

November 1, 2017

## Product Updates

The latest ratings from our labs

### Sizing up indoor air pollution

Air purifiers with HEPA filters can capture particles as small as 0.3 microns, which is far smaller even than the diameter of a human hair.

~0.3 microns  
Smallest size of particle an air purifier can filter

~5 microns  
Pet dander

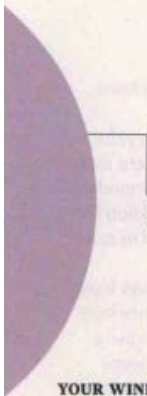
~10 microns  
Pollen, dust, and mold

## Clearing the Air

The air in your house can be five times more polluted than the air outside. Use our purifier ratings and tips to keep indoor air clean.

by Mary H.J. Farrell

**Pet Peeve**  
Households with animals require special attention to keep the air free of dander and other allergens.



~60 microns  
Human hair

**YOUR WINDOWS MAY BE** spotless and your floors may sparkle, but for millions of adults and children with allergies, asthma, and other respiratory conditions, a house is only as clean as its air.

Though it might be hard to believe, indoor air can be five times dirtier than what we breathe outside, exposing us to carcinogens including radon and formaldehyde, as well as quotidian lung-gunking impurities such as pollen, dust mites, pet dander, and a variety of particulate matter created when we burn candles or cook.

Judging from the skyward trend in sales figures, Americans are turning to portable air purifiers in increasing numbers, paying hundreds or even thousands of dollars to reduce indoor air pollutants and the sniffles, sneezes, coughs, and asthma attacks they can trigger.

But whether air purifiers can improve health is still up for debate. "There's very little good science on air purifiers," says Norman Edelman, M.D., senior scientific adviser for the American Lung Association. "Used properly, they have been shown to modestly reduce allergy symptoms. However, the data on reduction of asthma attacks is less clear."

The Environmental Protection Agency evaluates the energy consumption of air purifiers for its Energy Star program but is careful to issue a disclaimer about their health benefits: "While some home air cleaning devices may be useful in some circumstances, EPA makes no broad

endorsement of their use." According to the agency, the best way to avoid health problems caused by indoor air pollution is to control or eliminate the sources of pollutants (by banning smoking in the house, for instance) and to ventilate the home with clean outdoor air. (To minimize indoor air pollution without an air purifier, see "13 Ways to Bust the Dust," on page 11.)

Though the benefits of portable air purifiers are still being debated by the scientific community, recent research suggests that they could protect against the ill effects of air pollution under certain conditions. A small, well-designed study, funded in part by China's National Health and Family Planning Commission and conducted at a Shanghai university, found that the use of filter-based air purifiers was associated with reducing the adverse health effects caused by polluted air. Another study, conducted by Canada's British Columbia Centre for Disease Control and other Canadian governmental and academic groups, concluded that the use of

portable air purifiers can lower indoor levels of particulate matter caused by smoke pollution and, in doing so, benefit respiratory and cardiovascular health.

### Picking the Right Type

There are several types of air purifiers, including ionizing, ultraviolet, and filter-based. At CR we test portable filter-based models, which are the most common. (We usually don't test models that use only electrostatic-precipitator or ionizer technology, both of which produce ozone—a gas that smells fresh but has been proved to be a lung irritant.)

"Filter-based air purifiers are pretty simple machines that employ a fan to pull air through a filter that traps particles," says CR test engineer Dave Trezza, who runs the air purifiers lab. HEPA filter-based purifiers are claimed to capture "up to 99.97%" of allergens and pollutants as small as approximately 0.3 microns, which is about the size of fine dust and smoke particles. To test them we blow smoke and fine clay dust into an airtight chamber, then measure how quickly a purifier can clear the air, or not.

The very best models in our tests are effective at removing smoke and dust at both high and low speeds. That means they should also be able to capture pollen and mold, which are larger. But once pollen and mold spores land on the floor, nothing but a good vacuum will remove them. (See "Best Vacuums for Allergy Sufferers," on page 13.)

Filter-based air purifiers cannot capture gases, so they won't protect you from some of the most dangerous



BLUEAIR  
BLUE  
PURE 211  
S250

89  
OVERALL  
SCORE

**Product Updates**

indoor air impurities, including carbon monoxide, nitrogen oxides, radon, and volatile organic compounds. And unless they have a carbon filter, they won't rid your home of odors, so even if cigarette smoke has been filtered from the air, the smell will remain.

Portable air purifiers might not even reduce the symptoms of allergies or the frequency of asthma attacks. But if you've taken pains to keep allergens and other pollutants out of your home, an air purifier could help to reduce them further. And running one in the bedroom of a child who suffers from asthma certainly won't hurt and might even be of some benefit. If you decide an air purifier is for you, check our ratings, on page 14, and keep these things in mind when considering which one to buy:

**CADR.** This stands for "clean air

delivery rate" and indicates the volume of filtered air a unit delivers. Most air purifier packaging will display three CADR numbers, one each for dust, smoke, and pollen. "The higher the number, the faster the unit filters the air," Trezza says. "Look for a CADR above 250. Anything below 100 isn't very effective."

**Room size.** Manufacturers make claims that their air purifiers can clean rooms of a certain size, usually expressed in square feet or as small, medium, or large. But in our tests we found that many models weren't able to capably clean a room of the size claimed on the box. To get the best performance, choose one of the seven models that we recommend for large rooms (350 to 650 square feet), even if you're going to use it in a smaller space. "We recommend that you

buy a large unit and run it on a lower, quieter speed," Trezza says.

**Energy Star.** Models that carry this familiar blue logo are 40 percent more efficient than non-Energy Star models. That's an important consideration for an appliance that people tend to run 24 hours a day.

**HEPA filters.** Many air purifiers have a HEPA filter, which can capture very fine particles. Some units also use a prefilter to capture larger airborne particles, which can save you money by extending the life of the HEPA filter. (For important cost considerations, see "The Cost of Clean Air," below.)

**Help May Be in Your Basement**

If your home relies on forced-air heating and cooling (as most

**The Cost of Clean Air**

The air purifiers we tested range from \$50 to \$900, but replacement filters and energy costs can add significantly to your initial outlay. We've calculated the cost of ownership of our five top-rated models after one year and five years of operation.



newer homes do), an effective and efficient way to improve your indoor air quality is simply to upgrade the system's filter, according to Trezza. That's because heating, ventilation, and air conditioning (HVAC) systems recirculate the entire volume of air in your house, drawing it through intake vents, filtering it, and distributing it through ducts to every room.

But to turn your HVAC system into an air purifier, you may need to modify it slightly. Most HVAC systems are installed with 1-inch-thick filters designed only to protect the mechanical workings; retrofitting the system to accommodate special filters that are 2 to 5 inches thick will trap more impurities. Unless you're very handy, you'll need to pay a one-time fee to have the new, larger filter housing installed between the return air duct and the intake. Costs vary depending on your system and where you live, but HomeAdvisor, a website that compiles home remodeling and repair costs, pegs the national average at about \$1,500.

In the lab, CR's experts have found consistently that the thicker the filter, the better it works to reduce impurities and the less often you'll need to replace it. "These thicker filters are better for you and for your HVAC system," Trezza says.

Our recommended filters for HVAC systems (see page 15) are the best at removing dust, pollen, and smoke without impeding the flow of air. "These filters clean all of the air in your house," Trezza says, "but only when the system is running."

An HVAC system retrofitted with a thicker filter requires no special attention. "Just change the filter every three months or as often as the manufacturer recommends," Trezza says. "And be careful not to put it in backward, which could reduce the flow of air." The annual cost of replacing the filters we tested ranges from \$20 to \$130.

## 13 Ways to Bust the Dust

*Easy habits to reduce indoor air pollution.*

POLLUTANTS CAN BE introduced into the air of your home in a number of ways. Some are carried in on the breeze; some are carried in, unwittingly, by you. "A lot of things come into our homes on our clothing, including pollen and cat allergens," says Elliott Horner, Ph.D., lead scientist for UL Environment (Underwriters Laboratories). Other pollutants originate inside the home, such as when you pet your dog and release dander into the air or burn a piece of toast and send smoke streaming into the kitchen. It's difficult not to generate indoor air pollution in your home, Horner says.

To get rid of impurities, you need to pursue several lines of attack. Following the checklist below will help you to minimize indoor air pollution so that a portable air purifier won't have to work as hard, if you even need one at all.

**1. OPEN A WINDOW**  
Adequate ventilation is key to promoting healthy indoor air, and opening windows (when it's not too cold or the pollen count is not too high, of course) is an easy way to encourage a good exchange of indoor and outdoor air.

**2. BAN SMOKING**  
"Absolutely no cigarette smoke," says Norman Edelman, M.D., senior scientific adviser for the American Lung Association. Second-hand smoke impairs respiratory health and is responsible for some 3,000 lung cancer deaths a year in non-smokers, according to the Environmental Protection Agency.

**3. GIVE FIDO A BATH**  
If you have pets, bathe them and wash their bedding often to reduce allergy-causing dander. And we hate to break it to you, but you should also keep them out of bedrooms.

**4. USE EXHAUST FANS**  
Run fans in the kitchen (removes cooking fumes) and bathroom (removes steam) that vent outside. Also be sure that your dryer vents to the outside to minimize lint. To reduce the level of pollen in the air on days it's not possible to open the windows, run your window air conditioner on the fan setting with a clean filter.

**5. USE A DOORMAT**  
Wiping shoes can reduce pollutants carried into the house. Better yet, establish a shoes-off policy.

**6. CHANGE FILTERS**  
If you have a forced-air heating and cooling system, change the filters more often when there is more smoke or pollen in the air.

(For more on replacing filters, see "Time for a Change," on page 12.)

**7. SKIP FIRES**  
Flames dancing in the fireplace look delightful, but they release soot and smoke into the air.

**8. DON'T COVER UP ODORS**  
Avoid air fresheners, scented candles, incense, or other odor-masking fragrances, which can trigger asthma.

**9. VACUUM OFTEN**  
Do this especially if you have a pet. Brooms can just stir up more dust.

**10. USE A MICROFIBER DUSTING CLOTH**  
It will capture more dust than a cotton rag.

**11. MINIMIZE CARPET**  
It can trap pollutants such as dust mites, pet dander, mold spores, and other dirt and dust. Choose hard-surface flooring instead.

**12. TRY TO STAY DRY**  
To reduce mold, keep moisture down by using a dehumidifier and cleaning the filter regularly.

**13. STORE CHEMICALS SAFELY**  
Store solvents, glues, and pesticides away from living areas, and, when possible, use homemade cleaning products such as a mixture of white vinegar and water.

POOR ————— EXCELLENT  
 \$ CR BEST BUY ✓ RECOMMENDED

	Recommended	Rank	Brand & Model	Overall Score	Price	Test Results				
						Dust/pollen/ smoke removal (high)	Dust/pollen/ smoke removal (low)	Noise (high speed)	Noise (low speed)	Annual cost



SMALL ROOM (100 TO 300 SQUARE FEET)

1	✓		<b>Ionic Pro</b> Platinum TA750	33	\$200	✓	✓	!	✓	\$9
2			<b>Dyson</b> Pure Cool Link	26	\$500	✓	✓	✓	✓	\$102
3			<b>Hoover</b> WH10600	20	\$165	✓	✓	!	!	\$61
4			<b>Hamilton Beach</b> TrueAir 043B3	16	\$50	✓	✓	!	✓	\$25

**HOW WE TEST:** Overall Score is based primarily on how well models remove dust and smoke from a test chamber, plus quietness. Dust/pollen/

smoke removal is how well models capture cigarette smoke and fine clay dust. Noise is a measurement of decibels at high and low speeds.

Room size—small, medium, or large—is our recommendation based on performance. Annual cost combines filters and electricity.

	Recommended	Rank	Brand & Model	Overall Score	Price	Test Results				
						Dust/pollen/ smoke removal (high)	Dust/pollen/ smoke removal (low)	Airflow resistance	Annual cost	Thickness (in.)

Our recommended air filters for HVAC systems remove dust, pollen, and smoke, and don't impede airflow through the unit.



AIR FILTERS

✓	1	✓	<b>Lennox</b> Healthy Climate CarbonClean 16	70	\$100	✓	✓	✓	\$100	5
✓	2	✓	<b>Filtrete</b> Healthy Living Ultra Allergen 4 MPR1550	70	\$29	✓	✓	✓	\$29	4
✓	3	✓	<b>Carrier</b> EZ Flex Filter Cabinet	68	\$64	✓	!	✓	\$128	5
✓	4	✓	<b>Filtrete</b> Healthy Living Ultimate Allergen Reduction 1900 MPR	64	\$20	✓	!	✓	\$80	1
	5		<b>Filtrete</b> Healthy Living Elite Allergen 2200 MPR	59	\$25	✓	!	✓	\$80	1
	6		<b>Honeywell</b> Superior Allergen FPR 9	39	\$20	!	✓	!	\$68	1
	7		<b>Flanders</b> High Efficiency Air Cleaner MERV 11 Model 82755	39	\$30	!	✓	✓	\$19	3
	8		<b>Filtrete</b> Micro Allergen Defense 1000 MPR	37	\$15	!	✓	✓	\$48	1
	9		<b>Flanders</b> NaturalAire Pleated Microparticle MERV 10	23	\$11	✓	✓	!	\$44	1
	10		<b>Filtrete</b> 600 Dust & Pollen	20	\$9	✓	✓	!	\$36	1
	11		<b>Flanders</b> Precisionaire Pre-Pleat 40	11	\$7	✓	✓	✓	\$84	2
	12		<b>Web</b> Eco Filter Plus FPR 4	11	\$22	✓	✓	✓	\$0	1

**HOW WE TEST:** Overall Score is mainly how well models removed dust and smoke from a test chamber. Airflow resistance is

how freely air passed through the unit. Annual cost is estimated based on number of replacement filters needed.