ATTIC VENTILATION: Why It?s

By Raymond L. Corbin

Photo 1: Poor ventilation on this roof resulted in a significant dimensional change in the wood roof deck, which showed up as a ridge in the asphalt shingles.

"To ventilate or not to ventilate?" is a question sometimes discussed these days. Actually the discussion more often goes along the lines of, "How much more ventilation should be provided to do the job correctly?" With asphalt roofing shingles, there are at least two primary reasons to provide adequate below-deck ventilation: to reduce heat and moisture build-up.

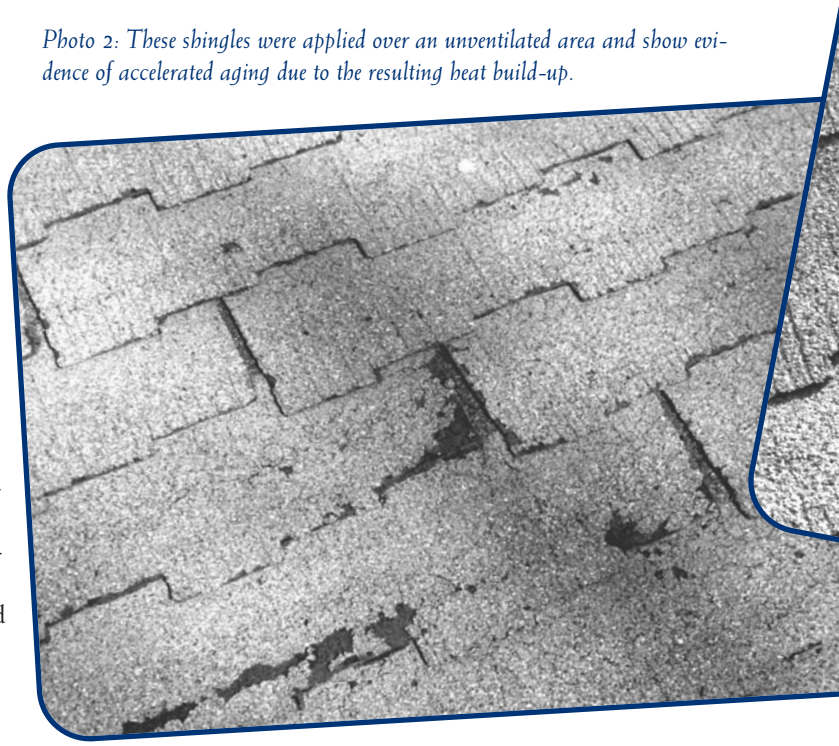
Typical shingle and structural problems experienced from improper ventilation can be:

- Premature shingle failure,
- Shingle buckling due to deck movement,
- Deterioration of the wood components,
- Moisture accumulation in the deck and insulation, and
- Accumulation of airborne pollutants.

In addition, where energy conservation is important, it is counterproductive to allow increased attic temperatures. Higher temperature allows for heat intrusion into the conditioned interior of the structure, which in turn causes increased energy usage. Proper ventilation of the underside of the roof deck or attic cavity helps to minimize heat build-up.

In areas of colder climates, lack of proper ventilation can lead to moisture accumulation and ice damming. All structures (some more than others) generate moisture from within. This warm, moist air in the form of water vapor moves through the structure and eventually contacts the cooler underside of the roof deck where it can condense into liquid water. At the very least, this will cause paint to peel, plaster to crack, and wood to rot.

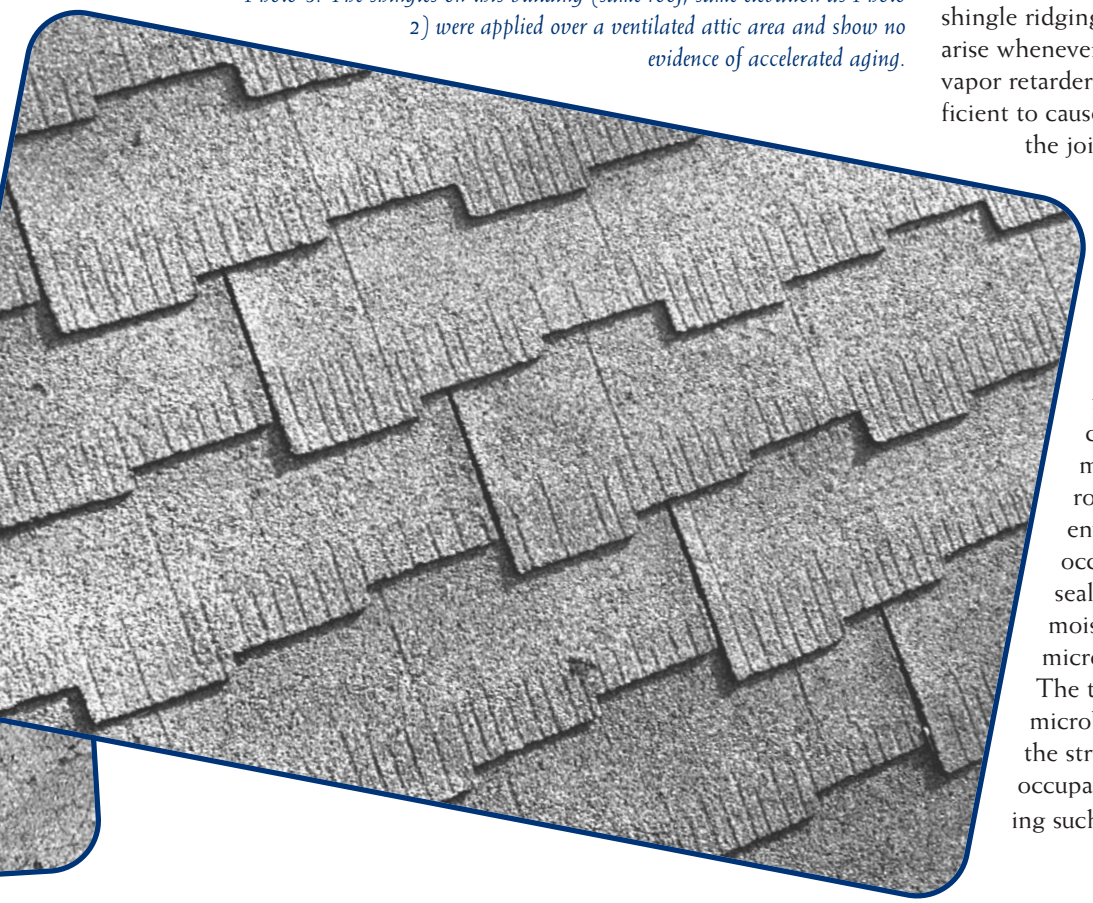
Photo 2: These shingles were applied over an unventilated area and show evidence of accelerated aging due to the resulting heat build-up.



Increases of moisture content can affect the wood deck's dimensional stability, possibly leading to excessive deck movement with its consequent stress upon the attached shingles. In addition, as the warm air enters the non-ventilated attic, it causes snow-covered roofs to melt at the deck surface. As the snow melt flows down the deck, it reaches the cooler overhang at the eaves and refreezes, causing an ice dam. This can result in a roof leak unless the structure has the proper self-adhering ice-and-water membrane installed at the eaves.

Another heat and moisture problem is the cathedral ceiling. In this type of construction it is common to see high R-value thermal insulation applied directly below the surface used to fasten the shingles. This type of construction not only prevents venting the underside of the shingle deck, it also allows the insulation to keep the shingles hotter. Prolonged heat exposure can have a negative effect on the shingle's coating asphalt, reducing its flexibility and durability, thus reducing the life expectancy of the shingle. A solution to this problem is to provide continuous venting (from eaves to ridge) through an air space located between the shingle deck (nailing surface) and the insulation. Additionally, an adequate vapor retarder must be installed below the insulation to prevent moisture build-up or, even worse, condensation at the shingle and deck interface.

Photo 3: The shingles on this building (same roof, same elevation as Photo 2) were applied over a ventilated attic area and show no evidence of accelerated aging.



Another moisture-related issue is the potential for shingle ridging on new construction. This problem can arise whenever there is inadequate ventilation and no vapor retarder. Often the interior moisture drive is sufficient to cause buckling of the underlayment felt at the joints in the plywood decking and, consequently, the covering shingles. The resulting pattern of ridging often causes a concern to the owner. Generally, but not always, the ridging will settle or become less obvious after the first year.

All of the afore-mentioned issues relate to the structure or to the shingles covering the structure. Consideration must also be given to the interior environment of the structure and how that environment relates to the health of the occupants. In the case of a non-vented, sealed attic, the ability of the cavity to vent moisture and prevent accumulation of microbes and airborne pollutants is restricted. The trapping of fungal-growing moisture and microbial contaminants within the cavity and the structure presents a health concern to the occupants. Further study is a must before utilizing such construction.

Summary

When evaluating the pros and cons of "To ventilate or not to ventilate," please consider the negative effect that prolonged heat exposure can have upon the flexibility of the coating asphalt, and thus, the shingles' aging characteristics. Asphalt roofing shingles are constructed with a blown (oxidized) asphalt that normally performs well over a wide range of conditions. However, logic should dictate that the hotter the shingles are kept, the more likely that this oxidization or aging process will continue, or even be accelerated. Allowing an increase in below-deck temperature only serves to elevate the temperature of the shingle already being heated by the sun's radiant energy, resulting in a negative effect to its long-term durability. Lastly, let us not forget that lack of proper ventilation within the structure could adversely affect the health of its occupants. ■

About the Author

Raymond L. Corbin is Director of the Better Understanding of Roofing Systems Institute (BURSI), sponsored by Johns Manville. He holds several United States roofing shingle design and application patents. Ray is a faculty member of the Roofing Industry Educational Institute (RIEI) and has served as Chairman of the Code Committee for the Asphalt Roofing Manufacturers Association (ARMA).

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