

## The Importance of Bathroom and Kitchen Fans

Bathroom and kitchen fans are an important part of your home's ventilation system. They remove odours from your house, which improves indoor air quality. They also remove moisture, which decreases the level of humidity in your house. High humidity can damage building materials and can cause mold growth. Mold may affect your family's health.

### COMMON FAN AND EXHAUST SYSTEMS

The two most common types of fans are impeller fans and blower fans.

Impeller fans move air with blades similar to airplane propellers.

Blower fans look like hamster wheels—they are often called squirrel cages—and generally do a better job of moving air than impeller fans.

Most exhaust systems consist of an exhaust fan, ducting and an exterior hood. Some houses have a central exhaust system, in which one fan draws moisture and odours from several rooms of the house using a network of ducts.

Kitchen exhaust systems usually have the fan and fan motor in the exhaust hood. Other systems use an in-line fan, which is in the exhaust duct, or a fan outside the house. In-line and outdoor exhaust fans are usually quieter than systems with the fan in the room.

A heat recovery ventilator (HRV) also exhausts moisture and odours. An HRV is a self-contained ventilation system that provides balanced air intake and exhaust. Like a central exhaust fan, it can be connected to several rooms by ducting.

### How good is the fan I have now?

CMHC's research shows that many houses have exhaust fans that:

- are too noisy
- move very little air
- are not energy efficient
- may cause backdrafting of combustion appliances
- use high-wattage lighting

### Are there better fans?

Yes. There's a new generation of effective, quiet, energy-efficient exhaust fans and controls.

### How do I choose the best system?

First, choose the quietest, most energy-efficient fan in the size range required. Most fan labels have Home Ventilating Institute (HVI) ratings so you can compare noise and energy efficiency. Look for a fan with replaceable parts and permanent lubrication. A fan suitable for continuous use is preferable. Be prepared to pay more for a quality fan.

Second, select low-resistance (smooth) exhaust ducting. Seal the joints and insulate sections that run through unheated spaces.

Third, place the exhaust hood where it will not cause moisture damage on exterior surfaces.

Fourth, if you have heating appliances with chimneys, make sure that fans won't cause the appliances to backdraft.

Fifth, install the proper controls.

## BATHROOM FANS: WHAT SHOULD I LOOK FOR?

Fan exhaust capacity is rated in litres per second (L/s) or cubic feet per minute (cfm). A normal bathroom needs a good-quality fan that draws 25 L/s (50 cfm). A poor-quality fan won't exhaust enough air and will be too noisy for regular use. The best fans have sound ratings of 0.5 sones or less and consume about 20 watts. Older units typically run up to 4 sones and 80 watts.

Large bathrooms, or those with bigger fixtures, such as spas, need larger fans. Place the bathroom fan as close as possible to the source of moisture or odour. For in-line fans, as long as the intake grille is properly located, the fan itself does not have to be close to the bathroom. Some bathroom fans have lights or heating lamps. If you choose a fan with integrated lights, look for efficiency. Any fan installed in an insulated ceiling—for instance, if the attic is above the bathroom ceiling—must not leak air and must be rated for use under insulation.

Make sure that exhaust fans, lights and heaters in bath or shower enclosures are rated and approved for wet conditions. Newer units approved for wet conditions may include ground fault protection.

### Noise

Noise determines whether people use a fan. Many people won't use a noisy fan. Select the quietest fan

in the size you need. Look for fans labelled “low noise” or “quiet,” and check for the HVI rating. If it is not rated, there is a good chance that it will be noisy. In-line fans, due to their potential remote mounting, can also be very quiet.

### Fan power requirements and airflows

There is more to energy efficiency than selecting an energy-efficient fan. Ducting can affect fan performance. Uninsulated, undersized, or droopy flex ducting, ineffective or dirty backdraft dampers and exhaust louvers can cut rated airflow by more than 50 per cent.

To find out if your exhaust fan is drawing air, hold a piece of toilet tissue up to the grille. The exhaust air should hold the tissue tightly to the grille. You could also check the outlet to make sure the air is leaving your house. CMHC has developed a simple test to measure flow and published it as an *About Your House* fact sheet titled *CMHC Garbage Bag Airflow Test* (see the last page for more information).

### Controls

Bathroom fans connected to light switches start running when the light is turned on. Often, users turn the light off before all the moisture is exhausted after a bath or shower. An electronic timer, which is usually quieter than a mechanical timer, offers a wide range of settings. Make sure the time instructions are easy-to-understand and the timer is

easy to use. You can use motion or humidity sensors, or a combination of both, to control the fan. Controls which allow you to specify operating times or maximum humidity levels are preferable to those where the operation is pre-set by the manufacturer. Use a delayed fan shut-off to keep the fan running for 15 minutes after you leave the room.

### Cleaning

Fans create static electricity which attracts dirt like a magnet to the fan and its housing. The dirt can encourage mold growth and restrict air movement. Clean fans, housings, backdraft dampers and exterior flaps seasonally. A typical bathroom fan can be cleaned by pulling down the grille, and unplugging and removing the fan module. Fans in ducts and exterior fans may be difficult to clean.

## KITCHEN RANGE HOODS

A kitchen range hood must move more air than a bathroom fan—about 50 to 140 L/s (100 to 300 cfm). As a result, they are noisier, with the lowest sound rating of about 4.5 sones, although they can be relatively quiet on low speed.

The most useful units have a low noise rating, an energy-efficient fan, fluorescent lights, sound insulation, anti-vibration mounts and duct connections. For heavy duty use, select non-corrosive materials such as aluminum or stainless steel. High quality hoods may have heat sensors and a safety shut-off.

Kitchen exhaust systems should discharge outdoors. Recirculating range hoods rely on filters to capture some odours and grease. The filters are generally made of carbon which must be replaced frequently to be effective. Grease will coat carbon, making it ineffective. With recirculating fans, cooking moisture and odours will usually remain in the house.

### Positioning

Range hoods are most effective when they extend out over the stove surface and are close to the stove top. Island units are less effective than wall units.

### Cleaning

Range hoods usually have washable, aluminum-mesh grease filters. Better quality filters have a smaller diameter mesh over a larger surface area and can be cleaned in the dishwasher. Clean or replace grease traps and filters frequently. There are now range hoods available that allow you to remove the fan, but not the motor, for cleaning in a dishwasher.

### Fire

There is always the possibility of a grease fire with a kitchen range hood exhaust. Smooth metal ducting, preferably galvanized steel, is safer in a fire than lighter assemblies.

### Installation

Install fans and exhaust systems so they make the least possible noise, vibrate as little as possible and leak as little air as possible.

Anti-vibration pads or foam tape can isolate the fan housing from wood joists and drywall. You can wrap fan housings and some duct sections in rubber or vinyl noise barrier mats.

### DUCTS

Install exhaust systems according to the building code and manufacturer's recommendations. Straight, short duct runs, with few turns, will result in the highest fan flow.

For bathroom fans, use duct with a diameter of at least 100 mm (4 in.). For long runs, use larger, 150 mm (6 in.) diameter duct to improve airflow. It is usually best to avoid fans with 75 mm (3 in.) exhaust ports and ducts. Follow manufacturer's instructions for kitchen exhaust duct sizes.

Seal all duct joints and connections with aluminum duct tape or duct mastic (available at contractors' supply shops) to prevent air, moisture and noise leakage. Standard cloth duct tapes tend to dry out and fall off.

Seal and then insulate all ductwork running through unheated areas to avoid moisture problems. The best practice is to slant horizontal runs of duct down toward the exterior outlet to drain any condensation outside.

Exhaust air should not be released into the attic, into a wall or ceiling cavity, crawl space, basement or in the roof soffit. These locations can promote condensation damage and mold growth.

### WEATHER HOODS, GRILLES AND BACKDRAFT DAMPERS

Even when fans are off, stack effects and wind loads may cause outside air to enter or inside air to exhaust through fan ducting. Fans are equipped with backdraft dampers, usually in the fan box exhaust port. Check damper flaps from time to time to make sure they are clean and working. The exterior exhaust flap or louvers should be clean and in good repair to maintain unobstructed airflow and reduce air infiltration. Most exhaust ducts are fitted with a single flap exhaust hood or triple louver aluminum or plastic exhaust grille. Use weather hoods that lie flat on the wall in driveways and other places where hood-type units could be damaged.

Plastic hoods break down over time and need to be replaced. Clean exhaust hoods of lint and nesting materials seasonally to ensure that the flap or louvers are not blocked or stuck open.

### SOME DANGERS

#### Chimney connections

Some older bathrooms have static exhausts which look like upside down funnels on the ceiling. If these exhausts are hooked into the furnace chimney, disconnect them from the chimney, seal the hole in the chimney with hydraulic (expanding) cement, and install a new powered exhaust. If these static exhausts go

## About Your House

The Importance of Bathroom and Kitchen Fans

directly outside, they can still be used, but a good fan will be more energy efficient and less drafty.

### High capacity systems

High capacity, industrial or oversized exhaust fans, and range-top barbecue fans can cause chimney backdrafting. Backdrafting occurs when air is drawn down the chimneys, bringing dangerous combustion exhaust gases into the house. Avoid backdrafting by selecting sealed combustion heating appliances. If you have appliances with chimneys in your house, and you wish to install high capacity exhaust fans, you will need a matching supply air fan to balance house pressures.

Many ventilation contractors or salespeople are unaware of the effects of large exhaust fans on other house appliances. Make sure that your system is properly installed with supply air. At the very least, make sure that you have smoke alarms and carbon monoxide detectors to warn you if you have severe chimney backdrafting.

## FOR MORE INFORMATION

Fact sheets and product ratings are available from:

Home Ventilating Institute  
www.hvi.org  
Telephone: (847) 416-7257

## Websites

**CMHC Garbage Bag Airflow Test**  
[http://www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu\\_003.cfm](http://www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_003.cfm)

**To find more About Your House fact sheets plus a wide variety of information products, visit our website at [www.cmhc.ca](http://www.cmhc.ca). You can also reach us by telephone at 1-800-668-2642 or by fax at 1-800-245-9274.**

### Priced Publications

*Clean Air Guide: How to Identify and Correct Indoor Air Problems in Your Home* Order No. 61082

### Free Publications

*Moisture and Air: Householder's Guide—Problems and Remedies* Order No. 61033

### About Your House fact sheets

*Attic Venting, Attic Moisture and Ice Dams* Order No. 62034

*Before You Start Renovating Your Bathroom* Order No. 62254

*Before You Start Renovating Your Kitchen* Order No. 62252

*Carbon Monoxide* Order No. 62046

*Choosing a Dehumidifier* Order No. 62045

*CMHC Garbage Bag Airflow Test* Order No. 62288

*Combustion Gases in Your Home—Things You Should Know About Combustion Spillage* Order No. 62028

*The Condominium Owners' Guide to Mold* Order No. 62341

*Fighting Mold—The Homeowners' Guide* Order No. 60516

*How to Get the Ventilation That You Need in Your House* Order No. 66348

*Maintaining Your Heat Recovery Ventilator (HRV)* Order No. 62043

*Measuring Humidity in Your Home* Order No. 62027

*Should You Get Your Heating Ducts Cleaned?* Order No. 62044

*The Tenant's Guide to Mold* Order No. 63902

©2000, Canada Mortgage and Housing Corporation  
Printed in Canada  
Produced by CMHC 19-01-11  
Revised 2001, 2005, 2007, 2010, 2011

Although this information product reflects housing experts' current knowledge, it is provided for general information purposes only. Any reliance or action taken based on the information, materials and techniques described are the responsibility of the user. Readers are advised to consult appropriate professional resources to determine what is safe and suitable in their particular case. Canada Mortgage and Housing Corporation assumes no responsibility for any consequence arising from use of the information, materials and techniques described.