



## Golden Rule

Property Inspections, LLC

*A Locally Owned Professional Inspection Company*

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### **WHAT ATTIC VENTILATION DOES**

Ventilation is a system of intake and exhaust that creates a flow of air. Effective attic ventilation provides year-round benefits, creating cooler attics in the summer and drier attics in the winter, protecting against damage to materials and structure, helping to reduce energy consumption and helping to prevent ice dams.

With poor ventilation, summer sunshine can cause a terrific buildup of heat in the attic space. In a home with poor ventilation, the heat in the attic may eventually reach 140°F on a 90° day. If the unventilated attic is heavily insulated, that heat will stay there much of the night, perhaps slowly migrating to the home's interior. An overheated attic, combined with moisture, can also be damaging to roof decking and roofing shingles, causing them to distort and deteriorate prematurely.

### **WHAT ARE THE BENEFITS OF ATTIC VENTILATION?**

An effective attic ventilation system provides year-round benefits. During warmer months, ventilation helps keep attics cool. During colder months, ventilation reduces moisture to help keep attics dry. It also helps prevent ice dams. This results in:

- added comfort inside the house
- protection against damage to roof materials and structure
- reduced energy consumption throughout the year

### **VENTILATION DURING WARM WEATHER**

You appreciate the effects of ventilation when you look at the temperatures involved. These are typical temperatures for a home with no attic ventilation, on a sunny day, with an outdoor temperature of 90°F :

- Temperature at roof sheath: as high as 170°F.
- Temperature at attic floor: up to 140°F.
- Temperature in rooms directly beneath attic: uncomfortable.

An unventilated — or inadequately ventilated — attic seldom loses enough heat overnight to compensate for the heat gained during the day. Ironically, the effect is magnified in modern homes with heavier insulation. Over time excess attic heat can cause premature failure in some shingles.

### **HOW VENTILATION HELPS SOLVE ATTIC HEAT PROBLEMS**

Ventilation can't eliminate the transfer of heat from roof to attic, but it can minimize its effect. To do that, a well-designed system must provide a uniform flow of air along the underside of the roof sheathing. That steady flow of air carries heat out of the attic before it can radiate to the attic floor.

It's critical that this airflow is distributed uniformly. That means intake and exhaust vents must be balanced — for both position and airflow capacities. Otherwise, "hot spots" can develop under roof sheathing, drastically reducing the efficiency and effectiveness of whatever ventilation is installed.



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## **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, 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:

- Under eave 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".
- Drip edge vents, which are used on homes without an eave area.
- 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.

### **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.



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



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

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.

*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.*



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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.



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

**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, box or turbine static vents, 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.





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*Figure 7-20: A baffled ridge vent 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
- 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 .
  - 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.



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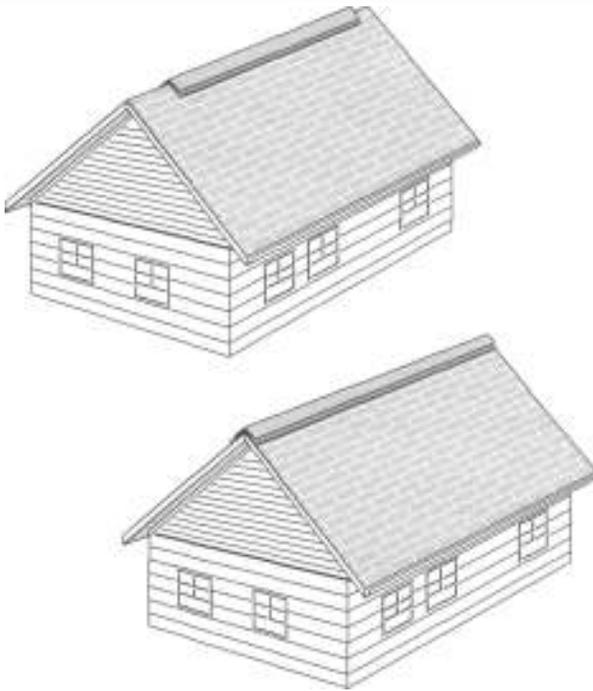
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*Figure 7-21: (Top) Ridge vent shorter than the ridge length presents an unattractive "broken" appearance. (Bottom picture) A ridge vent should extend all the way from one end of the roof to the other end of the roof for a smooth "unbroken" roof line.*

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.

To provide maximum ventilation benefits, wind turbines, like roof vent 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 7-25: Wind turbines are located near the ridge and are used to exhaust air from the attic.



Figure 7-26: Power fans are used to move large volumes of air a good option for hard-to-vent hip roofs.



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## **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. 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.)

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. (Some models offer a two-speed option that allows speed — and air movement — to be determined by the "demand" for increased ventilation.)

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.

When **evaluating the feasibility of using power attic 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, of course. 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).

In addition, power fans provide ventilation in some circumstances where fixed non-powered systems would prove inadequate. One common example involves hard-to-vent hipped roofs. Most fixed systems fail to meet ventilation code requirements for high vents, while power fans can provide the air needed to ventilate the attic properly.

Another example is a tile roof. Gable-mounted power fans will do the job nicely (although they must be mounted high on the gable to exhaust air correctly) if a fixed system is not feasible.