

Conditioned Attic Spaces

Control Air and Moisture for Higher Energy Efficiency



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For years, building codes have called for attic ventilation to control air and moisture flow. But all too often, HVAC ducts were also located in those vented, unconditioned attics, which led to HVAC systems working harder and using more energy to meet homeowner demands.

An HVAC system located in a vented attic is exposed to temperature extremes. According to the U.S. Department of Energy Building Technologies Program, that means the energy needed for air conditioning and heating typically goes up 10 percent when ducts are in the attic. Also, leaky ducts can lose as much as 20 percent of conditioned air flow to the attic.¹

Since 2006, the DOE's Building America program has influenced builders across the country to adopt unvented, conditioned attics to improve home energy efficiency and comfort.

For a vented attic, typically the attic floor was insulated and served as the top layer of the thermal envelope of a home, leaving the attic temperature unregulated.

In an unvented conditioned attic, insulation is placed in contact with the roof sheathing instead of on the attic floor, and the attic space is air-sealed. That moves the thermal envelope and the air and moisture control layers to the roof deck.

The primary benefit of this type of construction, also called a cathedralized attic, is the ability to locate HVAC ducts inside conditioned space, where duct leaks and heat losses/gains won't increase the home's energy bill.

According to the DOE, the energy savings from installing ducts in conditioned attics may be substantial because numerous studies have shown that ducts in both new and existing homes are typically very leaky.

Building Science Evolution

Sealing the attic moves the air barrier from the floor of the attic to the roof deck, along with the moisture control layer. That means it's critical then to seal the roof sheathing layer from both air and moisture.

For a traditional vented attic, basic building materials like 15 lb. felt were good enough in most cases, to keep out moisture under the roofing material.

But, with an unvented conditioned attic, the basic building materials may not be enough to ensure the panel layer remains airtight. Leaks through the felt and between the sheathing panels could allow air and moisture into the

“*Why put all that money into creating a conditioned attic space and protect it with only 15-pound felt on the roof?*”

Beau Walker, Builder

conditioned space of the attic, basically negating all the extra work and cost.

In a conditioned attic, the insulation is moved from the attic floor to the rafter bays. There are many insulation choices, from spray foam to fiberglass batts. Some insulation, such as closed cell spray foam, can also function as a redundant air control layer.

However, any gaps or pinholes in the spray foam are potential air leakage pathways. Also, if there are any moisture leaks, spray foam insulation may obscure small water problems until they become larger water problems.

In storm prone areas, shingles and roof felt can blow off in high winds. That leaves the panel seams unprotected against wind driven rain. That allows moisture into the insulation layer between the panels, where it can lie hidden to cause rotting issues.

To ensure an air and moisture tight attic, it makes sense to invest in materials that will perform at the level a high performance home requires.

Real World Experience

If a builder and homeowner are going to the expense of achieving a conditioned attic, it's advisable to make the system as robust as possible. Why invest in air sealing and spray foam and settle on commodity grade roof felt for protection?

Conditioned attics are more common in hotter climates, where HVAC units are typically located in the attic. Beau Walker, owner of West Ridge Construction in San Antonio, Texas, said conditioned attic spaces are the best option for homeowners in his area who want to improve their energy bills and reduce moisture risks over the lifetime performance of their home.

Walker's company uses ZIP System® sheathing and tape, combined with spray foam insulation, to create conditioned attic spaces in new homes. Huber Engineered Wood's ZIP System® sheathing and tape is an innovative system that helps streamline the weatherization process for exterior walls and roofs. Because ZIP System® sheathing is manufactured with a built-in water-resistive barrier on its surface, it eliminates the need for housewrap in wood-frame walls or roof felt underlayment for roofing.

With an integrated water-resistive barrier, the Structural 1-rated engineered wood panel eliminates the risk of water getting trapped between the wall or roof sheathing and the weather barrier or underlayment, which can be a source of costly moisture damage and schedule delays to repair. In addition,

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the system's taped panel seams use an advanced acrylic adhesive on the tape which further protects the durability of the roof deck and helps create a continuous air and moisture-barrier that not only protects against moisture penetration, but also reduces air leakage in conditioned attic roof assemblies.

Less air leakage contributes to higher energy efficiency.

"In my experience in Texas, the average temperature in a vented attic space is about 130 degrees F," Walker said. "I have seen in homes that use ZIP System® roof sheathing and tape with foam insulation, the thermostat in the living space can be set to 72 degrees, and in the unvented attic the temperature will be around 78 degrees."

That puts a significantly lower strain on the home's HVAC unit.

As a multi-functional system providing structure and protection against moisture and air leakage, ZIP System® sheathing and tape is an efficient component of a roof system protecting conditioned attics, Walker said. It protects the roofline from moisture penetration while also serving as an air barrier contributing to energy efficiency, and the ease of installation reduces chances for install error.

"Why put all that money into creating a conditioned attic space and protect it with only 15-pound felt on the roof?" Walker said. "It makes sense to protect that investment with ZIP System sheathing and tape."

For more information, visit www.ZIPSystem.com.

REFERENCES

¹ U.S. Department of Energy. 2013. Unvented, Conditioned Attics.
http://energy.gov/sites/prod/files/2014/01/f6/1_1c_ba_innov_unventedconditionedattics_011713.pdf