To find the number of intake vents required, use the Net Free Area Table as explained earlier in Step 5 to the left.

NET FREE AREA TABLE

Type of Vent	Net Free Attic Vent Area (sq. in. — approximate)†
High Vents – Exhaust	
FilterVent® (8' length)	144
ShingleVent® II (4' length)	72
Hip Ridge™ Vent (4' length)	48
Roof louver	50
Wind turbine (12")	112
Rectangular gable vents	
12" x 12"	56
12" x 18"	82
14" x 24"	145
18" x 24"	150
24" x 30"	324
Low Vents – Intake	
16" x 8" undereave vent	56
16" x 6" undereave vent	42
16" x 4" undereave vent	28
Continuous soffit vent & vented drip edge: 8' length	72
Shingle-over intake The Edge™ Vent: 4' length	36
Perforated aluminum soffit: One square foot	14
Lanced aluminum soffit: One square foot	4-7

† Be sure to check specifications for individual products to determine actual net free vent area.

TYPES OF ATTIC VENTILATION PRODUCTS

In general, ventilation components can be divided into two main categories: intake vents and exhaust vents.

INTAKE VENTS

The best location for intake vents is in or near the roof eave or low at the roof's edge, placed on both sides of the roof.

Intake vents are available in many designs. In choosing the right unit for a particular job, you have to consider the structure of the home, the area where the units will be located and the net free area provided by each unit.

The most common types of intake venting are:

- Undereave vents, which are mounted in the soffit. Units vary in size from 16" x 8" to 16" x 4". Net free area varies according to unit size.
- Continuous soffit vents, which are also mounted in the soffit. These units vary in length, with the typical length being 96".
- Vented drip edge, which is used on homes without an eave area.
- The Edge Vent Shingle-over intake which is a roof-top installed vent available in 4' lengths.
- Mini-louvers, which are typically used with other types of intake venting; they're too small by themselves to provide sufficient net free area of intake. In most applications, they're installed in an exterior wall to help eliminate moisture that collects in the wall cavity. To be effective, mini-louvers must be installed below the source of humidity (such as a bathroom or laundry area). That placement allows a flow of air to collect the humidity and carry it into the attic.
- Vented soffit panels, which are vinyl or aluminum soffits with vent openings already cut into the panels. Be sure to check the net free area of the panels to assure they provide enough ventilation to balance the system.

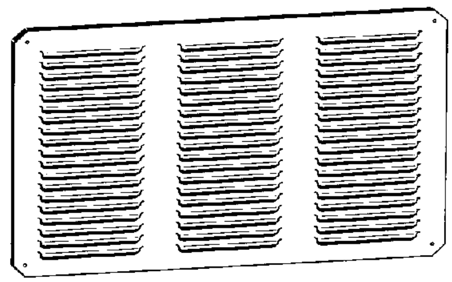

Figure 7-13: The undereave vent, an intake vent, allows needed air to enter the attic. It is located on the underside of the eave.

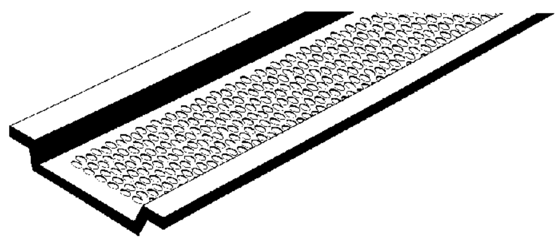

Figure 7-14: A continuous soffit vent takes in outside air and is located on the underside of the eave.

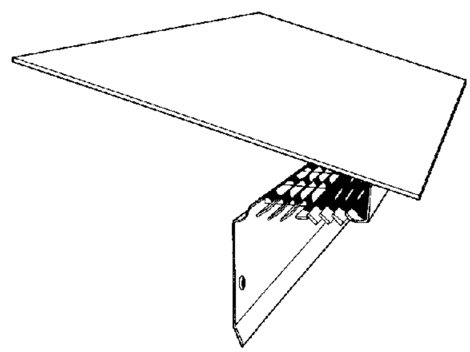

Figure 7-15A: For soffitless applications vented drip edge combines a drip edge with intake louvers.

Figure 7-15B: While conventional intake vents require installation in the soffit for maximum weather protection, the shingle-over intake vent The Edge Vent has been designed for roof-top installation and maximum weather protection.

Here's a Tip... When installing ridge vent with equal soffit ventilation, all other exhaust vents should be blocked with plywood or plastic. Attic fans should also be removed and the decking replaced where the fan was installed. (Thanks to Vincent Hee of Oreland, Pennsylvania.)

EXHAUST VENTS

Exhaust vents are designed to permit an efficient, unobstructed outflow of attic air. These units must be designed to prevent (or at least minimize) rain and snow infiltration. Exhaust vents must be used with intake vents to provide proper high/low balance and thus an adequate flow of air through an attic.

Exhaust vents are available in different designs:

Roof louvers

Roof louvers (also called roof pots) are installed as close to the roof ridge as possible to allow maximum release of moisture and overheated air. They are available in round, square and slant-back styles. Because they're installed near the ridge, they provide a continuous airflow along most of the underside of the roof sheathing. The airflow pattern isn't uniform, however, so for maximum effectiveness, vents should be spaced equally along the roof.

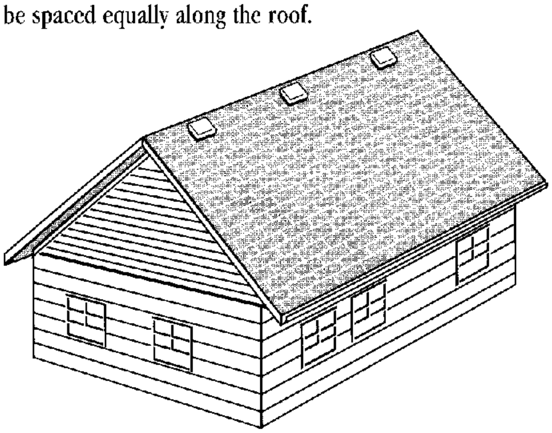

Figure 7-16: A roof louver is an exhaust vent located near the ridge.

Gable louvers

Gable louvers are typically installed in the gable ends of the house. Two types are available: rectangular and triangular. In most installations, a unit is placed at each gable end.

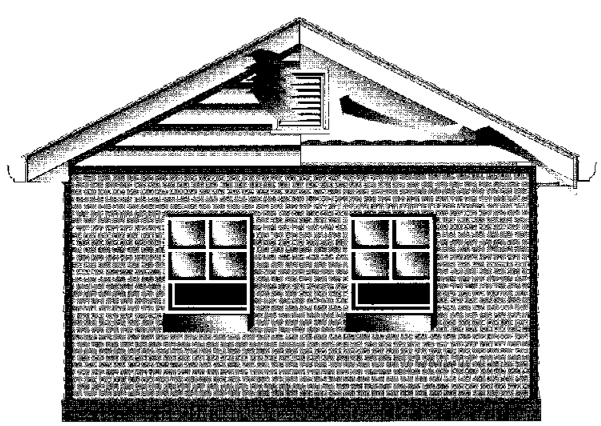

Figure 7-17: The gable-louver, an exhaust vent, allows unwanted air to flow out of the attic. These are located at the ends of the attic.

Note: Sometimes louvers are installed in opposite gable ends, without intake venting, in the mistaken assumption that a good "cross flow" of air can provide adequate ventilation. What typically happens, however, is illustrated in Figures 7-18 and 7-19. If wind direction is perpendicular to the ridge, the louvers act as both intake and exhaust vents, providing ventilation only in the areas near the vents. If the wind direction is parallel to the ridge, a cross flow of air is established, although the flow tends to dip toward the attic floor, leaving the hottest air still at the underside of the roof sheathing. Of course, if absolutely no intake venting can be installed at low points in the attic, a louver-only installation is preferable to no ventilation at all.

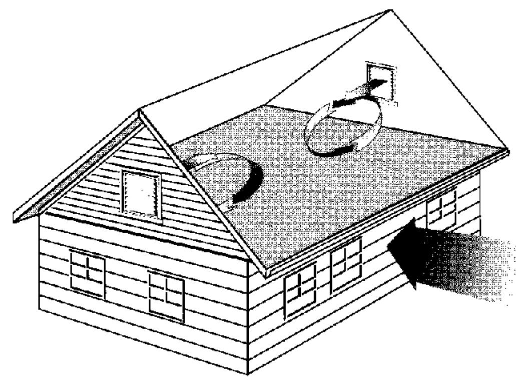

Figure 7-18: With wind blowing perpendicular to the ridge, the louvers act as both intake and exhaust vents.

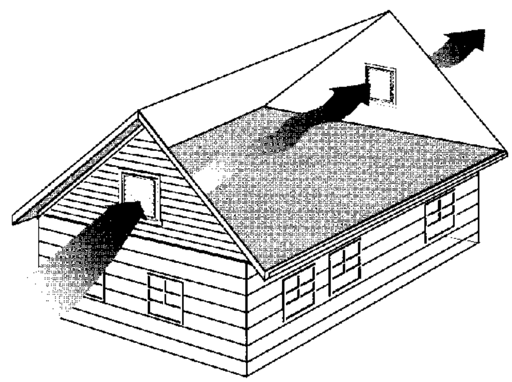

Figure 7-19: With wind blowing parallel to the ridge, airflow dips toward the attic floor leaving the hottest air still on the underside of the roof sheathing.

NEVER MIX TWO TYPES OF EXHAUST VENTS

When ridge and soffit ventilation is added to an attic with other vents in place, such as gable end vents, roof louvers, wind turbines or power fans, you must remove or block off the other ventilators. When installed properly, ridge and soffit systems draw air in the bottom (soffits) and out the top (ridge). Other open ventilator holes in the roof or gable will shortcut the low-to-high draft and diminish the ventilation effectiveness.

RIDGE VENTS

Ridge vents offer unique advantages compared to other types of exhaust vents. Those advantages include:

- **Maximum efficiency.** The best ridge vents use an external baffle designed to draw heated air from an attic regardless of wind direction or force. Figure 7-20 shows how that happens.

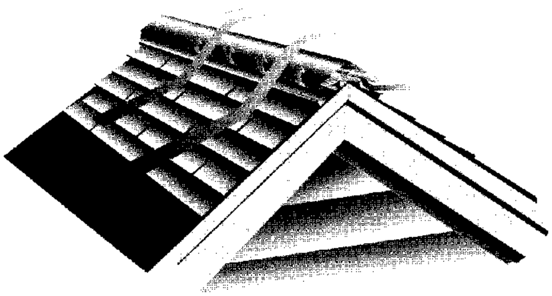

Figure 7-20: A baffled FilterVent® creates an area of low pressure on both sides of the ridge vent. It literally lifts air out of the attic through both sides of the vent.

When wind direction is perpendicular to the ridge, it strikes the external baffle and jumps over the ridge. That movement creates a Bernoulli effect, causing low pressure to develop on both sides of the vent. When that happens, air from the attic is "lifted" out, in much the same way low pressure created above an airplane wing gives "lift" to the plane (refer also to Figure 7-9).

The same thing happens when the wind direction is parallel to the ridge. It moves up and over the ridge, creating a low pressure area.

In addition, when little wind force exists, ridge vents take full advantage of the thermal effect to maintain air circulation across the underside of the roof sheathing. Warm air rises to the ridge and exhausts through the vent. That allows a continuous flow of cooler air to enter at intake vents. Only ridge vents use thermal effect efficiently and effectively, because only ridge vents provide continuous and uniform air movement along the full length of a roof.

Note: For best results, intake venting should be divided equally along both sides of a structure.

- **Maximum air movement.** Ridge vents with an external baffle provide a higher volume of airflow per square foot of attic area than any other fixed non-powered vent system. That conclusion is based on a series of independent tests that measured — and compared — the volume of air movement provided by ridge vents and other fixed vent systems. Externally baffled ridge vents work better because they take advantage of two natural forces: the thermal effect (the fact that warm air rises) and low air pressure that is created as air is deflected by the baffle up and over the ridge vent to create an area of low pressure on both sides of the ridge vent (see Figure 7-9).
- **Uniform air movement.** Because ridge vents run the entire length of a roof, they provide a uniform flow of air along the underside of the roof sheathing. That air movement helps eliminate "hot spots" that can develop with other types of exhaust vents — even powered vents. No other exhaust vent provides this type of airflow pattern.
- **Maximum visual appeal.** Most ridge vents offer a low-profile design that minimizes its appearance on a roof. Shingle-over designs allow optimum blending with other roof materials.

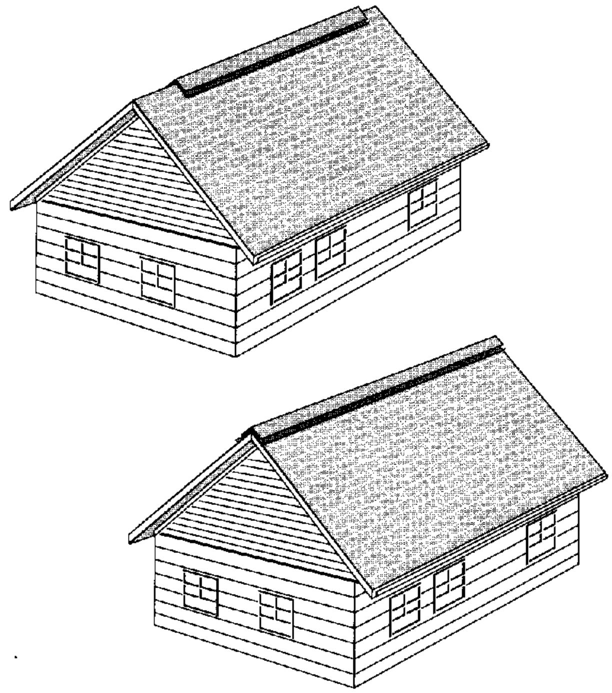

Figure 7-21: (Top) Ridge vent shorter than the ridge length presents an unattractive "broken" appearance.
(Bottom) A ridge vent should extend all the way from one end of the roof to the other end of the roof for a smooth "unbroken" roof line.

It's important to emphasize that the advantages listed above apply only to ridge vents that use an external baffle design. A series of independent tests has concluded that only an external baffle can direct the wind up and over the vent. That's significant, because it's that controlled flow of air that creates the area of low pressure that causes air to be drawn or pulled from an attic.

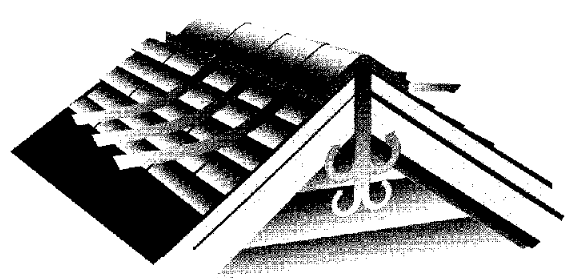

Figure 7-22: A roll vent with an internal baffle, or without any baffle at all, does not "pull" air from the attic through both sides of the vent.

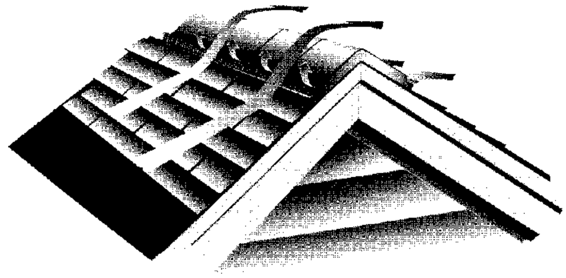

Figure 7-23: An externally baffled vent "pulls" air from the attic through both side of the vent.

Ridge vents without an external baffle were ineffective, failing to create the low air pressure needed to exhaust attic air through both sides of the vent. As a result, testers concluded that "an external baffle was the most significant contributor to the performance of a ridge vent."

WIND TURBINES

Wind turbines use a moving part to help exhaust air from an attic. That moving part consists of a series of specially shaped vanes that turn wind force into a rotary motion. As the spinning vanes gain velocity, they create an area of low air pressure. That low pressure, in turn, pulls air from an attic.

Although not as effective as ridge vents, wind turbines provide a low-cost alternative in areas where consistent wind speeds of at least 5 mph are typical. Without that minimal wind speed, wind turbines act essentially as roof louvers.

When the wind is blowing, however, wind turbines can be effective air movers.

To provide maximum ventilation benefits, wind turbines, like roof louvers, must be equally spaced along a roof. Otherwise, ventilation will be focused in the area surrounding the wind turbine, allowing hot spots to develop in other areas of the attic.

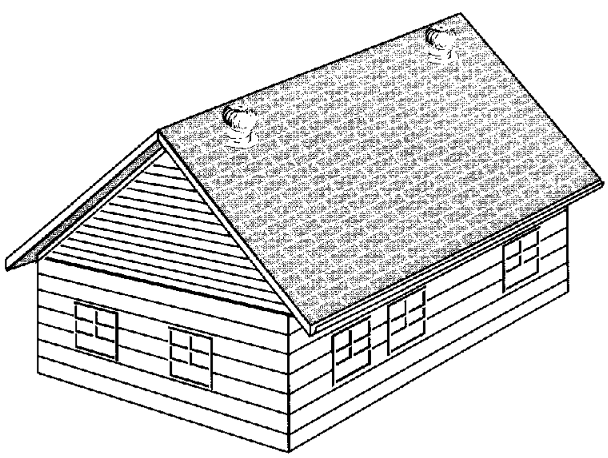

Figure 7-24: Wind turbines are located near the ridge and are used to exhaust air from the attic.

POWER ATTIC VENTILATORS

Like a wind turbine, a power fan uses the rotary motion of blades to draw hot air from the attic. But instead of using wind power to drive the blades, power fans use electricity to drive high-efficiency motors or sunlight if they are solar powered.

Unlike a wind turbine, however, the effectiveness of a power fan isn't dependent on wind force. Instead, a power fan is turned on and off as needed, automatically, with thermostat and humidistat controls. (In some models, an integral humidistat control is standard; in most models, however, a humidistat is an add-on option. Generally, solar powered fans do not have thermostat or humidistat controls.)

Depending on the size of the motor and the efficiency of the blade design, power fans can move more than 1,500 cubic feet of air per minute. That high volume of air movement is critical. To ensure adequate ventilation, power fans must provide at least 10 changes of attic air every hour.

Although a power fan can move a large volume of air, typically a single unit cannot "vacuum" all hot air from an attic. Usually, to provide uniform air movement along the underside of roof sheathing, a series of power fans must be spaced equally along a roof.

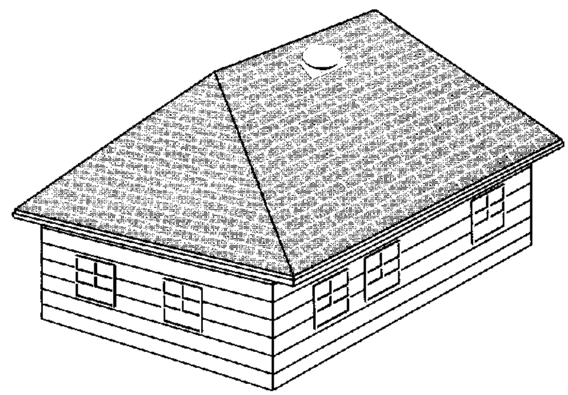

Figure 7-25: Power fans are used to move large volumes of air — a good option for hard-to-vent hip roofs.

When evaluating the feasibility of using power fans, it's important to evaluate one factor which is considered to be a major disadvantage: namely, that power fans cannot vent away moisture during the winter unless they are equipped with humidistat controls.

If this is a problem in your climate, it can be solved, by using a power fan that has a humidistat control. When that's done, power fans do offer key benefits. For one, they ensure a high volume of airflow, even on days when outside air is virtually still (a common occurrence in inland areas on hot summer days).