

## Thermal Envelopes

Standard residential and commercial construction has traditionally designed vented attics without regard for regional and climatic conditions. Also, many vented attics are not designed and constructed in accordance with properly proportioned eave and ridge venting. This can accentuate the problem of extreme attic conditions. In warm, humid climates, attic temperatures can reach well in excess of 120 degrees Fahrenheit. This, coupled with the infiltration of moisture laden air and attic pressurization, can cause a myriad of problems for energy efficiency, indoor air quality, condensation and comfort. An attic cannot be vented enough to minimize these conditions. Attic fans can cause exfiltration problems and negative air pressures in the envelope. The ambient outdoor conditions would be preferable to the extreme attic conditions that are created.

The **Thermal Envelope** utilizes an unvented (sealed) attic design that places the insulation at the roof plane in lieu of at the ceiling. Thereby bringing the entire building envelope within the thermal and air barrier. Research has proven that there are many benefits to this method. By locating the thermal and moisture barriers at the same plane, it eliminates the opportunity for moisture to enter the attic and condense on cold mechanical systems. Moisture will not condense within spray foam insulation making it the ideal material for this application.

The Florida Solar Energy Center ([www.fsec.ucf.edu](http://www.fsec.ucf.edu)) attributes 65% of the infiltration in the average Florida home to the attic. This, coupled with duct leakage, can place an insurmountable burden on the mechanical systems to maintain indoor air quality and occupant comfort. Frequently, the result is a "sick building or home," leading to occupant illness. There are many contributing factors; however, the most significant element is the failure of the building envelope. If we first address how we correctly build the "closed box," we can then better engineer the mechanical systems within that "box."

The building envelope has long been overlooked and addressed uniformly in different

hygro-thermal zones. We no longer ignore that climatic conditions greatly effect how we should build the "box." The latest research has led to newly applied perspectives in Building Science ([www.buildingscience.com](http://www.buildingscience.com)), primarily the Thermal Envelope. **The 1997 ASHRAE Handbook (23.10)** recognizes and endorses this procedure stating, "because the net benefits of attic venting do not always clearly outweigh the disadvantages, venting should not be required in a warm humid climate." **The 2002 Florida Energy Code** also prescribes Thermal Envelopes for commercial buildings. The same techniques are being applied to residential buildings with complete success.

The Thermal Envelope alone can remedy many of the symptoms *ailing "sick buildings"* in southern climates. A necessary step in the "cure" is that we must change the environment. "Fix-it" or "Band-Aid" approaches are only a temporary solution putting the problem off to reoccur another day. Generally condensation, duct sweating, infiltration, humidity control and bacteriological growths within building envelopes vanish when remediated with a foam-sealed Thermal Envelope.

The spray foam insulation method is the most comprehensive solution to address the remediation of a building envelope. The diverse application techniques and the inherent properties of Foam allow it to accomplish the most difficult and otherwise impractical sealing and insulating jobs with assured success. A Thermal Envelope sealed with semi-rigid foam allows control of humidity levels within the 45-50% range, a level at which molds, mildew, dust mites and many allergens perish -- immediately affording the occupants maximum indoor air quality. The system also improves the thermal comfort within the entire envelope and vastly improves energy efficiency. The sum of the results is clean, comfortable, healthy, energy efficient, sustainable construction; that not only is a Lifetime Warranted product itself, but also extends the life of the building envelope and the systems within it. Visit [www.zipfoam.com](http://www.zipfoam.com) for more information.