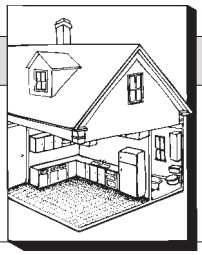

Choosing K&B Exhaust Fans

by William Lotz

Ineffective kitchen and bathroom exhaust fans are frequently the culprits in a house with moisture problems. In many homes, usually those built before 1940, there are no exhaust fans at all. Even in new homes, fans are often low on the priority list. They usually fall somewhere after the mailbox. That means when the fans are installed, they are often of the cheapest and noisiest variety. Even on a modest budget, good exhaust fans should be installed to protect the house from moisture.

The typical signs of moisture are peeling paint on clapboards, ice or condensation on windows, and mold and mildew on bathroom ceilings and walls. These could be signaling problems that can lead to serious structural damage or pose a health threat to the occupants. A good-quality exhaust fan, however, can help by quietly removing moisture, as well as odors, from the house.

The Right Fan for the Job

Choose a quiet fan, so the occupants will use it. There are a few inexpensive bathroom and kitchen exhaust fans that don't sound like someone is using a chainsaw in the room. Manufacturers measure the sound level of their fans in sones. Those with a sone rating up to 3 are quiet and, as a result, are the most likely to be used by homeowners. If the rating is above 5 sones, however, there is no question that the fan is running, and it is unlikely to get used.

The amount of air the fan draws is measured in cubic feet of air per minute (cfm). Generally, the more cfm a fan draws, the higher its sone rating.

Bathroom fans. As a rule, fans ranging from 70 to 110 cfm are sufficient for baths up to about 100 square feet (see Table 1). For a half-bath, lean toward the lower end of this range. In full baths, especially those used by several people, you need the full 110 cfm of power. In some cases, codes have specific requirements for the size of the fan.

Two good examples of quiet bathroom fans are the Penn Zephyr Z-6 (Penn Ventilator Co., 9995 Gantry Rd., Philadelphia, PA 19115; 215/464-8900), which rates 1.3 sones, or the Broan LoSone 360 (Broan Manufacturing Co., 926 W. State St., Hartford, WI 53027; 800/558-1711), which rates 1.5 sones. Both are so quiet, you hardly know they're on. But they pull 95 cfm and 100 cfm respectively, enough for most bathrooms.

Rooms with hot tubs require a more powerful fan. When the hot tub is in the bathroom, install a fan that pulls between 270 and 420 cfm. If the tub is remote, install a fan that pulls between 200 and 300 cfm from the tub area. Wire the fan so it's activated by the "bubble" switch on the tub. This way it will be turned on every time the occupants use the hot tub.

Similarly, bathroom fans should be connected to the light switch so that the fan is in use whenever the lights are turned on. It may take some persuasion to get your electrician to do this since most are used to putting in two switches. But using a single switch makes a big difference in how often the fan will be used.

Many companies make fan lights that, as the name implies, are a fan and a light in one unit. These often have a heater attached as well. While these combination units are less expensive than buying each of the components individually, I haven't had much luck with them. The fans tend to be noisy and the light isn't very good. In my experience, something that's designed to do everything doesn't do anything well.

Kitchen fans. Full-sized overhead range hoods up to 360 cfm are sufficient for most kitchens. But don't look for the kind of low sone ratings found in bathroom fans. Kitchen fans are more powerful and usually louder (see Table 2). One of the quieter models is the NuTone SH2000 (NuTone Company, Madison and Redbank Roads, Cincinnati, OH 45227; 800/543-8687; or 513/527-5100 in Ohio), which rates 5 sones at 320 cfm.

A more expensive but quieter kitchen fan is the remote blower. This type has a powerful, mushroom-shaped fan that's located outside the house. A good example is the Broan Model 338, which mounts on the roof and draws 900 cfm. Remote blowers, particularly the roof-mounted variety, need such powerful fans because they are pulling the air through long duct runs. To minimize resistance to air flow, these also use larger ductwork, typically 7-inch or 9-inch round.

Many manufacturers don't provide sone ratings for remote blowers. Fans that do have them often rate as high as 10 or 20 sones. It may be quiet in the house, but all the neighbors know the fan is running. While there's nothing you can do to make this fan quieter, you can minimize its intrusiveness by using a little common sense when installing it: Don't put a wall unit near the living room window, for instance. Putting it at the back of the house may make peace with the neighbors, but stay clear of the deck…you get the idea.

Finally, avoid ductless kitchen exhaust hoods, sometimes called recirculating hoods. They are considerably less expensive than other models because there is no ductwork to install. But the moisture pulled from the stove is vented right back into the house.

Backdrafting Danger

In most homes, the volume of air that's pulled out by an exhaust fan is small enough that it is replaced by fresh air leaking in through cracks and crevices in the structure. However, when you get extremely powerful fans that draw upward of 300 cfm, you can't exhaust that much air without sucking replacement air — often in the form of poisonous combustion gases — back down the chimney. Backdrafting, as this is called, is more of a problem in tightly built houses. But studies have found that backdrafting occurs in leaky houses, too.

In some of the more expensive homes I work in, the builders,

Table 1. Good-Quality Bathroom Exhaust Fans

Brand	Model	CFM	Duct Size	Sone Rating
NuTone	QT80	80	4-inch dia.	1.5
	QT110	110	4-inch dia.	2.5
Broan	LoSone 360	110	10 x 3 1/4-inch	1.5
Cook	Gemini 4-10	88	8 x 3 1/2-inch	2.4
Greenback	SP 108	104	6 1/2 x 5-inch	2.5
	CSP 108	72	6 1/2 x 5-inch	1.0
Acme	V-100	110	10 x 3 1/4-inch	2.9
Penn	Zephyr Z-6	95	10 x 3 1/4-inch	1.3

Table 2. Good-Quality Kitchen Exhaust Fans

Brand	Model	CFM	Duct Size	Sone Rating
NuTone	SH 2000	320	10 x 3 1/4-inch	5
	TH 500	320	10 x 3 1/4-inch	5
Broan	Silhouette	300	10 x 3 1/4-inch	4.5
	103023	360	10 x 3 1/4-inch	4.5

For most kitchens, a full-sized overhead range hood that pulls at least 300 cfm is needed to exhaust moisture and cooking odors.

architects, or homeowners want a commercial gas range with a 1,000-cfm exhaust hood. I recognize the appeal of these restaurant-size fans, but unless you have a motorized damper for outdoor air connected to the exhaust fan, or some provision for heating make-up air, you're going to create pressurization problems that will lead to backdrafting. Unless the clients have the extra money to invest in this type of air replacement system, I advise them to stick with the lower-cfm range hoods.

Installation Tips

The most critical element in installing a fan is to keep the duct run as short and straight as possible. Remember that fans usually have tiny motors that use very little electricity and don't generate a lot of power. You can't expect a 100-cfm fan to push air all the way out 30 feet of ductwork.

This is especially true when you're using flexible duct. While some people swear by it, the ridges in the material, as well as the loops that form between hangers, create friction and inhibit air flow. The ridges also collect dirt from the air. Worst of all, as air movement is slowed by the ridges, it tends to condense when it hits a cold area. The result is dripping ductwork, sopping wet insulation, and all the accompanying moisture problems.

I prefer aluminum ductwork with all of the joints sealed airtight with specialty duct sealant. If the duct is in a cold attic or crawlspace, it must be insulated to prevent interior condensation. This can be accomplished by burying the duct in the attic insulation wherever practical, and wrapping with duct insulation elsewhere.

I recommend aluminum wall or roof caps. The painted steel variety rusts quickly. The terminations should be located well away from windows, skylights, doors, or porches. Avoid eave terminations since moisture from the exhaust fans can blow back into the stud space. Roof terminations in snow country should have an ice membrane 3 feet in each direction under the shingles.

It's worthwhile to buy an exhaust fan with integral backdraft dampers. If you've ever stood under a fan that's leaking cold air, especially just after stepping out of the shower, you understand the advantages of a damper. It's often a good idea to use two dampers in case one is not working well.

Lastly, one of the most important "don'ts" for anyone installing kitchen or bathroom exhaust fans: Never exhaust into an attic, basement, or crawlspace! (That goes for dryer vents too.) Doing so practically guarantees moisture problems. ■

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