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Consumers Guide

HEATING, REFRIGERATION and AIR CONDITIONING INSTITUTE of CANADA

Indoor Air Quality

Eliminate, Ventilate, Filter...

Take these steps for better Indoor Air Quality

A Guide to Indoor Air Quality

Good indoor air quality can be defined as the absence of any substance in the air that is a health hazard or a source of discomfort to the occupants. The purpose of this article is to acquaint homeowners with the dangers of poor IAQ and how they can maintain healthy IAQ inside their home. Poor IAQ will have an adverse effect on both the health and welfare of the occupants and the structure of the home may also be damaged. Both visible and hidden damage to the structure may be caused by prolonged buildup of moisture levels in the walls and attic.

Homeowners should be concerned with the quality of their indoor environment. Construction practices used from 1980 onwards to reduce energy consumption and moisture damage to buildings have reduced natural air leakage. Without ventilation when doing laundry, cooking or taking showers, excessive moisture is created resulting in high humidity, occupant discomfort, bacterial or fungus growth and lingering odors.

To improve indoor air quality in your home you should start by ridding your home of its toxins:

- replace chemical cleaners with non-toxic, homemade or store-bought cleaners
- keep paint cans and other solvents in storage away from the house
- do not use air fresheners as they add chemicals to the air
- no smoking indoors
- wash pets regularly
- keep your house free from dust and dirt. Clean your heating and cooling systems. Without proper maintenance, these systems can become a breeding ground for mold and bacteria. Your furnace filter should be checked monthly. Along with filtering our air properly, you should clean your ducts every 3 to 5 years and possibly sooner if you have children, pets or have done major renovations.

Methods to improve and control air quality include:

- ventilation (primary solution)
- air cleaning (filtration)
- air conditioning
- dehumidification
- humidification (humidity to be kept between 30-50 %)
- local exhaust fans

Ventilate your home to get rid of the particulates and chemicals in the air but also to expel humidity

- On temperate days with low humidity, open the windows to bring fresh air inside
- Operating bathroom and kitchen fans is another simple way to get stale air out your home. Run them for at least half an hour after showering or cooking. If they are the only ventilation system in the house, run them for at least two hours a day. Make sure they vent outside and not just into the attic.

A Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV) mechanically controls the rate of air exchange in your home and saves energy when compared to other methods of ventilation. The HRV or ERV should be balanced to introduce the same amount of fresh air as the stale air it exhausts. The HRV/ERV core exchanges heat/energy from one air stream to the other so in winter time the fresh air is warmed by the stale air exhaust. In the summer time, in an air conditioned home, the incoming air is cooled by the stale air exhaust. HRV's/ERV's are often installed in new, tightly built homes but

can also be installed in older homes that have been renovated to make them energy efficient.

After you reduce toxins and begin ventilating, you can consider filtering your air. Most air filters will remove some air borne pollutants from the indoor air such as dust, but will not effectively remove carbon monoxide, radon and lead dust. They may reduce to varying degrees allergens from mold and dust mites.

The health benefits of air filters are not clear, because there is such limited health evidence currently available from controlled clinical trials of filter use. However, it is clear that you should never use an air-cleaning device that deliberately produces ozone (ozone generators). It is not recommended by Health Canada. There is also insufficient evidence to make health claims regarding the use of ultra-violet (UV) light in home air cleaning devices.

There are two types of particle filters:

1. Mechanical devices draw air through a fibrous or metal material with different sized pores that trap particles.
2. Electronic devices use electronically induced charges to attract and/or remove pollutants, and can offer performance and energy saving advantages for a whole-house system. However, some can produce significant amounts of ozone that result in unhealthy indoor air quality and a pungent odor.

Proper installation, operation and maintenance are critical for effective operation of air filters. Check the filter for dust and debris buildup at least every month during heavy use. Replace or clean the filter as necessary, based on the manufacturer's recommendations.

If you want to reduce indoor particles using a central air filter, you are advised to run the furnace fan all the time. Note however that there is a significant electrical cost to do this. If you are considering purchasing a new furnace consider a high efficiency furnace with a brushless DC motor (efficient furnace fan motor).

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

The Association of Home Appliance Manufacturers (AHAM) operates a voluntary third party verification and certification program for portable room air filters. AHAM labels list a filter's clean air delivery rate (CADR) and recommend the maximum room size the filter can handle. The CADR takes into account both the air volume passing through the air filter on high speed and the minimum filtration efficiency for removing particles of smoke, dust and pollen from a room. You'll see numbers from 10 to 450. Air cleaners with a CADR of 10 or less are barely distinguishable from gravity at removing airborne particles.

Tools for Comparing Efficiency of Air Filters

Air filters that are highly efficient at removing certain types and sizes of particles may be inefficient at removing others. Particles smaller than ten microns in size (one sixth the diameter of human hair), that are not visible to the naked eye are of the greatest health concern.

Full-house (central) filters can be rated in a number of ways. Current standards use the Minimum Efficiency Reporting Value (MERV). MERV is expressed as a number between 1 and 20.

Central forced air systems in homes usually have a rectangular, one-inch thick fiberglass filter that slides underneath the furnace fan or into a wall or ceiling register where the air returns to the furnace. These filters are most effective at removing particles 10 microns in size or larger, and typically remove less than 10% of the very small particles that reach the filter. They are disposable.

Very low-efficiency type filters are often rated by weight "arrestance". Weight arrestance is NOT efficiency. It is the percent of weight, in grams of dust, which the filter can hold before it loads up completely. It is a measure of the filter's ability to handle coarse particulates and prevent physical damage to the air handling system. MERV ratings for such filters are usually between 1 and 4.

Medium-efficiency filters are typically pleated, woven material and are rated at 20-50% efficiency for removing particles of 0.3 to 10 microns. Both disposable and washable models are available. MERV ratings for such filters are usually between 5 and 8.

High-efficiency filters are rated at 0-95% efficiency. Both disposable and washable models are available. They are sometimes mistakenly called "HEPA" filters, however, true HEPA (High Efficiency Particle Arrestance) filters are 99.97% efficient. These are available from an HVAC professional.

MERV ratings for such filters are 9 and over; the top-performing models tested

by Consumer Reports have had a MERV of 11 to 13. MERV ratings do not apply to electronic air filters.

Humidifiers

Because summer air is naturally more humid it is not necessary to humidify during the summer months. In fact, dehumidification is often desirable and fortunately your air conditioner is an effective dehumidifier. During the winter months, however, when the air is much drier, proper indoor humidification provides a healthier, more comfortable living environment.

Drum and flow-thru humidifiers are evaporative types that can only put as much moisture into the air as the air can handle. Steam and spray-type humidifiers on the other hand can add moisture to the air regardless of its temperature. Ask your HVAC contractor to learn which humidifier is best for your home.

After installing a humidifier in your home it may take up to three weeks before you feel any difference. This is due to the fact that furniture, woodwork, carpeting, plaster and house plants will absorb the newly produced moisture until they reach normal levels.

You can purchase a hygrometer which monitors your humidity just like a thermometer measures temperature. Make sure levels stay below 60% in the summer and between 30% to 50% in the winter.

Ventilating Fans

A ceiling or wall-mounted fan (with or without a light source) or remotely mounted in-line fan, designed to be used in a bathroom, utility room or a kitchen range hood, whose purpose is to move objectionable air from inside your home

to the outdoors is known as a residential ventilating fan. ENERGY STAR qualified ventilating fans use, on average, 65% less energy than standard models.

Because of their blade design, they move more air with less noise and their high performance motors last longer.

Ventilating fan sound levels are measured in sones. A sone is an internationally recognized measurement of sound output. Sones translate decibel readings into numbers that correspond to the way people sense loudness. The higher the sone reading the louder the fan.

The Heating, Refrigeration and Air Conditioning Institute of Canada, working with stakeholders, is committed to reducing Canadian's exposures to indoor air pollution by developing Indoor Air Quality Guidelines and increasing public awareness.

A qualified technician should determine what system is right for you. Many contractors have been certified as having successfully completed the HRAI Residential Mechanical Ventilation course. Consider consulting a member of the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI). HRAI members are required to carry relevant trade and municipal licenses as well as workers' compensation and liability insurance and must adhere to a code of ethics which includes developing and maintaining an understanding of proper equipment selection. For a list of HRAI members in good standing, visit www.hrai.ca or call toll free at 1-877-467-HRAI (4724).