# Cooling Strategies

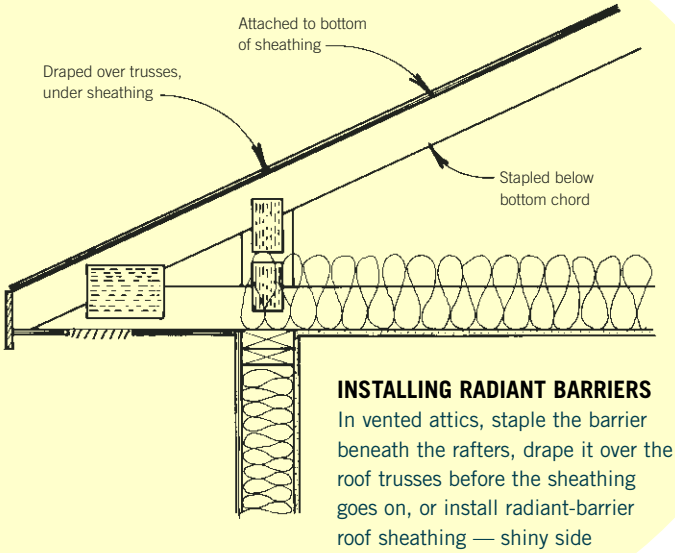
**Q:** Do radiant barriers really save energy?

**A:** Radiant barriers — typically a reflective foil on a reinforced paper backing or a foil-faced sheathing — are intended to reflect radiant energy and reduce the amount of heat entering a home. The barrier's effectiveness (measured as a reduction in a home's cooling bill) depends on several factors, the first of which is climate. According to the Florida Solar Energy Center (FSEC) at the University of Central Florida, radiant barriers make the most sense in locations in which there are 2,000 cooling degree-days or more. In more moderate climates, radiant barriers may also be effective wherever annual cooling bills exceed annual heating bills. There is no evidence that radiant barriers work in predominately heating climates.

The amount of insulation in the building also bears on the barrier's effectiveness. Homes with minimal (R-19) attic insulation will see a higher reduction in the amount of heat buildup from a radiant barrier than homes with well-insulated ceilings (R-30 or greater) that are already blocking heat flow.

Installing a radiant barrier should always be the last line of defense, not the first. Venting the attic and installing good ceiling insulation are typically simpler and far more effective ways to reduce attic temperatures and block heat transfer. And installing a light-colored (preferably white) shingle or reflective metal roof will offer the greatest savings for the least investment.

Should a radiant barrier be warranted, keep in mind that the reflective side of the barrier must be facing an open air space to work. The barrier can't just be draped over the ceiling insulation on the attic floor. The easiest method is to install foil-faced OSB or plywood roof sheathing, though a barrier sheet can also be draped over the top chords of trusses.




**INSTALLING RADIANT BARRIERS**
In vented attics, staple the barrier beneath the rafters, drape it over the roof trusses before the sheathing goes on, or install radiant-barrier roof sheathing — shiny side down in all cases.

## Got a question?

**We want to hear from you!**

**EMAIL**
coastal-editorial@hanleywood.com

**MAIL**
Coastal Contractor Magazine
Attn: Soundings
186 Allen Brook Lane
Williston, VT 05495

# Fastening Roof Tile

**Q:** What's the best way to secure roof tiles to keep them from blowing off in high winds?

**A:** To prevent the problem, you first have to understand what causes improperly fastened tiles to become loose and blow away. When wind flows over a roof surface, it creates a negative pressure similar to that over an airplane's wing. This negative pressure, combined with the updraft from the wind hitting the structure, creates enormous uplift forces on the roofing. The blowing wind also pushes underneath roof tiles along the eaves and rakes. Eventually, roof tiles that are improperly fastened will work loose, break, or even be carried away in a gust. In regions with winds in excess of 100 mph, roof tiles are a major source of wind-borne debris, posing serious threats to neighboring buildings.

Specific fastening recommendations depend on sheathing thickness, building height, base wind speed, roof slope and profiles, tile size, the number and size of overhangs, the angle the building sits in relation to the wind, and even the degree of precision with which one tile fits onto another. While code requirements vary, the National Tile Roofing Manufacturers Association (NTRMA) recommends two nails, or a nail and a clip, for every tile over nominal 5/8-inch sheathing. In high-wind zones, two 10-penny ring-shank nails or two #8 screws per tile, plus clips to secure the edge of tiles, are suggested. In areas prone to the strongest winds, tiles on all ridges, hips, and rakes should be set in a bed of adhesive, as well as secured by nails and mechanical clips. Adhesives bond the tiles together at the head lap, where the wind can find its way in and begin to pry the tiles loose.

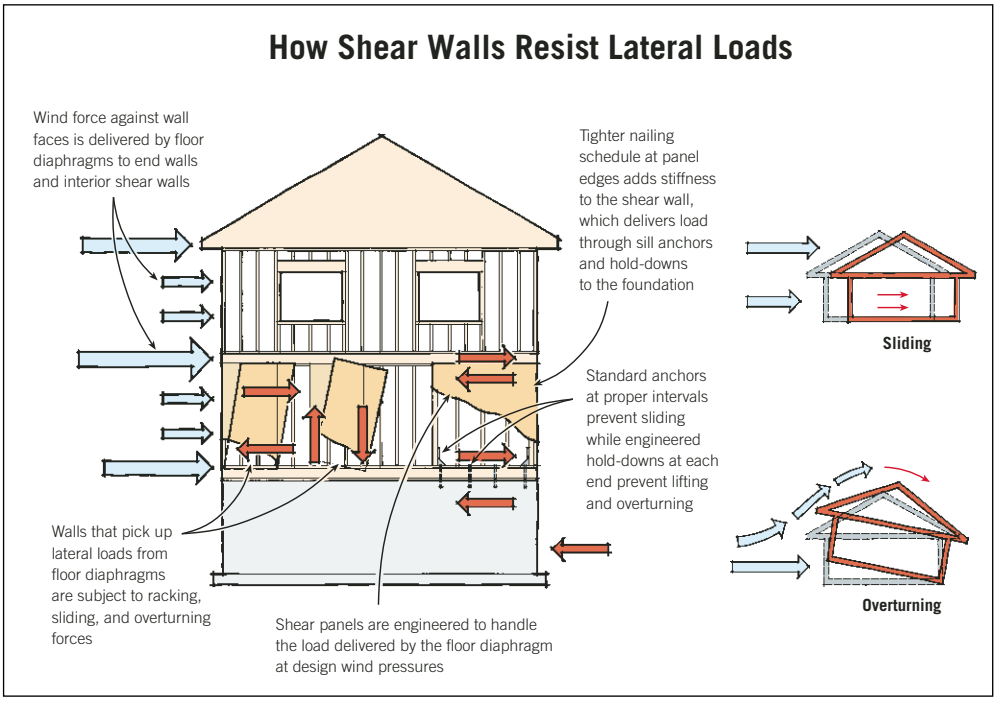
Some tile roof installers prefer mortar systems to nailing and clips, arguing that nailing tiles will penetrate the waterproof membrane and lead to leaks. However, leakage should not be a problem with a well-installed tile roof. Moreover, mortar systems are particularly intolerant of even the slightest building movement; consequently, mortar-bedded tiles are easily blown loose, as evidenced by the high degree of damage on homes in recent hurricanes, particularly along roof edges where uplift forces are greatest.

**ROOF TILE CLIPS**
In high-wind zones, best practice calls for nailing roof tiles with a minimum of two 10d ring-shank nails or two #8 screws per tile, plus clips to secure the edge of tiles. Clips that secure the front end of tile (above and right) are more effective than clips that secure the side edge of each tile (below).

# How Shear Walls Work

**Q:** We have been advised by our city planning board to add structural reinforcement for beachfront homes with shear walls. Is a shear wall the same as solid plywood wall sheathing?

**A:** Not exactly. While plywood stiffens a wall, a shear wall must be stiff enough to resist racking *and* must be anchored against sliding and overturning. High winds exert a constant pushing force, or load, against a wall face. The large surface area of a wall collects the wind pressure and transfers it to the studs, which in turn transfer this force to the floor or roof systems at the top and bottom of the wall (see illustration). A plywood-sheathed floor (or diaphragm) resists this force, acting like a sideways beam, and transfers the load to shear walls placed within the exterior shell and/or interior partitions. The shear walls then restrain the floor diaphragm and carry the load to the foundation and the ground.




**HOW SHEAR WALLS RESIST LATERAL LOADS**
Conventionally sheathed exterior walls can withstand some of the lateral force exerted by high winds but are not strong enough to resist hurricane-force loads. By contrast, plywood or OSB shear panels are engineered specifically to handle extreme sliding and overturning forces applied to the building.

The stiffness of a shear wall results from plywood or OSB sheathing that is nailed in a much more rigorous fashion than is ordinary wall sheathing. A shear wall typically requires nails spaced every 2 to 3 inches along panel edges. D-head nails usually are not allowed, and the nail head must not be overdriven. To pin the wall in place, the shear wall must be anchored to the foundation. For stud and plywood construction, the usual anchors are Simpson Strong-Tie's HDA series or an HD -type equivalent, and second-floor walls must be tied together with metal strap ties. Stud and plywood framing isn't the only way to build a shear wall, however. In commercial construction and large custom homes, engineers might call for a steel moment frame or a reinforced masonry shear wall to pick up wind loads.