technical bulletin

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# *Ventilation and Moisture Control for Residential Roofing*

The proper ventilation of attic areas is a very important design consideration. If implemented correctly, proper ventilation methods can help ensure the maximum service life of roof assembly materials, and can improve heating and cooling efficiency. Minimum ventilation requirements are specified by insulation manufacturers for energy efficiency and by building code officials for code compliance. In addition, ventilation is required by shingle manufacturers to ensure the performance of the roof. Overlooking this consideration may result in these moisture related problems:

- Premature failure of the roofing including blistering
- Buckling of the roofing shingles due to deck movement
- Rotting of wood members
- Moisture accumulation in the deck and/or building insulation
- Ice dam formation in cold weather

In cold climates, internal building moisture is often a primary cause of roofing problems. Tighter construction techniques and heavier insulation applications help seal the side walls and create a more effective retarder against cold air penetration. Occupancy-generated water vapor will eventually reach the cold underside of the roof deck and condense. This may cause wood to rot, plaster to crack and paint to peel. Proper attic ventilation allows water vapor to escape before it condenses at the roof deck. Proper ventilation also helps to reduce the occurrence of many problems such as expansion/contraction of decking and ice damming in cold, snowy climates.

During the summer months, very high roof deck temperatures are caused by the sun's radiant heat. Eventually, the heat from the deck permeates the attic space, and finally reaches the living space. This, of course, decreases cooling efficiency. Additionally, recent research has reinforced the theory that prolonged exposure to extreme heat accelerates the aging of asphalt roofing products. By properly ventilating the underside of the roof deck, heat buildup and its related problems can be reduced.

The calculation of ventilation requirements is dependent on three primary factors: the size of the attic, the placement of the vents and the "rating" of the vents. There are two types of vents, intake vents and exhaust vents. It is a combination of these types that provides free-flow ventilation, the most efficient way to handle problems of unwanted heat and moisture in enclosed areas.





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In most cases, a minimum free-flow ventilation area equal to one square foot per 150 square feet of attic floor area must be designed and properly installed to provide proper ventilation. Where a properly designed and installed eave and ridge ventilation system is employed, a free-flow ventilation area equal to at least 1 square foot per 300 square feet of attic floor area is often sufficient. Combination eave and ridge venting is generally recognized as a superior venting technique.

Vapor retarder effectiveness is dependent on thorough coverage, either of the attic floor, or the bottom of the rafters. Penetrations, such as wiring chases, lights, flues and any holes or tears in the material can dramatically reduce the performance of a vapor retarder. The use of a vapor retarder, if well installed, can help to alleviate moisture concerns. Vapor retarders do not, however, help to remove heat or prevent the formation of ice dams. Ice dams are formed by the cyclical thawing of snow over the warmer portions of the roof and re-freezing at the cold eave. Proper ventilation can reduce the overall temperature of the roof deck, thereby minimizing the thawing of snow and ice on the surface of the roof.

Many modern homes are build with cathedral-style ceilings, with the insulation place between the roof rafters.* Free-flow ventilation must be provided to these assemblies under the roof deck through the use of vent baffles or chutes, which create a space between the roof deck and the insulation, or by constructing or using a ventilated deck sub-assembly, which is applied over or in place of the existing deck. (See Figure A.) In no instance should insulation be in contact with the underside of a roof deck or blocking the eave intake vents. Many homes also are built without overhanging eaves, and have no soffit in which to install a vent. Special facia vents, or venting "drip edge" vents are available for this application. When choosing any eave to ridge ventilation system, be certain that the lower vents meet the fresh air intake requirements of the local codes and provide at least as much capacity as the upper exhaust vent.

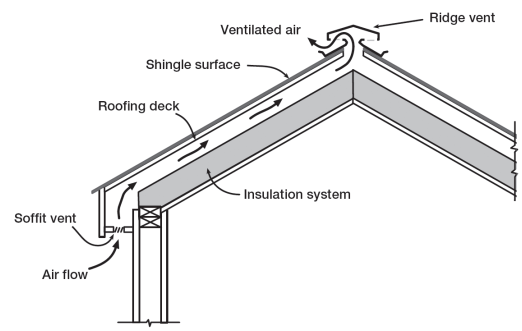


*Figure A: Ridge and soffit ventilation system for cathedral ceilings using insulation vent baffles*

The manufacturers of ventilation systems and vapor retarders should be consulted for proper use of their products. It should be noted that ventilation specifications were created well before the trend to higher energy conservation, tighter housing construction methods and cathedral ceilings. This standard may not be sufficient for every structure. Unusual situations require a designer with technical expertise.

Additional guidelines may be found in the free publication *Give Your Attic Breath of Fresh Air*. Simply send a self-addressed stamped envelope to: American Society of Home Inspectors, 85 West Algonquin Road, Suite 360, Arlington Heights, IL 60005-4423. Further information may be found in the *Residential Asphalt Roofing Manual*, published by the Asphalt Roofing Manufacturers Association, 1156 15th St., NW, Ste. 900, Washington, DC 20005.

* For more on this construction, see the ARMA Technical Bulletin *Application of Asphalt Shingles Over Insulation, Insulated Decks, or Radiant Barriers*.