During the International Code Council's (ICC's) 2003-04 code development cycle, the U.S. Department of Energy submitted and ICC accepted sweeping changes to ICC's energy-efficiency requirements, including a provision in the *International Residential Code* (IRC) allowing unvented attics, or "conditioned attic assemblies," in certain situations.

As a result, the upcoming 2006 edition of IRC will allow unvented, conditioned attics when the following four conditions are met:

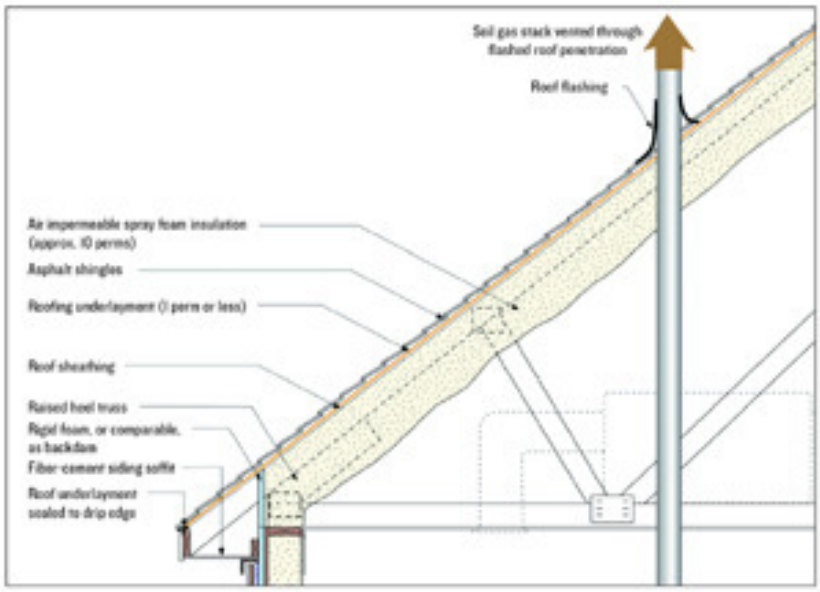
1. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic space.

2. An air-impermeable insulation is applied directly to the interior underside of the structural roof deck. "Air permeable" is defined as ASTM E283, "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen." An exception is permitted in the code's Climate Zones 2B and 3B (portions of southern California and Arizona) where the use of air-impermeable insulation is not required.

3. In Climate Zones 3 through 8, sufficient insulation is installed to maintain the monthly average temperature of the condensing surface above 45 F (7 C). These zones encompass all the U.S. except Florida and Hawaii and the southernmost portions of Alabama, Arizona, California, Georgia, Louisiana, Mississippi and Texas. The condensing surface is defined as either the structural roof deck or interior surface side of the air-impermeable insulation. For calculation purposes, an interior design temperature of 68 F (20 C) is assumed; exterior temperature is determined as the monthly average outside temperature.

4. In warm, humid locations, for asphalt shingle roof systems, a vapor retarder with a perm rating of 1 perm (57.4 mg/s•m²•Pa) or less be installed on the exterior side of the structural roof deck. For wood shingle and shake roof systems, a 1/4-inch- (6-mm-) thick minimum air space shall be provided between the underlayment and shingles or shakes. "Warm, humid locations" include all of Florida and specific counties in Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Texas.

UNVENTED ATTIC: The new International Residential Code language allows unvented attic spaces, as long as the roof is insulated with air-impermeable foam and there's no vapor retarder between the attic and the living space.



Recommended insulation for coastal areas by FEMA technical fact sheet # 8
Insulation: plastics, synthetics, and closed-cell foam, or other types approved by local building officials

Article from Building Science

There's no evidence that sealed and insulated attics trap moisture. Researchers have found that, in hot, humid climates, buildings with unvented attics are actually less likely to have condensation and mold than those with vented attics. That's because, in these climates, most moisture comes from outside, and the foam keeps the attic dry by sealing that moisture out.

Humid attics wouldn't be so bad if it weren't for leaky air-conditioning ducts. Depending on the pressures in the HVAC system and the pressures in the house created by that system, these leaks can blow cold air into the attic or suck hot, humid air into the ductwork and into floor and wall cavities. Either way, you have a problem. Air leaking from the ducts can cool nearby surfaces enough that humid attic air condenses on them. Moist air pulled into the ductwork will get blown into the living space, where it can condense on walls and ceilings. There has seen none of these ills in homes with sealed and conditioned attics (conditioned by means of passive connection to the living space).

Foam contractors are trained and certified by insulation manufacturers. There have been no reported problems with unvented attics built in Florida as long as 10 years ago. It's a proven building technology.

In high wind regions – particularly in coastal areas, wind driven rain is a problem with vented roof assemblies. Additionally, during high wind events, vented soffit collapse leads to building pressurization and window blowout and roof loss due to increased uplift. Unvented roofs – principally due to the robustness of their soffit construction - outperform vented roofs during hurricanes – they are safer.

Effects on roofing

- The greatest influence on roof temperature is geographic location. The mean roof temperatures for Miami and Green Bay, Wis., for example, differ by 18 degrees Celsius.
- The direction a roof faces has the second greatest influence on average roof temperature (in excess of 1.44 degrees Celsius in the east through south-to-west range studied, but the real difference is greater because other directions, such as north, will be cooler).
- The color of roofing materials influences the mean temperature of a roof system slightly less than direction (1.45 degrees Celsius average for these parameters).
- Ventilating the area under a roof deck reduces the average temperature 0.5 degrees Celsius (about one-third the influence of the direction or color and one-thirty-sixth the influence of geographic location). Even with wind assistance, ventilation reduces average roof temperature about half as much as using white rather than black shingles.

- Within the ranges studied, slope has the least influence on average shingle temperature