

# Inspecting and Educating Go Hand in Hand When it Comes to WHOLE-HOUSE FANS

Bob Mulloy, ASHI Member

While regional in use, a whole-house fan can be a positive feature in today's airtight, energy efficient homes. These fans are designed to exchange large volumes of air in the living space, thereby reducing the heat radiating down from the roof and attic, improving ventilation, and increasing evaporative cooling. Unfortunately many clients don't have the foggiest idea what a whole-house fan is or how to use it, and, most importantly, the potential dangers it might pose.

Therefore, as with many other components, when a whole-house fan is present, I become both inspector and educator. As effective report writing is my passion, I've developed language that can be used to explain things verbally to a client or through the use of boiler-plated text. While each inspector must decide how to explain a component to the client and what must be reported, it is up to all of us to recognize "adverse conditions."

## As the Inspector

First, the voice of experience - do not turn the fan on until you have inspected it, or you and the client may be exposed to hazardous conditions. I ask the owner or the real estate agent if it is safe to operate the fan, but I am still wary and use my judgment based on observed

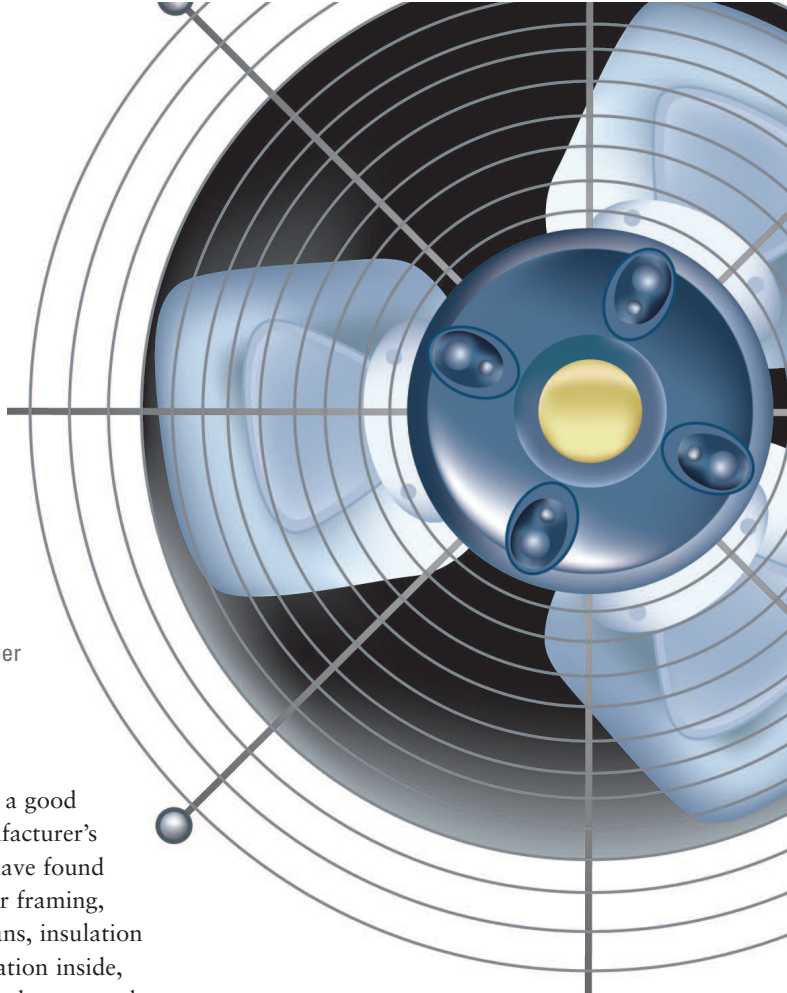
conditions. This is also a good time to ask if the manufacturer's manual is available. I have found unsafe wiring, improper framing, and loosely mounted fans, insulation covers with loose insulation inside, broken belts, stored goods—even rodent droppings—in and on whole-house fans.

After asking if the fan is safe to operate, I check the controls. Are they out of the reach of children? Labeled? Easy to find or hidden in a closet? A manual control or a clock timer should be present, but not a thermostat. If a thermostat is present, I report it as "unsafe," because unsupervised fan activation can cause depressurization hazards. In addition, the controls should be capable of operating the fan without energizing other appliances.

More advice: Don't turn the fan on yet; not until you've been in the attic.

In the attic, evaluate the attic-ventilation system in relationship to the needs of the fan. To ensure air drawn up into the attic can escape, there must be about 1 ft<sup>2</sup> of net-free attic ventilation area for every 750 CFM (cubic feet per minute) of fan airflow. Absent an instruction manual or some indication on the fan of its capacity, you may not be able to determine if there is adequate attic ventilation, but you should be able to observe the following:

- Are the attic vents free from obstructions?
- Will the type of insulation or its placement negatively interact with the fan?
- Are the ceiling penetrations sealed? If not, pressurized, hot air can leak back into the home through light boxes, attic hatches, and other penetrations or flow down within the walls all the way to the basement.
- Is the rough framing for the whole-house fan opening appropriate or do you see substandard workmanship?
- Is the fan mounted securely?
- Is a guard present to prevent accidental contact with the fan belt?
- Is a guardrail present to reduce the potential for a fall into the moving fan blade?
- Are there joists within the fan that will restrict air movement?
- Is the fan acoustically isolated from the structure with rubber or foam, so as to prevent noise transmission? ▶▶▶



- Is the fan still covered for the winter season?
- Are the springs on the louvers intact?
- Are the louvers bent or obstructed?
- Is the fan belt worn or defective?
- Are there any signs of substandard wiring?

All the above can be done quickly as part of a standard attic inspection. Later you can ask the owner if a permit was obtained for the installation.

Once you've inspected the controls, the louvers from the hallway and the fan from the attic, should you flip the switch? Not yet! If there is a real estate agent nearby, I suggest you ask him or her if the fan is operational, and if the answer is "yes," ask that person to open a window or exterior door and to turn on the fan. Explain that you want to remain free to monitor its function. If no real estate agent is present, then you must decide to activate the fan yourself or not. ALERT—remember to caution people move out of the way and not stand under the fan for safety!

If the fan is activated, check for operational problems such as the following:

- Loose belts
- Excessive noise or vibration
- Faulty louver opening & closing
- Loose fan blades
- Shutter or vane oscillation
- Weak air flow
- Debris spilling from the fan
- Loud thump when shutters close
- Whistling sounds from the attic

Of course, inspections do not always go as planned. Sometimes the whole-house fan is covered and sealed for the winter, the power is shut-off, or there is no attic access. When a system or component is not "readily accessible or is shut-down," I document the condition found at the time of the inspection, advise my client that further investigation is needed and fulfill my role as educator.



*UNSAFE – potential for AC refrigerant lines and flexible insulated duct to contact the fan.*

I do not energize the circuit; and I do not remove the insulation covering or tape from a switch. I do not force the louvers open manually, or remove the fan to enter the attic. Instead, I use risk-reduction language by reporting that the system was in a "shut-down" condition at time of inspection, that the true operational condition of the whole-house fan is undetermined, and that further inspection is needed.

I recommend in writing that the client ask the owner to demonstrate the operational condition of the whole-house fan prior to commitment, or that the owner provides written documentation attesting that the system or component is functional, or that the parties agree to withhold an agreed-on sum of money in escrow until the fan can be proven to be seasonally operational.

### The educator

Whether or not the whole-house fan is activated, you are the expert on site, and your clients have expectations that you will educate them regarding the maintenance and operation of each system and appliance. They expect you to bring problems to their attention, and to provide direction when needed prior to commitment. It's important to efficiently inspect the home, but don't forget the client's sometimes unrealistic expectations or their lack of comprehension

during a time of high anxiety.

Explaining things in simple terms helps clients grasp the significance of your observations. For risk management, you must report the same findings and explanations in your final report.

### How does a whole-house fan work?

Typically fans are installed flush with the ceiling of a central hallway adjacent to the attic. I point out the automatic louvers and explain how they open when the fan is turned on, and automatically close when it is turned off. When on, the fan pulls cool outside air into the living spaces from open windows (fenestrations), creating a negative pressure situation in the home. The air in the living spaces is then pumped up into the attic and flushes the hot attic air out through the existing attic exhaust vents. The flushing effect created by a whole-house fan can provide many complete air changes per hour for the home if used correctly.

Since whole-house fans and air-conditioning systems should not be operated at the same time, I explain to my clients that outside air temperature and humidity dictate when the fan will yield optimum comfort, as opposed to air-conditioning. When the outdoors temperature is five degrees less than the indoors, the fan creates a cooling air movement within the home. While comfort levels

# DISCUSS THE DRAWBACKS

As an educator, I also alert clients to the following limitations and possible drawbacks to using a whole-house fan.

- Only cools the inside of a house to the outside temperature.
- Does not dehumidify.
- Can produce air noise, shutter vibration and motor noise.
- Can restrict access to the attic.
- Can cause excessive moisture levels in an attic during cool weather, resulting in condensation—conditions that are conducive for mold growth.
- Contributes to winter heat loss if not sealed and insulated.
- Will overheat if used without removing winter insulation covers.
- Blades and belts pose a risk of personal injury.
- Can be an attractive nuisance for children; parental supervision is needed.
- Can depressurize a home significantly, resulting in potential back-drafting interactive problems with combustion appliances in the home, and potential carbon monoxide hazards.
- Can suck dust and pollen into the home, causing respiratory and allergy problems.
- Can cause turbulence in the attic, possibly stirring up silica, dust mites, or insulation that can cause attic air to be forced back into the home through penetrations (hatches, lights, fans, duct registers, balloon framing).
- Can cause particles from the attic to be blown back into the home through attic and eave hatches, and blown out of eave vents and sucked back into the home through the open windows.
- May draw radon into the home.

between a whole-house fan and central air-conditioning will differ, there are cost benefits to consider: the fan may cost between \$400-600 for installation, compared to \$4000-7000 for air-conditioning. For those who have central air-conditioning, the seasonal use of a whole-house fan during the spring and fall can relegate use of air-conditioning to the hot summer months.

Even though a whole-house fan draws massive amounts of fresh air into a home, vents stale and hot air outside, removes odors, and has a perceived cooling effect as moisture evaporates from the human body, it is not a substitute for central air-conditioning. However, for homes that lack ductwork, a whole-house fan may be an attractive cooling alternative.

## How to operate the fan safely

My “Whole-House Fan course 101,” includes teaching the client about proper seasonal opening and closing procedures. I explain to clients that operating a covered fan could cause overheating and pose a risk of fire. Also, windows should be opened, and the fan should be turned on only when outside temperature and humidity are lower than indoor temperature and humidity. Not all windows must be open, but generally windows should be opened 4-5 inches as needed to equal approximately three times the area of the whole-house fan opening.

If you do nothing else, always remember to alert your client that depressurization and potential backdrafting problems from other appliances can be a great risk factor associated with a whole-house fan. Drawing large amounts of air from the home creates negative pressure. If the windows are not opened sufficiently, or if the attic is insufficiently ventilated, then combustion appliances that rely on atmospheric draft (such as water heaters, dryers, fireplace, etc.) may be at risk for backdrafting, flame rollout, or pilot blowout. Backdrafting may allow carbon monoxide to enter the home, and flame rollout may reach flammable materials. One of the reasons I recommend >>>

*Photo:*

*Louvers do not properly open and close*



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## WHOLE-HOUSE FANS *continued*

turning off the circuit in the winter, is because if the switch for the fan is accidentally turned on when windows are closed backdrafting is even more hazardous.

I suggest monitoring the opening and closing of the louvers, as their proper function is critical for the overall operation of the whole-house fan. Louver function can be impaired by accidental damage, objects may have fallen into the fan from the attic and may block louvers, or springs may wear out. The fan should not be operated if the louvers are defective. The client should read and follow the manufacturer's instructions regarding use and lubrication. I recommend a winter close-up routine including shutting off the circuit breaker to the whole-house-fan for safety, and the installation of an attic insulation box to prevent drafts and heat loss. In addition, I suggest parents

establish strict rules as to who is allowed to operate the whole-house-fan.

When I finish inspecting a whole-house fan, my client is no longer in a fog. He or she knows what the fan does, how it works, how to use it, and most importantly, the potential dangers it might pose. ■

*Bob Mulloy, ASHI member #561 and president of Allsafe Home Inspection Service, Inc. East Bridgewater, Mass., currently chairs the Education Committee for the ASHI New England Chapter. He has received the chapter's President's Award, Member of the Year Award and Mel Chalfen Award for educational training. A former report writing instructor for home inspectors at Northeastern University, and former editor of his chapter newsletter, Mulloy has been a frequent contributor to The ASHI Reporter. He is also an approved Massachusetts education provider and a frequent education speaker for ASHI chapters and Cape Cod Community College. Additional articles can be viewed at his Web site, [www.allsafehomeinspection.com](http://www.allsafehomeinspection.com). He can be reached by email at [rmulloy@verizon.net](mailto:rmulloy@verizon.net).*

## WEB RESOURCES

<http://www.eere.energy.gov/buildings/info/homes/wholehousefan.html?print>

<http://www.wholehousefan.com/>

## MAINTENANCE INFORMATION TO SHARE WITH CLIENTS

Whole-house fans should be installed and maintained according to the manufacturer's instructions, which usually call for lubricating mechanical moving parts, tightening fan mountings, inspecting and replacing worn belts, and monitoring the movement of the louvers to aid operation and service life. Because whole-house fan louvers rarely seal adequately, I recommend the following winter maintenance steps in cold climates to reduce heat loss.

Install an insulated cover over the fan opening in the fall. Covering the fan opening with plastic only is not adequate. The insulated cover can be installed from the attic side or from the house side, but it must be removed before the fan is used in the spring.

When the fan is covered, turn off the circuit, and tag it "off," to prevent accidental activation. Place a piece of tape over the switch on the wall and post a note reminding the occupants that the fan is covered for the winter. Activating a covered fan can cause hazardous backdrafting, may damage the fan by overheating and may pose a risk of fire.

Year around, a homeowner should maintain the attic-ventilation system and should seal penetrations into the attic for efficient whole-house fan function.

Well meaning homeowners often install additional attic insulation or block vents not knowing the affect it will have on the effective air movement necessary for the operation of the whole-house-fan.

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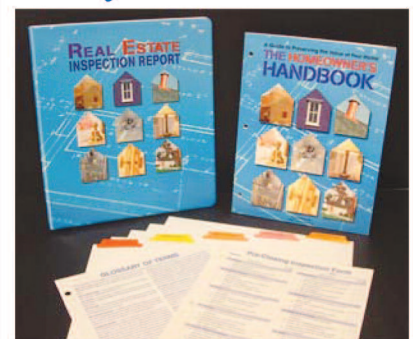
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