Turn to FOLEY on p 43

“David took the time to educate me on the passive house movement, which began in Germany approximately 20 years ago. The basic premise is to build a super-tight, super insulated building envelope to greatly reduce and minimize the size and capacity of the heating system.”

We reviewed the architectural drawings for this structure. I expected either some space-age design with exotic materials or a boring Igloo cooler box-like structure with tiny windows. This project was neither. The architecture was a traditional American Foursquare design that fit right in with the 1930s vintage neighborhood in Bethesda, Md., where the house was being built. There was very little to distinguish this as a passive house just by looking at it. The details were in the skeleton.

The basement had a full 4” perimeter insulation and 6” of slab insulation. The wall structure consisted of 7½” thick SIP (structural insulated panel) panels with another 2” of foam board under the finish element. The windows were a triple-glazed, insulated frame model special ordered from Canada. The roof structure consisted of 12” thick SIP panels. Thermal bridging was eliminated.

Every gap or crack was sealed, caulked or insulated. No one was allowed to drill or puncture the building envelope. All penetrations had to be scheduled and submitted to the architect and builder for approval. Once approved, the hole was drilled by the general contractor (GC) and sealed by the GC, after the pipe or cable penetration was run. This house was tight!

The house was being built on spec by O’Neill Development Corporation, Gaithersburg, Md. Brendan O’Neill Jr. was the project manager. We held multiple planning meetings with the architect, GC and other trade subs. Everyone had to understand the concept of a passive house and be aboard or this would not work. It was imperative that we coordinated our work and were aware of what everyone else was doing or it would quickly devolve into a disaster. Peabody and O’Neill were the ringleaders that kept this project going in the right direction.

Astounding results

After I reviewed the plans, I did the takeoffs and performed a load calculation. I had to manually enter most of the data, since most of the building envelope structures were not in the dropdown menus provided by the load calculation software. At first, I did not believe the results: Heat loss for the 4,600 sq. ft. structure was less than 24,000 Btu at design conditions or approximately 5 Btu/sq. ft. Keep in mind that we see design conditions for relatively few hours annually. The majority of the heating load hours are at partial load. I found these results absolutely amazing.

I wanted to incorporate radiant floor heating in my design, but this was vetoed by the architect. Radiant was not necessary as MRT (mean radiant temperature) is maintained at a comfortable level by the utter lack of heat loss through the structure. This will have to be proven to me, as I am still not sold on this idea. The house is wired with sensors and data-loggers, so we will see what happens next winter.

Mechanical ventilation is critical in such a tight house. This system runs 24/7 to ventilate the structure, bringing in fresh air while exhausting stale air. The exhaust points, return air and supply duct locations, as well as the ventilation duct penetrations, were carefully detailed with the architect and GC.

BY DAN FOLEY CONTRIBUTING WRITER

PASSIVE HOUSE, ANYONE? PART 1

HYDRONICS
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**FROM THE FIELD**  
Dan Foley is owner of Foley Mechanical Inc. His company has 14 full time and two part-time employees. His primary focus is on radiant and hydronics with large custom homes. Foley also does service, replacement, HVAC, sheet metal, controls, piping, renewables (geo and solar thermal), which services the Washington, D.C. metro area.