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THE TRUTH ABOUT VENTILATION

When you hear the term "attic ventilation" you probably imagine that classic diagram of a simple gable roof with arrows pointing in at the eaves and out along the ridge. Real attics must not have seen those diagrams, because airflow rarely follows the arrows. William Rose, with the Building Research Council at the University of Illinois, has been conducting some of the first real research into how and why attic ventilation works. His findings can help you design and build more effective attic ventilation. And they may surprise you.



Attic ventilation is the traditional way of controlling temperature and moisture in an attic. "New --and perhaps more effective ways -- will emerge from on-going research," says Rose. Meanwhile, builders rely on ventilation, so it should be done in the best way known.

Purposes of Attic Ventilation

Ventilating an attic reduces temperature swings. From your own experience, you know that a vented attic is cooler on a hot day than an unvented one. The cooling effect of venting has two benefits. First, it makes the home more comfortable during hot weather and reduces the cost of mechanical air-conditioning. Second, it helps get the rated life out of asphalt shingles.

According to Rose, BRC research also shows a ventilated attic is slightly warmer on a clear, cold night than an unvented attic.

In winter, venting maintains uniform roof sheathing temperature, which reduces the likelihood that ice dams will form. Without good ventilation, warm spots form near the eaves that melt snow, which can later re-freeze into a dam. More melting snow can build up behind the ice dam and damage the building.

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One of ventilation's primary jobs is to reduce the accumulation of moisture inside attics. BRC's research supports that idea. In side-by-side tests, air was permitted to leak into the attic from a humidified space below. More frost appeared on unvented attics than vented ones.

Attic Moisture

Research at BRC and elsewhere clearly indicates that moisture is carried into attics from below on small currents of air. Moisture laden air leaking from the living spaces is one major source. Surprisingly, crawlspaces can supply much of the damaging moisture to attics. Moist air from crawlspaces rises through openings around plumbing, ducts and wires. Once in the attic, the air cools allowing its water vapor to condense on roof sheathing.

"Don't rely on ventilation alone to take care of moisture in the attic," says Rose. "The best protection against condensation and mildew in the attic is a dry basement or crawlspace. Also important is an airtight ceiling."

Driving Forces

Most people have been taught that warmer air rises and escapes from the high vents, while cooler air enters in lower vents. Thermal buoyancy is a major cause of air leakage from the living space to the attic, but research at the BRC shows that wind is the major force driving air exchange between an attic and the outdoors.

"Our research shows that the role of thermal buoyancy in diluting attic air with outdoor air is negligible," says Rose.

This requires rethinking about the design and location of attic vents. For example, some ridge vents may allow air to blow in one side and out the other, without drawing much air from the attic. Rose believes that ridge vents with baffles create better suction to draw air out.

Soffit Vents

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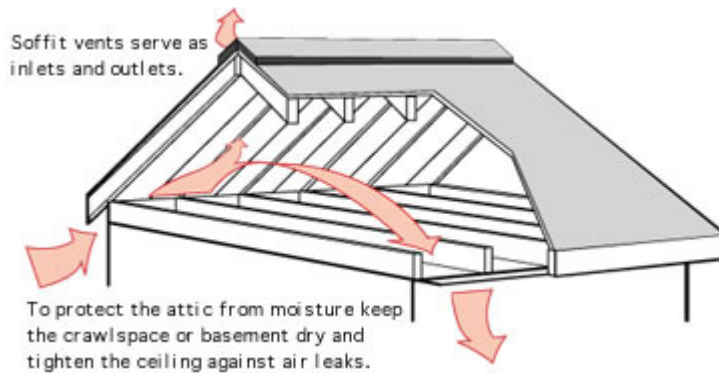
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Rose considers soffit vents to be very important.

"If a roof had only one type of vent device, I would choose soffit vents," he says, "because they work well as inlets and outlets."

There's less problem with rain and snow getting in, because soffit vents point downward. To get maximum protection, locate soffit vents as far out from the wall as possible. If rain or snow blow into the soffit, it's less likely to soak the insulation or drywall.

Soffit vents should always be installed whenever there are high vents. High vents, on ridges or gables, will pull air out of the attic. Without soffit vents, make-up air would be drawn through the ceiling, which increases heat loss and adds moisture to the attic.

Because of the importance of soffit vents, Rose believes that at least 50 percent of the vent area should be low on the roof.

More Research

For years, builders have discussed the merits of unvented roofs. Based on current information, venting attics seems to be a good idea. One of BRC's current research projects is looking into the question of unvented vaulted ceilings. Another study is looking into the merits of placing insulation just below the roof in a flat-ceiling attic. Including the attic within the conditioned space reduces heat loss from ducts, protects pipes from freezing,

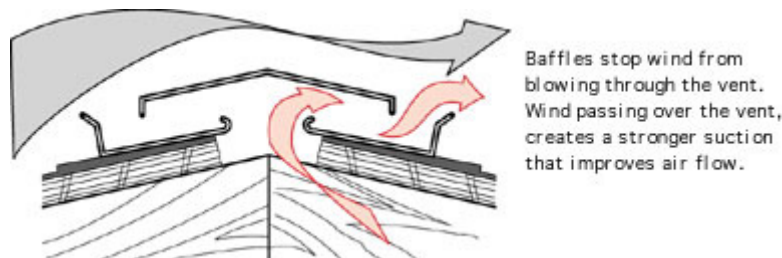


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colleagues will soon dispel more attic myths.

Baffles Improve Ridge Vents



Tips for Good Attic Ventilation

Based on his experience and intuition, rather than specific research findings, Rose suggests the following ideas for good ventilation:

- Distribute soffit vents evenly around the attic, including corners. Place at least 50 percent of the vent area into soffits. Select vents with low air flow resistance.
- Install a ridge vent with low air flow resistance and good aerodynamics. Net free area (NFA) indicates resistance and is stamped on the vents. Higher numbers mean less resistance and better air flow. A standardized test has been developed,



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but not yet adopted by manufacturers. Until it is adopted, you may have to rely more on common sense than NFA. To judge the aerodynamics ask yourself these questions: Will air blow through the vent or flow over it? Will attic air flow easily through the filter? Can snow blow in?

- Install air chutes to protect soffit vents from blockage by insulation. They channel air flow along the underside of the roof sheathing and don't seem to reduce air flow significantly.

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