that by thus “removing” the electret charge, the filters will perform similarly to how they perform in real life, and that the true minimum efficiency as designated by MERV will be achieved.

The proposed change is not without critics. Among technical comments is one that the addendum “risks predicting worse filter behavior than could be observed in most filter applications in real world use.” In other words, it may err to an equal extent in the opposite direction to the one it strives to correct. It has also been argued that the proposed conditioning step doesn’t adequately consider its effect on other non-electret filtering mechanisms. Another said that if

electrets must be preconditioned, perhaps ALL filter types should also be preconditioned to insure fairness.

Aren't there non-electret media that will do the same job? Non-electret media have not been used in MERV 8-13 residential filters because of their typically much higher airflow resistance. Manufacturers cannot simply switch to different, non-electret media and attain the same MERV if they expect to stay within airflow resistance constraints, which is typically .25" w.g. initial resistance for 1" residential filters.

So what then? Will marketers downgrade their filter offerings to a lower level and suffer the accompanying \$3 or so loss in their price points? Perhaps. But perhaps just as likely, they may look toward other more "creative" methods of judging filters that don't rely on MERV. Some marketers are doing that already, diluting the MERV rating and subsidizing it with their own data..

Don't be afraid to ask manufacturers for MERV

How do you find out the MERV of a filter that you're considering for purchase? American Air and Flanders Precisionaire post the MERV prominently on their packaging. On others, if the package does not include MERV, it's possible that it is just old packaging. Check the manufacturer's website to see if they have posted MERV levels there. Or a quick phone call to the manufacturer should get you an answer, but be sure to ask them to follow it up with a printed test report by mail, showing the MERV. If, on the other hand, they say that MERV doesn't adequately measure filtering performance...that their method is better...be very wary of their offering.

And now yet another filter performance rating to watch

MERV measures what airborne debris a filter will catch. There is now an air filter measurement that must be watched just as closely. It's called "airflow resistance." That is a measurement of how much the filter resists the movement of air while doing its job filtering.

Why is that important? Because the more a filter resists airflow, the harder your fan motor has to work and thus the more electricity it will use. Until recently, that would mean a moderate increase in your electric bill. But with the recent jumps in energy prices it now could mean up to hundreds of dollars extra on your electric bill in a year, depending on the amount of resistance and the amount the furnace or air conditioner is used.

What causes airflow resistance? Dust building up on your filter eventually begins to block airflow. That's why electric companies remind us to change our air filter on a regular basis. In fact, a dirty air filter can cost you several dollars extra on your electric bill every month.

Ask for the “initial resistance”

But there's more to it than that. Some filters have an innately higher airflow resistance than others, even when brand new. That measurement is called “initial resistance”. Generally, the higher performance filters have higher initial resistance. Does that mean we should skip the high performance filters and just use spun glass? That would be like telling a mother of six kids to get rid of the station wagon and buy a “mini” to save gas. If you need an extra level of filtration, you need it. But just like the mom who can buy a more energy efficient station wagon, with a little research you can buy a more energy efficient high performance filter.

Again, don't be afraid to ask the manufacturer for the initial resistance of their air filter. It will be expressed by the measurement “inches water gauge.” The higher the resistance, the higher the number. Filters on retail shelves today range from about .04 inches water gauge to .36 inches water gauge.

Some manufacturers recommend that no filter be used beyond .50 inches water gauge in residential units. So keep in mind that if a filter starts out at a very high resistance level, you have very little filtering time left before it reaches that level. The chart below illustrates the approximate electric cost per day to run a fan motor pulling air through an air filter at different levels of airflow resistance.

In conclusion

All hvac air filters are not equal, so:

1. Be cautious of proprietary filtration rating methods. Insist on MERV so you can compare competing filters on an equal, unbiased rating scale.
2. Check for your filter's “initial resistance” level, measured in inches water gauge. The higher the resistance, the more it will cost you in electric use.

One day we may see a rating scale that accounts for both filtering efficacy and energy efficiency. Until then, with a little effort we can count on MERV and initial resistance measurements to give us peak value for our air filtering dollar.

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