



The Importance of Proper Attic Ventilation to the Roofing System

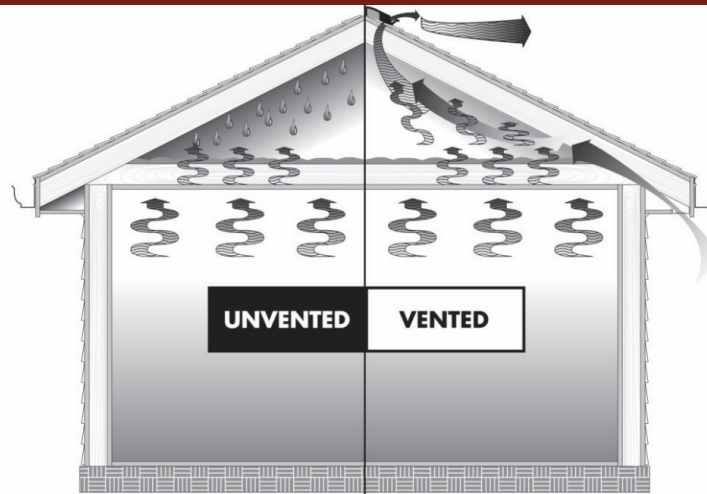


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BY ASPHALT ROOFING MANUFACTURERS ASSOCIATION (ARMA)

Many commercial buildings

developed for the retail, hospitality, healthcare, and multifamily industries use wood-framed design and construction techniques that use steep-sloped asphalt shingle roofs with enclosed attic or rafter spaces.

While current building codes use specific design criteria to reduce the likelihood of moisture problems in unvented attic systems, the most common and time-tested approach is to provide **proper ventilation under the roof assembly**.

Ventilation is a system of intake and exhaust that creates a flow of air. Proper attic ventilation provides year-round benefits for all types of roofing systems, creating cooler attics in the summer and drier attics in the winter, protecting against damage to materials and structure, aiding in reducing energy consumption, and helping to prevent ice dams.

With poor ventilation, summer sunshine can cause a massive buildup of heat in the attic space. In a building with poor ventilation, the temperature in the attic may eventually reach 140°F on a 90°F day.

An overheated attic, combined with moisture, can cause a number of problems, including damage to roof decking and roofing shingles, which can become distorted and deteriorate prematurely.

Heat that's absorbed in the attic can also radiate into the living space causing air conditioners, fans, refrigerators, and other appliances to work harder. **As a result, energy bills can increase.**

In the winter, moist, warm air from the lower portions of a building will tend to rise through the ceiling into the attic, especially through bypasses where electrical and plumbing fixtures are installed. In a cold attic, the warm, moist air condenses on the cold surfaces of the rafters, the nails and other metal, and the attic side of the deck. **This excess water can create several problems.**

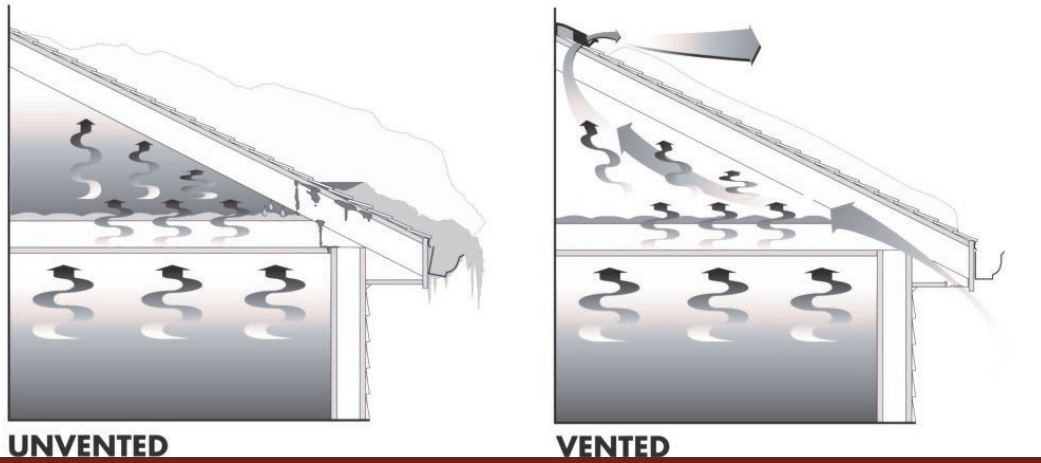


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First, the condensation can cause the deck to swell, resulting in waviness and buckling of both the deck and the shingles. Second, the water can rot the roof deck, destroying its ability to carry loads and its nail-holding capability. Third, severe condensation can drip onto the insulation, reducing its effectiveness and possibly seeping through to the ceiling below. Damp insulation causes wood rot, mold, and mildew, leading to poor indoor air quality in the rest of the home.



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Another winter problem caused by poor ventilation is the formation of ice dams. Ice dams form in cooler climates during winter when heat collects in a poorly ventilated and/or inadequately insulated attic space. Built-up attic heat combines with the sun's warmth to melt snow on the roof, even though outside temperatures may be below freezing. The flow of melting snow refreezes at the eaves and gutters.

This freeze-thaw cycle can result in a pool of water that can back up under roof shingles and behind fascia boards, soak roof decking and wall sheathing, damage exterior and interior walls, peel paint, and ruin ceilings. Current model building and energy codes include requirements aimed at reducing the chance of ice damming, which is more common in existing homes having less insulation that allows heat to escape through the attic and into the roof deck. For this reason, reroofing provides the perfect opportunity to reassess the roof and attic assembly and address any deficiencies while installing new roof coverings.

HOW VENTILATION WORKS

Efficient ventilation requires a very specific type of air movement to provide year-round benefits. A flow of air must be established to produce air changes — a steady, high volume of air movement. System components must be correctly sized and positioned to provide constant airflow, moving in a constant direction, throughout the entire attic area. Air movement can be created using natural or mechanical ventilation. Two key forces create natural air movement: stack and wind effect. Mechanical ventilation relies on a power source.

STACK EFFECT

The stack effect occurs because air that is heated is lighter than cold air. This rising warm air causes the pressure in the upper parts of the attic to increase and lower parts to decrease. Air will naturally exit and enter at the higher and lower locations in the attic space, respectively, due to the pressure differentials. A well-designed ventilation system places exhaust vents at or near the ridge and places intake vents at the lowest point in the attic, typically in the soffit or near the roof's edge.

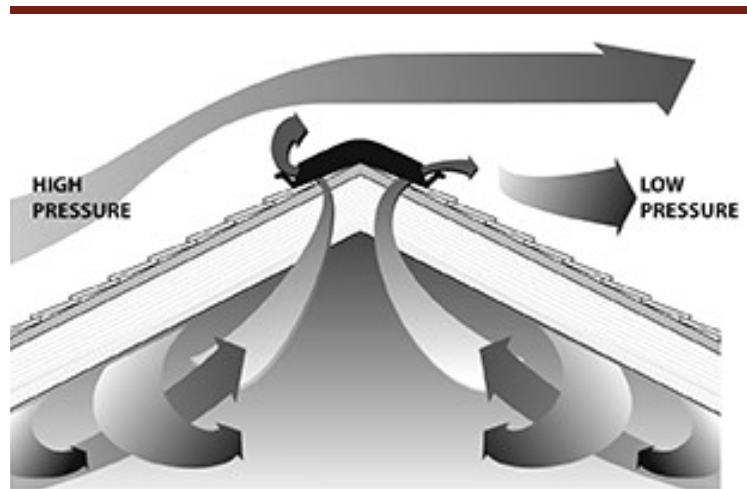


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WIND EFFECT

The stack effect alone cannot create the high volume of air movement needed for proper ventilation. Wind force is the key element in designing a non-powered ventilation system. A wind-driven flow of air against and over a building's exterior surface creates areas of high and low air pressure. High pressure forces air into the attic, while low pressure pulls air out.

HOW TO PUT THESE NATURAL FORCES TO WORK

A properly designed ventilation system requires a balance between the intake and exhaust vents to achieve the desired airflow capacity. In general, the net-free area of intake venting should be equal to or greater than the net-free area of exhaust venting. Net-free area is the total unobstructed area through which air can enter or exit a vent, measured in square inches. In addition, intake and exhaust vents must be positioned to create a proper high-low balance. Balance is achieved when half of the vent area is placed high in the attic (exhaust) and the other half placed low in the attic (intake). Without that balance, the area of proper ventilation is limited to the lesser of the two vent areas.

Proper placement of exhaust/intake vents assures a continuous flow of air, moving in the desired direction. Intake and exhaust vents must be positioned to assure continuous airflow along the underside of the roof sheathing. Also, intake vents must be located so there is little possibility of rain or snow infiltration and that the intake opening isn't blocked by dirt, building debris, or attic insulation.

VENTILATION STANDARDS

The International Code Council (ICC), the U.S. Department of Housing and Urban Development (HUD), and ASHRAE have set standards for roof ventilation. Shingle manufacturers have adopted these standards as minimum acceptable ventilation conditions. Overall, proper ventilation plays a critical role in preserving the life of the roof and building performance, especially in light of ever-changing weather conditions. With the above recommendations, durable, long-lasting roofs are well within reach.

For more information about attic ventilation, visit www.asphaltroofing.org.

About Aaron R. Phillips



Aaron R. Phillips
ARMA Vice President
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My goal is to advocate and advance the technical interests of the asphalt roofing industry.

Aaron R. Phillips, ARMA Vice President of Technical Services, has worked in the asphalt roofing industry since 1988. Phillips serves as ARMA's primary technical voice, assuring that asphalt roofing is accurately, equitably, and appropriately represented in all scientific and technical discussions regarding residential and commercial roofing applications. He manages all of ARMA's technical-related activities and also serves as the association's technical liaison to organizations involved in the development of building standards. Phillips has been active in various industry organizations throughout his career, including more than 25 years of service as an ARMA volunteer.

Why Choose Asphalt Shingles? Beautiful, Affordable, and Reliable

About ARMA

The Asphalt Roofing Manufacturers Association (ARMA) is a trade association representing North America's asphalt roofing manufacturing companies and their raw material suppliers. The association includes the majority of North American manufacturers of asphalt shingles and asphalt low slope roof membrane systems. Committed to advances in the asphalt roofing industry, ARMA is proud of the role it plays in promoting asphalt roofing to those in the building industry and the public.

For more information about ARMA, visit asphaltroofing.org.

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