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Breathe Easy

Whole-house ventilation isn't just a good idea, it should be a standard feature in your homes. Here's how it works.

The evolution to better, efficient, and more durable housing has led to a real need to include mechanical ventilation to maintain indoor air quality in tighter homes with reduced air infiltration rates. The need is clear and ominous: the American Lung Association has a strong list of cause-and-effect concerns that respiratory asthma and lung-effect health problems have increased 80% since our tightening of homes began 30 years ago and with the addition of more chemistry to the indoor environment.

The combination of increased pollutants and tighter enclosures makes the case and justification for mechanical ventilation seem quite obvious. Ensuring a continuous supply of fresh, filtered air isn't an additional cost—it is simply a forgotten one.

Managing the invisible is an interesting challenge. The air in our homes contains particulates—some we can see, but most we can't. And it's the ones we can't see, like VOCs, that could be the most harmful.

Specifying and installing ventilation is straightforward and effective: design, specify, and verify the operation of the system; select quality components and an effective strategy; and test the operation of the system by requiring the mechanical contractor to check airflow and termination point delivery.

How much ventilation are we talking about? The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has determined how much fresh air is needed to provide an acceptable level of indoor air quality, specified in ASHRAE Standard 62-02, which states that we need to provide 7.5 cfm of fresh air per bedroom, plus the ability to get an additional 0.01 cfm of fresh air per square foot of floor area.

Now comes a little math, but it's not too bad. We just need to know the home's dimensions and the number of bedrooms. If you want to skip the calculations, use this rule of thumb: An average-size home of 1,800 to 2,000 square feet will require 40 to 60 cfm of distributed, filtered fresh air.

There are various techniques for ventilation and distribution, and some options are better suited to certain climates than others. Here are two basic strategies you can start with to modify for your own designs and climate requirements. Any strategy should assume that all forced-air heating and cooling system components, including ductwork, will be sealed airtight with mastic and, if possible, installed within conditioned space.

STRATEGY 1: EXHAUST AND SUPPLY SYSTEMS

This method relies on a quiet exhaust fan running on either continuous low-speed operation or periodic higher-speed operation.

The exhaust fan is typically installed in a second-floor bathroom or in a central hallway. I have seen HVAC contractors install this fan in relatively close proximity to the centralized air return, where it gets some mixing assistance from the main air-handler. I also recommend installing a fresh air intake from outdoors to the return portion of the air-handler; this is in addition to any duct delivering combustion air to HVAC equipment. This fresh-air intake duct should include a damper (Figure 2) as well as a circulation controller. This will let the blower in the furnace filter the air as it comes in, reducing pollen and dust levels. I definitely recommend upgrading the type of filter you install (see "Upgrading Filters," page 18).

You can modify the exhaust and supply system mentioned above by excluding the exhaust fan and allowing the air-handler to draw in fresh air through a duct from the outside. This strategy is acceptable in most climates, but it might need to be modified in very cold climates. In colder climates, moist warm air could escape into an unheated attic or come into contact with exterior walls; this air could condense and create some moisture challenges. Measuring relative humidity levels and controlling the amount

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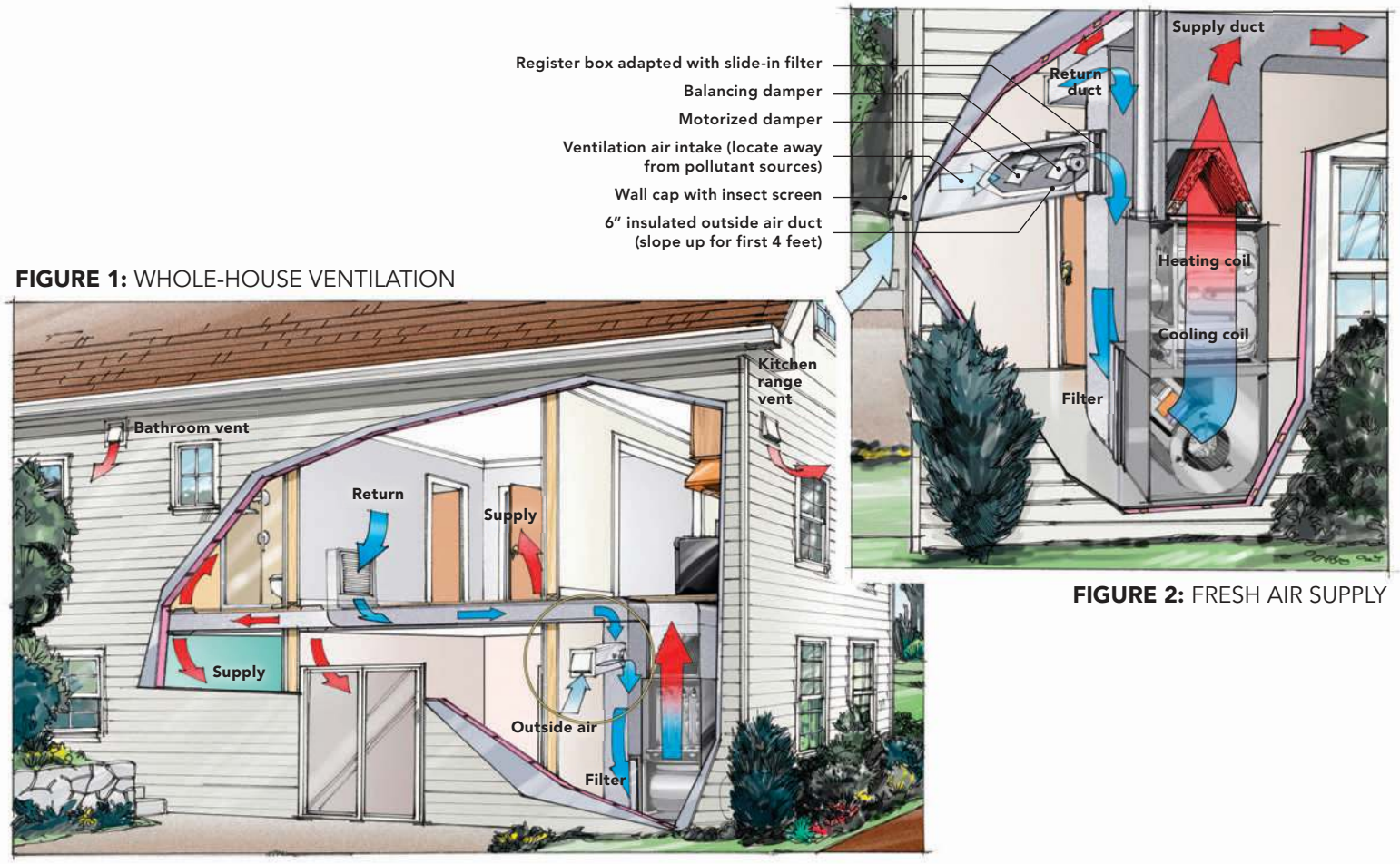

FIGURE 1: WHOLE-HOUSE VENTILATION

FIGURE 2: FRESH AIR SUPPLY

of incoming air, as described above, can avoid most moisture problems.

Cost: Between $400 and $1,000, depending on the fan quality, location of the air-handler, filtration system, and which control strategy you select. When you include a higher-quality filtration package, like the one shown here, the mechanically induced fresh air travels past this filter before it enters the home. Fresh, filtered air, properly distributed, is the result we're after.

STRATEGY 2:

BALANCED VENTILATION WITH ENERGY RECOVERY

Another strategy for managing indoor air quality is the use of balanced ventilation equipment with energy recovery—often referred to as an air-to-air heat recovery system. These systems have been on the market for more than 30 years.

This is a more expensive alternative than the techniques described above, but there are some additional benefits. First, as the name suggests, they recover energy. As indoor air is exhausted from the home, the exhaust air transfers its heat (or coolness) to the incoming fresh air. Energy recovery can be between 50% and 70% efficient in both cold and hot climates. In humid climates, the systems also can remove moisture before it enters the home.

These ventilation units have advanced controls that let you increase airflow when there's a temporary air-quality issue, such as your visiting uncle's cigars, a sleepover of teenage boys, or cooking fish on a night too cold for open windows. In some cases, certain people (me included) simply prefer more fresh air.

Cost: Between $1,800 and $2,500, depending on the equipment, installation approach, and control strategy. It will be assumed that good filtration is always included as mentioned above.

I have evaluated hundreds of homes over the past 20 years, and have witnessed the increasing need to create healthy and safe environments for our homeowners. There are many ways to introduce a continuous supply of fresh air into a home, and we no longer need to debate if it's necessary. It is. It's the right thing to do when your job is building homes for people.

For a quick ventilation calculator, visit **ecohomemagazine.com.**

UPGRADING FILTERS

I strongly recommend using an upgraded filter. The standard for media filters is based on the MERV (Minimum Efficiency Reporting Value) rating. The list below explains industry guidelines:

MERV 1–MERV 4: Throwaway Fiberglass Media

MERV 10–MERV 11: Pleated Media Air Filters 30% ASHRAE

MERV 13: Pleated Media Air Filters 65% ASHRAE (65% ASHRAE is about 20% effective on particles of less than 1 micron)

MERV 14: Pleated Media Air Filters 95% ASHRAE

I recommend a 4-inch-thick MERV 12, which provides longer filter life, as the amount of actual filter media is significantly larger than a 1-inch-thick filter. A good heating contractor can easily install these.—*M.L.*

ILLUSTRATIONS: HARRY WHITVER; BASED ON ILLUSTRATIONS COURTESY OF JOSEPH LSTIBUREK