Attic and Crawl Space Ventilation

Much care is taken in the design and construction of today's energy efficient homes and buildings. One critical area of concern is moisture, especially in attic and crawl spaces. Proper ventilation of these areas is imperative to prevent moisture related problems, initially during the construction phase, but also during the life of the building.

Considerable amounts of moisture can be introduced into the finished building from common, everyday use. Normal living activities in kitchens, bathrooms, utility rooms, and even firewood stored indoors can add a considerable moisture load to the building, including attics and crawl spaces. To reduce the possibility of excessive moisture in these areas, attics and crawl spaces should be properly ventilated. Improper or inadequate ventilation can result in moisture condensation on the underside of the roof or floor sheathing causing an increase in moisture content. If this occurs, the panels may expand and buckle or be subject to other moisture related problems. Further, no fans or appliances should be vented into the attic or crawl space. Providing a gap at all panel edge and end joints is recommended in part because of the possibility of panel expansion caused by moisture build-up in improperly vented attic and crawl spaces.

The minimum ventilation for attics as specified by Section 806.2 of the 2015 International Residential Code is one square foot of net free vent area for every 150 square feet of crawl space or attic area. (Note: one square foot of net free vent area for every 300 square feet of attic area is allowed if an acceptable vapor retarder is installed on the warm side of the attic insulation.) Further, attic ventilation should be balanced with 50 percent in the upper portion of the roof area (e.g., ridge vents) and 50 percent in the lower portion of the roof area (e.g., soffit vents). Specifications of shingle or other roof covering manufacturers should also be checked.

As an example, assume a rectangular ranch-style house is 40 feet wide and 60 feet long with no vapor retarder installed at the ceiling. This house would have approximately 2,400 square feet of attic area and would require 16 square feet of net free vent area, split evenly between ridge and soffit vents. Soffit vents would therefore require a little less than 10 square inches of net free vent area per lineal foot of soffit assuming a gable profile roof with the gables at the 40-ft ends. A continuous ridge vent would be required to provide approximately 20 square inches of net free vent area per lineal foot. Care should be taken to ensure that soffit vents are not blocked by insulation and that roofing underlayment does not block the ridge vents.

The illustration below (see Figure 1) shows a combination of ridge and soffit vents and how air flow is ideally directed through an attic space. Other upper roof vents include gable end vents, and cap or turbine vents, any of which can be used if they provide approximately 50 percent of the necessary ventilation area.

Crawl space moisture can be minimized by providing adequate drainage away from the foundation and by properly installing a vapor retarder as ground cover. A minimum 6-mil polyethylene vapor retarder is generally used. Care should be taken to ensure that all seams are overlapped at least 8 inches and that all rips and tears are patched. When a Class I vapor retarder (6-mil polyethylene) is installed over exposed earth, the minimum net area of ventilation openings must be at least one square foot for each 1,500 square feet of under-floor space area. And there must be at least one ventilation opening within three feet of each corner of the building. (See Section R408 of the 2015 International Residential Code.)

Manufacturers of venting products should be contacted for information on net free venting capabilities of their products.

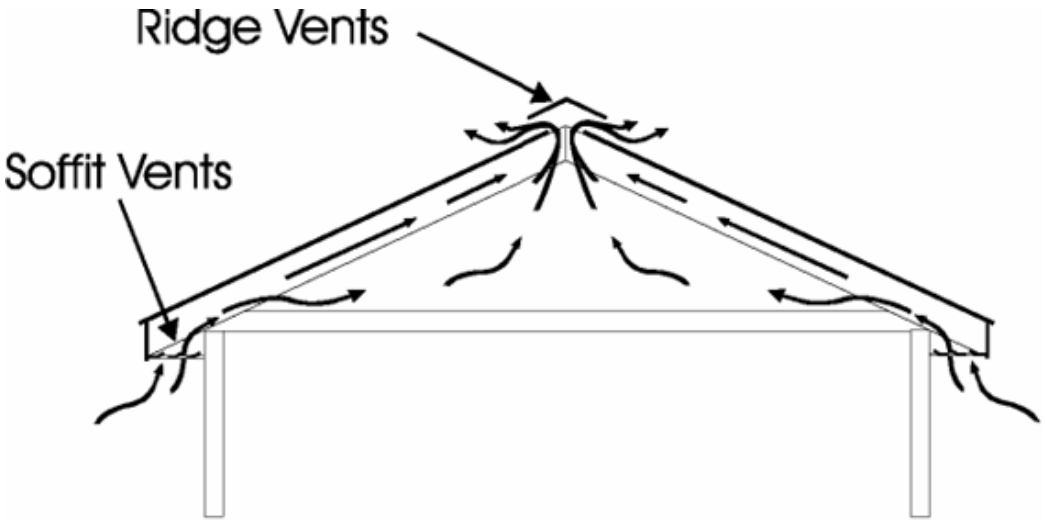

Figure 1. Illustration of attic ventilation with air flowing in through soffit vents and out through ridge vents. Ridge and soffit vents should be balanced to assure adequate air exchange.