



Healthy Indoors Partnership

# home air filters

Most of us are aware of the dangers of air pollution, especially if we live in big cities where smog is monitored. But indoor air pollution can be just as harmful as outdoor air pollution — or even more so.

## SHOULD I BUY AN AIR FILTRATION DEVICE?

Poor **indoor air quality** has been associated with a wide array of health problems, including allergies, asthma, lung cancer, and throat and lung infections. While it is known it is unhealthy to have a lot of fine particles such as dust, tobacco smoke and pollen in your home, the health benefits of air filtration devices are not clear based on the very limited scientific evidence available. What we do know is that filters are unlikely to make a significant difference to your health if someone smokes in your home or it has a lot of fine settled dust.

The best way to solve indoor pollution problems is to **eliminate or reduce the sources of pollution**. For example, the only way to protect yourself from the hazards of tobacco smoke is to ensure that no one smokes in your home, as filters cannot remove all of the cancer-causing pollutants found in tobacco smoke. Fuel burning appliances should be properly installed and maintained to vent to the outdoors; if they are leaking gasses into your house they

need to be repaired immediately. Unvented fuel-burning appliances such as barbeques, kerosene space heaters and unvented fireplaces must never be used indoors. Many products and building materials are now available that produce few or no air contaminants at little or no extra cost (see *References and Further Information*).

When source reduction is not possible, the next best thing is to dilute and remove the pollution through **ventilation** — for example, by using fans that exhaust outdoors.

**Air filtration**, used along with source reduction and ventilation, can also be helpful. Home filters can effectively remove many types of particles. However, most are not effective at removing very small particles or odours and gases. Very small particles include viruses, pet allergens, lead and asbestos. Odours and gasses include formaldehyde, radon and the by-products of burning fuel (e.g., carbon monoxide.) The following information will help you decide if an air filtration device could be useful as part of your solution to indoor pollution.

## TYPES OF AIR FILTRATION DEVICES

The majority of particles that remain suspended in your home's air are too tiny to be visible to the naked eye. But they're not all the same size or type. That's why it's important to choose a filter that is rated for the kind(s) of particles that most concern you.

Air filtration devices can treat your whole house or a single room, depending on the type you choose. 'Whole house' devices — also known as central devices — generally require that the house have a forced air furnace system. If you want to treat only one room in your home, a stand-alone, portable device is all that's required.

Some filtration devices reduce odours or gases, others reduce particles and some do both. Those that reduce odours or gases are not covered in

this guide. Those that reduce particles are either mechanical, electronic or both. The mechanical ones remove contaminants using a variety of forces, depending on particle size. Some use pleated filters to increase the surface area of the filter, thereby increasing the devices' efficiency. Electronic devices charge the incoming particles, which are then drawn to collection surfaces.

You should be aware that some electronic devices can produce hazardous amounts of ozone. To minimize ozone emissions, these filters need to be cleaned and maintained regularly, and operated according to the manufacturer's instructions.

Health Canada and similar agencies in other jurisdictions warn the public not to use air cleaners that intentionally produce ozone in their homes because of potential adverse health effects. (*For details, see the Health Canada reference on the back cover.*)

### DIFFERENT TYPES OF WHOLE HOUSE PARTICLE FILTERS

TYPICAL FILTER TYPES	OVERALL EFFICIENCY AND MERV RATING	AVERAGE DUST SPOT EFFICIENCY RATING	AVERAGE ARRESTANCE RATING	SMALLEST PARTICLES HANDLED EFFECTIVELY	TYPICAL HOME USES
Permanent/ self charging Washable Disposable panels Fibreglass	Low efficiency MERV 1-4	Less than 20%	60% to 80%	10 microns - larger house dust - unbroken pollen and plant spores	Protects your air handling system from physical damage
Pleated Media panels	Medium efficiency MERV 5-8	20% to 35%	80% to 95%	3 microns	General home air cleaning
Rigid cell/cartridge Rigid box Non-supported/bag Pleated high efficiency filters	High efficiency MERV 9-12	40% to 75%	95% to 98%	1 micron - pet dander (pet allergens are even smaller) - bacteria	Superior general home air cleaning
HEPA ULPA	True HEPA MERV 17-20	99.9%	Not relevant	.3 micron or smaller - smog - smoke particles from tobacco, candles, wood, and cooking oil - finer house dust	Smoke, smog and fine dust removal  Highest levels of particle removal

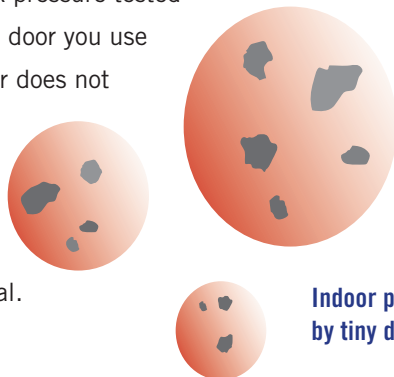
Based on "NAFA Users' Guide for ANSI/ASHRAE Standard 52.2 – 1999, by the National Air Filtration Association.

## WHOLE HOUSE (CENTRAL) SYSTEMS

Whole-house filters are rated in a number of ways, including Average Dust Spot Efficiency, Average Dust Arrestance, and Minimum Efficiency Reporting Value (MERV). These ratings are generally printed on the filter package. MERV is usually the most helpful of the three. It is expressed as a number between 1 and 20; a higher number means greater particle removal efficiency and the ability to trap particles of a smaller size. The top-performing models tested by Consumer Reports have had a MERV rating of 11 to 13. True High Efficiency Particle Arrestation (HEPA) filters are rated as equivalent to MERV 17 to 20, but require a different testing protocol. Unfortunately, all of the above rating systems only apply to passive mechanical air filters.

If you decide on a central filtration system, keep in mind that the more you run your central system fan, the more particles you will remove. But you will also use more energy. If you plan to replace your furnace, you can minimize your electrical consumption by incorporating a brushless DC motor (BLDC or ECM™).

Before selecting and installing a new furnace or filtration system, it may be helpful to contact a company or contractor that is experienced in designing and installing central filtration systems. To avoid major airflow (and energy) loss, have your system's ductwork pressure tested for leakage. If the door you use to access the filter does not have a flexible gasket or cover, add weather stripping to provide a tight seal.



**Indoor pollutants can stick to and be carried by tiny dust particles suspended in the air.**

If you switch to a filter with a higher MERV rating, you may be increasing the amount of resistance (often called pressure drop) that your furnace fan has to work against. This can impair the operation of your furnace. However, even HEPA filters can be installed in whole house systems. If unsure, check first with the person who services your furnace to ensure that what you buy is compatible with your current system.

## STAND-ALONE or PORTABLE ROOM DEVICES

The Association of Home Appliance Manufacturers (AHAM) operates a voluntary third party verification and certification program for portable room air filtration devices. The AHAM certification label states a filtration device's clean air delivery rate (CADR) and recommends the maximum room size it can handle. The CADR takes into account the air volume passing through the device on high speed, and the filtration efficiency for removing airborne particles of smoke, dust, and pollen from a room.

You'll see numbers from 10 to 450. Filters with higher CADR ratings are able to clean larger rooms. A filter with a CADR of 10 or less is barely distinguishable from gravity at removing airborne particles.

A properly sized portable air filter with an appropriate CADR rating can significantly reduce particles within a room. Such filters may be helpful in "sanctuary" rooms (usually bedrooms), especially for those who are particularly sensitive to indoor air contaminants. Install them in the room(s) where you spend most of your time or experience the worst symptoms.

## MAINTENANCE TIPS

Proper maintenance is critical for air filters to operate effectively. Dirty filters can harbour pollutants, reduce the efficiency and evenness of your heating/cooling system, and even cause the system to shut down. For mechanical filters, ensure that the frame fits tightly in its seat to prevent air from bypassing it. Check for dust, mold and debris build-up at least every month. Replace or clean the filter as necessary, based on the manufacturer's recommendations. Washable filters should be vacuumed first, then cleaned with mild soap and water.

### Notes:

- *There is insufficient evidence at this time to make claims regarding the use of ultra-violet (UV) light and ionizers in home air cleaning devices.*
- *This information is provided as a general guide to filter use and does not address specific applications or individual filter performance in a given application.*

## REFERENCES AND FURTHER INFORMATION

**AMERICAN LUNG ASSOCIATION:** "Air Cleaning Devices" A good overview. [www.lungusa.org/site/pp.asp?c=dvLUK900E&b=35696](http://www.lungusa.org/site/pp.asp?c=dvLUK900E&b=35696)

**ASSOCIATION OF HOME APPLIANCE MANUFACTURERS:** A website on portable air filters and the ANSI / AHAM AC-1 Clean Air Deliver Rate (CADR) approach. [www.cadr.org](http://www.cadr.org)

**CALIFORNIA AIR RESOURCES BOARD:** "Air Cleaner Devices for the Home: Frequently Asked Questions" A good overview of considerations when purchasing a filter. [www.arb.ca.gov/research/indoor/aircleaners.html](http://www.arb.ca.gov/research/indoor/aircleaners.html), see Air Cleaner Devices fact sheet link.

**CANADA MORTGAGE AND HOUSING CORPORATION (CMHC):** "Your Furnace Filter" [www.cmhcschl.gc.ca/en/co/maho/gemare/gemare\\_008.cfm](http://www.cmhcschl.gc.ca/en/co/maho/gemare/gemare_008.cfm)

**CONSUMER REPORTS:** Objective information on the performance of specific models, as well as general advice. [www.consumerreports.org/cro/home.html](http://www.consumerreports.org/cro/home.html)

**FOR INFORMATION ON ASTHMA CONTROL:** [www.asthma.ca](http://www.asthma.ca) and [www.cmhc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu\\_005.cfm](http://www.cmhc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_005.cfm)

**HEALTH CANADA:** "Warning - Health Canada warns the public about air cleaners designed to intentionally generate ozone" This publication includes a list of affected ozone generator brands and models. [www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/1999/1999\\_62\\_e.html](http://www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/1999/1999_62_e.html)

**LOW-POLLUTION PRODUCTS:** Healthy Indoors Partnership (HIP) will prepare a separate consumers' guide to finding and buying low-emission products and services. In the meantime, we suggest the following helpful sites: [www.oikos.com](http://www.oikos.com) and [www.cmhc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu\\_006.cfm](http://www.cmhc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_006.cfm)

**NATIONAL AIR FILTRATION ASSOCIATION:** Provides technical guides to MERV ratings and air filtration. [www.nafahq.org/publications.html](http://www.nafahq.org/publications.html)

**EXPERT PANEL:** To provide consumers with balanced guidance in purchasing residential air filters, experts from the following organizations joined together to develop and review this Buyer's Guide. While the guide represents their assessment of the current state of knowledge on residential air filters, it does not necessarily reflect the view of any particular participating organization.

Canada Mortgage and Housing Corporation  
Canadians for Properly Built Homes  
Climatec Environmental Technology  
City of Toronto Public Health  
Government of Canada  
Health Canada  
National Research Council  
Natural Resources Canada  
Healthy Indoors Partnership (HIP)  
Heating, Refrigeration and  
Air Conditioning Institute (HRAI)

National Air Duct Cleaners'  
Association (NADCA)  
National Air Filtration Association (NAFA)  
Nutech / Lifebreath  
Ontario College of Family Physicians,  
Environmental Health Committee  
Ontario Public Health Association  
Venmar Ventilation  
Women's College Environmental Health Clinic  
3M