



# ICYNENE

## Icynene<sup>®</sup> and the benefits of unvented attic assemblies

Increasingly, the significant advantages of unvented, conditioned attic construction over standard vented attic roof technology are being recognized with respect to rainwater control, energy conservation, moisture management, humidity control, and fire performance.

Icynene<sup>®</sup> has been used in unvented attic assemblies for more than 12 years, gaining preference with designers, contractors and building code officials throughout North America as a tried and proven insulation material.

### What is an unvented attic assembly?

In an unvented attic assembly, air-impermeable insulation is applied directly to the underside of the structural roof deck and is tied into the insulation located in the walls, so that the roof system becomes part of the insulated building enclosure.

In this system, the attic space becomes indirectly conditioned as a result of air leakage, heat transfer and vapor diffusion through the ceiling.

A fundamental requirement of an unvented attic assembly is the use of air-impermeable insulation on the underside of the roof to prevent air infiltration and exclude airborne moisture from the attic. This reduces latent air-conditioning loads and provides further reductions in energy consumption. Code requires the use of an air-impermeable insulation such as Icynene.

### Unvented attics and building code

In 1996, the U.S. Department of Energy began research with computer modeling, followed by full scale testing. As a result, unvented attic systems have been constructed under special approval for more than 12 years and a set of design recommendations has been developed for common use. These recommendations refer to a conditioned attic assembly, which was adopted by the International Code Council in 2004 and is now part of the 2006 International Residential Code (section R806.4).

### Unvented attics in hot humid climates

In hot, humid climates unvented attics have widespread application where design practices and space limitations require HVAC equipment and ductwork to be located in the attic. In this situation, modifying the attic to create a conditioned attic space (with the help of Icynene) can generate significant reductions in energy consumption.

In conditioned attic assemblies, the attic space generally remains within about 5°F of the directly conditioned living space below the attic, with a relative humidity much lower than ambient, due to the indirect conditioning of the space. The potential for condensation is significantly reduced, along with the potential for structural rot.

Where hurricanes are prevalent, conditioned attic assemblies provide an advantage over the typical vented attic system. By eliminating vents, wind-driven rain can be kept out of the attic.

### Vented and unvented attics in cold climates

In cold climates, attic ventilation is a common method to remove warm, humid air from the attic space. Air leakage from the living space occurs through cracks and joints in the ceiling, around electrical penetrations and around recessed or pot lights.

Without adequate attic ventilation, condensation can form on the underside of the roof deck, and interior heat can cause snowmelt on the roof surface, leading to ice damming and roof leaks. Icynene® is an ideal insulation material for vented attic systems as it insulates and air-seals the ceiling, minimizing the potential for condensation and ice damming.

Icynene can also support unvented attic systems, which can perform very well in cold climates (zones 6 and higher) where HVAC systems are located in the attic, where scissor trusses make it difficult to insulate the floor or in cathedral ceilings where the intent is to turn the attic into living space. A vapor retarder is recommended in cold climates.

## Summary

With any roof system there should always be a contingency plan to address the possibility of roof leaks, especially with wood roof decks. When employing a conditioned attic assembly, insulation materials should be selected that allow rainwater to drain through the material, ensuring roof leaks can be located and repaired prior to any long term damage of the roof sheathing. This insulation must not impede the drying of the wood sheathing to the interior, thereby preventing moisture build-up and improving the life of the sheathing.

## About Icynene

Icynene is the insulation of choice for numerous home demonstration projects, utilizing the unvented attic assembly, including The New American Home® and Tradewinds at the International Builders' Show 2008.