

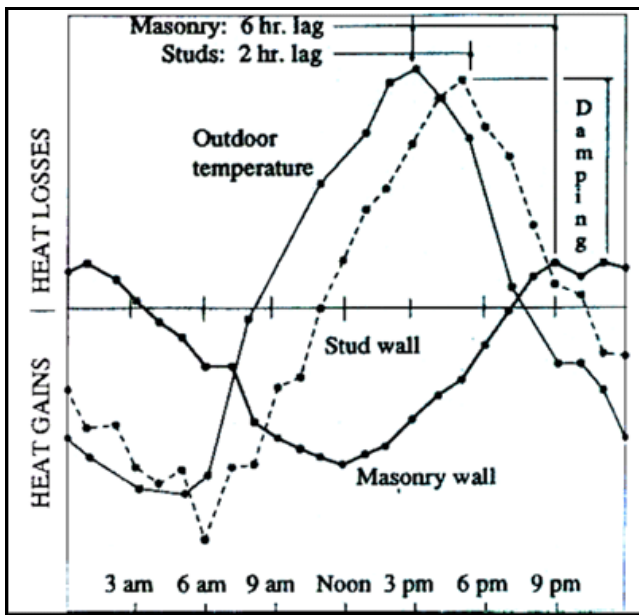
Energy Efficiency Comparison – Masonry vs. Wood Frame

Thermal Mass

The energy efficiency of concrete masonry is one of the reasons it has remained the predominate building material in Florida for the past 70 years. Thermal Mass is the secret behind its energy saving attributes.

Thermal Mass moderates the heat flow through a masonry wall. Only heavy walls made of concrete or concrete masonry possess enough “Mass” to store and release energy at different times of the day. This delayed thermal response is shown in [Figure 1]. The “lag” between the outside air temperature and the response of the high mass wall, as denoted in the figure, allows for a portion of the energy that would have passed through the wall to be reabsorbed back into the outside environment.

Figure 1 – Delayed Thermal Response



Florida is nearly the perfect climate for Thermal Mass to be effective since the temperature across most of the state, and throughout the year, swings above the desired interior temperature (or “set” temperature) during the day and below the set temperature at night.

The Florida Building Code has recognized the value of Thermal Mass for over two decades by assigning lower multipliers to mass walls. The values in [Figure 2] are taken directly out of the current 2007 Florida Building Code – Chapter 13. The values in the table are multipliers

used in determining the energy efficiency of a residential structure in central Florida. A lower multiplier results in proportionally higher energy efficiency.

Figure 2 – Energy Points Masonry vs. Wood Frame*

Summer Point Multipliers (SPM)

Wall System	R-Value Range	Interior Insulation / Exterior Wall
Masonry	7 - 10.9	0.8
Wood Frame	7 - 10.9	2.3

Winter Point Multipliers (WPM)

Wall System	R-Value Range	Interior Insulation / Exterior Wall
Masonry	7 - 10.9	2.3
Wood Frame	7 - 10.9	2.5

* 2007 Florida Building Code – Chapter 13 – Table values from Alternate Residential Points System method

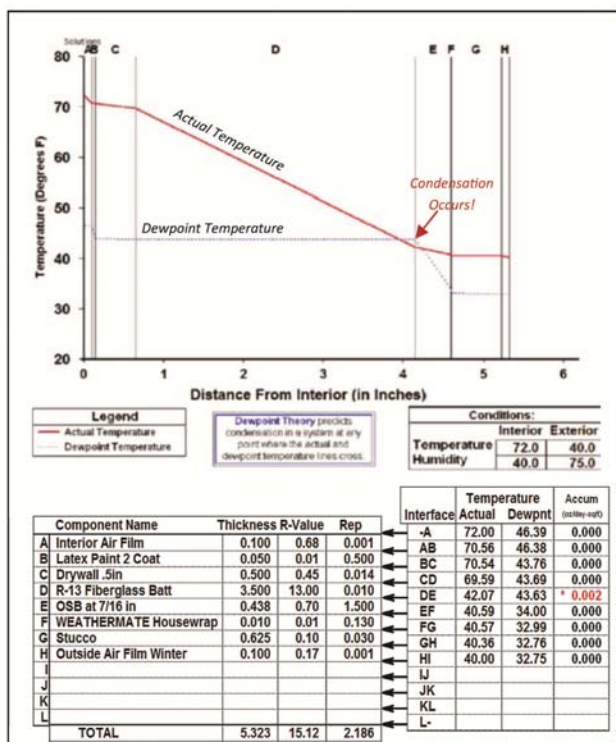
Preventing Moisture Condensation & Mold Growth

Another important advantage of masonry walls is preventing moisture condensation and mold growth within the wall cavity. Condensation occurs when the temperature of an object falls below the “dew point” of the surrounding air. Water on the outside of your iced-tea glass is a perfect example of this. Dew point is determined by the moisture content of air, often referred to as the “percent humidity”. On a dry crisp day in winter your percent humidity may be as low as 10-20%. Alternately, on a hot sticky day in mid-summer your humidity is probably in the 80-90% range.

Typically, wood frame walls in Florida will include a vapor barrier on the EXTERIOR, behind your stucco or exterior paneling. The vapor barrier is placed on the exterior to prevent hot, moist summer air from entering the wall cavity and condensing out on the back side of your interior drywall. Unfortunately, conditions reverse in winter and this arrangement allows warm moist air from the INTERIOR of the home to come into contact with the cold exterior plywood sheathing. The result is condensation that causes both a reduction in insulation value and high potential for mold and mildew growth.

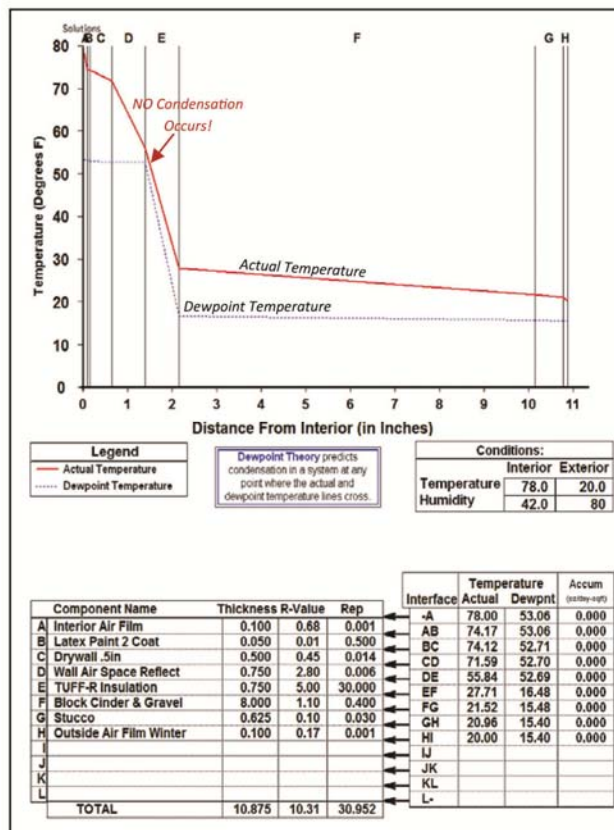
[Figure 3] is a dew point analysis for a typical wood frame wall, described above, with fiber bat insulation between the 4" wood studs (calculated between 72 degrees interior and 40 degrees exterior). The upper line is the actual temperature in the wall and the lower line is the dew point temperature, below which water condenses out of the air. As discussed, at the back side of the exterior sheathing, the wall temperature drops below the dew point temperature and the insulation and plywood in this area will be soaked with water – not a good situation!

Figure 3 – Dew Point Analysis – Wood Frame



[Figure 4] is a dew point analysis run on a masonry wall under considerably more severe winter conditions (78 degrees interior and 20 degrees exterior). This standard masonry wall section incorporates 3/4" of polyisocyanurate directly adhered to the interior face of the block. Standard 3/4" furring strips and wall board are attached over the ISO board. As you can clearly see there is no cross over between the upper temperature line and lower dew point line. Even in the event that there was some small amount of condensation in a masonry wall, concrete has the distinct advantage that it is neither a food source for mold nor is it damaged by mold or moisture. Fiber insulation, stud lumber and plywood do not possess any of these desirable traits.

Figure 4 – Dew Point Analysis – Masonry



Masonry is 100% Florida!

Energy efficiency and moisture control are very important but only two of the many components that make concrete masonry a sustainable building product. Another important consideration is that concrete, and the cement and aggregates that go into concrete, are 100% locally produced products. This reduces transportation and provides maximum employment to our local economy.

Concrete masonry is THE energy efficient and sustainable choice for Florida home builders.

Additional Resources

Florida Building Code –2007 – www.floridabuilding.org

Technical notes - www.ncma.org See 6-01B; 6-02B; 6-03; 6-04A; 6-09C; 6-13B; 6-14A and 6-17A.

Thermal Catalog of Concrete Masonry Assemblies:

<http://www.ncma.org/resources/design/Documents/Thermal%20Catalog%20Phase%20I.pdf>

Life Cycle Analysis:

http://www.imiweb.org/design_tools/life_cycle/index.php

[Thermal Mass - Energy Savings Potential in Residential Buildings](http://www.imiweb.org/design_tools/life_cycle/index.php)