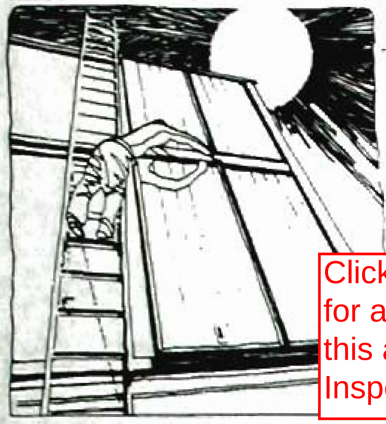

Is Roof Venting Necessary?

...ay ...w roofs

For years, we've been told to vent roofs and cathedral ceilings to ward off moisture damage and ice dams. But with today's higher insulation levels and tighter buildings the old rules may no longer be in force.

First, we should review the theory of roof venting. It goes like this: Moisture gets into the attic or roof by leaking up through cracks or by diffusing through the ceiling drywall. When airborne moisture hits the underside of the roof sheathing, the moisture condenses into water or frost.

Ventilation helps by removing this moist air before it has time to condense and cause trouble. Or if small amounts do condense, the vent air will reevaporate and remove it the next sunny day. Ice can directly evaporate by a process called "sublimation." If roof leaks or extreme condensation soak the insulation, ventilation will let it dry when the weather warms up.

A second function of roof venting is to prevent ice dams. Ice dams occur when a warm roof melts snow, which drips down and refreezes at the cold eave. A line of ice builds up at the eave, creating a dam. In bad cases, water pools behind the dam, runs under the shingles, and leaks into the house.

Providing continuous ventilation from ridge to eave prevents ice dams by keeping the roof surface cold. With a cold roof, the snow remains frozen till a warm day when it melts evenly and drains safely away.

Finally, roof venting significantly reduces summer cooling loads where this is an issue. Combined with radiant barriers, the effect can be striking (*Solar Age*, 7/84, p. 34).

Condensation

How does water vapor get into roof spaces? Primarily by moisture-laden air leaking through gaps in the drywall, and around electrical fixtures, exposed beams, and intersecting walls. Another route is up through the sidewalls.

Why does the air want to go up into this space? The main driving force is the stack effect—warm air continually moving up from the bottom of the house and out the top as if the house were a large hot-air balloon anchored to the ground. A secondary cause is wind sweeping over the top of a house, creating a low-pressure zone that sucks air out of the house. This is like the "lift" force that gets airplanes off the ground.

If the air/vapor barrier is good enough to resist these forces, then there's no problem. In a borderline situation, however, a vent space can actually make matters worse. The reason is that when the winds blow, the vent space can get depressurized and can suck moist household air into the roof from the house below. In such cases, reducing rather than adding ventilation may help—for example, blowing the vent spaces in a cathedral ceiling with cellulose, cutting off any airflow.

While I wouldn't recommend this approach, the principles are worth noting. No amount of ventilation will prevent condensation if the air is moist enough and the surface is cold enough. Look at the frost on your car windshield on a cold morning! Furthermore, ice-cold air doesn't do much to dry out wet materials. So in severely cold climates, don't count on roof ventilation. Count on vapor barriers and household moisture control.

A further blow against long-cherished notions about roof ventilation comes from researchers at Lawrence Berkely Labs who found that in a mild climate (3000 degree days), most attic moisture comes *from* the ventilation air itself, not from the house. In winter, the nighttime air deposits dew in the attic and daytime air evaporates it. In general, the attic held much more water in winter than in summer. But in both the daily and seasonal cycles, the water was stored safely in the attic lumber and sheathing.

To be safe, the no-vent route requires a near perfect air/vapor barrier in the ceiling. Also, household moisture levels should stay at a reasonable level—say 30 to 50 percent. If you have any doubts about airtightness, a blower door and smoke stick can provide a real education. The second condition—a safe moisture level—can usually be

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