

Adequate attic ventilation critical for performance

by Mark S. Graham

Q: *I am replacing an asphalt shingle roof system and have been told by several contractors that additional attic ventilation is necessary. How do I determine the amount of attic ventilation required?*

A: Proper ventilation of the attic space below an asphalt shingle roof system and other types of steep-slope roof coverings is a critical design consideration. Inadequate ventilation can cause excessive heat and humidity (i.e., water vapor) buildup in the attic, which can



result in premature failure of the roof covering material, ridging or buckling in the roofing materials because of movement in the deck, deterioration of structural deck and framing members, moisture accumulation in insulation and the formation of condensation in the attic, which can drip into the building's interior.

Generally, the minimum required net-free ventilating area for enclosed attic spaces is calculated as a 1-150 ratio of the area of the space being ventilated—that is, a minimum of 1 square foot (0.09 m²) of ventilation opening should be provided for every 150 square feet (14 m²) of ceiling area.

An attic vent's net-free area is the total area of openings in the vent, taking into consideration appropriate size deduction for any louvers, screening, matting, etc.—this information typically is provided by the vent product manufacturer.

For attics where vents are located at both the eaves or soffits and along or near the ridge, the ratio of minimum net-free ventilation area to the area of the space being ventilated

can be reduced to a 1-300 ratio. When 50 percent of ventilation openings occur in the roof's upper portion, such as at the ridge, and the remaining 50 percent occur at the eaves or soffits, it is referred to as a balanced ventilation system. Using balanced ridge and eave ventilation typically is preferred when using the 1-300 ratio ventilation calculation method because it provides for optimum cross ventilation.

These methods for calculating the minimum attic ventilation requirements are based on research conducted in the 1940s by the Housing and Home Finance Agency, the predecessor to the current Federal Housing Administration. They since have been widely adopted by the model building codes, most asphalt shingle manufacturers and the Asphalt Roofing Manufacturers Association.

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It is important to realize that the 1-150 and 1-300 ratios are recognized as *minimum* ventilation requirements intended to eliminate problems associated with moisture accumulation in attics. These ratios were not necessarily directed at minimizing heat gain within attics. If a significant reduction in attic temperature is desired, substantially greater net-free ventilation area typically is required.

In certain instances, additional ventilation beyond the minimum provided by the area-based ratio calculation method may be necessary. For example, additional attic vents or other ventilation means, such as mechanical ventilation, may be necessary for steeply sloped roof shapes, which have attic spaces with dispro-

portionately large air volumes compared to the ceiling surface areas.

For information on techniques for ventilating cathedral ceiling style compact roof assemblies, see "Unique techniques for ventilating steep, compact roofs," March 1993, page 14.

Q: *Why is an underlayment felt required under asphalt shingles?*

A: It is important to understand that asphalt shingles and most other types of steep-slope roof coverings are not waterproof membranes but are individual water-resistant components installed in overlapping rows to shed water. For that reason, the use of an underlayment felt is advisable because it provides secondary protection from wind-driven rain, as well as snow and ice backup. This secondary protection also is useful in the event that shingles become damaged or dislodged or high winds dislodge individual shingles.

An underlayment felt also serves to separate the shingles from the deck. This helps minimize "picture framing," which is the visible outline of deck panels typically caused by irregularities in roof decking. This separating layer also protects the shingles from resins and other chemicals contained within nailable deck substrates.

A proper underlayment felt also is necessary in meeting Class-A or -C fire ratings. By itself, an asphalt shingle is not fire-rated but is a component of a fire-rated assembly. Many municipalities require a roof assembly with a Class-A or -C fire rating by code or ordinance.

Additional information about felt underlayment is provided in *The NRCA Steep Roofing Manual*. **PR**

Each month in this column, one of NRCA's deputy directors of technology and research will answer readers' technical questions. If you have a specific question that you would like answered in this column, send it to Professional Roofing, 10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607; or fax (708) 299-1183.