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Lessons From Living In a Foamed House

Foam insulation has been around for quite some time, but recent improvements to the products and application methods have made this approach to insulating homes and buildings more attractive than ever. There's a good chance you'll work on a foamed house in the near future. If you're lucky, you'll be brought into a project where the entire home was foamed, or better yet, you'll get a chance to work on a new home where you can design and install with foam insulation in mind.

I've had the opportunity to live in a foamed house for nearly two years now. In fact, my home actually won a *Contracting Business* Quality Home Comfort Award last year (*CB*, July 2007, pg. QHCA-10).

Following are some highlights about what I've learned about foam, why it's so different than traditional insulation, and how it has impacted the comfort, indoor air quality, and operating costs of my home. I'll also direct you to some websites where, if you so choose, you can get quite an education on foam and other insulation methods.

Why talk about foam insulation in an HVAC publication? Because as an HVAC contractor, it's important that you understand how it impacts your system design and installation.

Myths and Misconceptions

First, let's dispel a few myths about insulation in general. The single most misunderstood principle is the distinction between R-value of a wall, and that wall's true insulation value under real life conditions.

If you've been reading my articles over the years, you know I'm a big proponent of measuring things as they really work in the field, not just under perfect laboratory conditions. My motto over the last two decades (and my e-mail signature) has been, "If you don't measure, you're just guessing!"

It's no different with insulation. In simple terms, the ASTM-approved laboratory R-value test of insulation basically consists of placing a regulated heat source on one side of a piece of insulation, and measuring the temperature on the other side.

The weakness of this test is that it's done with no air movement across the insulation.

Why is this important?

Because most walls with typical fiberglass batts, or even loose fill insulation, experience infiltration of outside air along with what are

called convective loops, where air circulates within the wall structure. The net effect is severe reduction in true insulation value through the wall.

A phrase the fiberglass industry hates to hear is *effective R-value*. At National Comfort Institute, we've known for years that typical wall insulation doesn't cut it. In our classes, we measure R-value of R-13 walls and regularly chart effective R-values between R-3 and R-6.

The beauty of foam insulation is because it seals while it insulates, it can eliminate infiltration of outside air into the wall cavity, thus eliminating convective loops. It also reduces thermal bypasses between stud cavities thereby virtually eliminating air movement within wall structures. Just a couple of inches of foam can far exceed the effective R-value of many inches of other insulation types.

This also holds true with attics and crawl spaces. The most effective way to insulate an attic or crawl is to make the space part of the thermal envelope. In attics, this can be done by spraying foam on the rafters (cathedralizing) and eliminating ventilation altogether. This method has no negative effect on shingle temperatures, and if you ask most shingle manufacturers (maybe not the ones who also make fiberglass insulation), they will warranty the shingles, in writing. I found this to be true on my own home.

Good Indoor Air Quality

One of the additional benefits of foaming attics is they stay much cleaner than they do with traditional insulation — and so does the home. With no air infiltration, little dirt is deposited in the attic. Traditional attics are loaded with dirt and dust (and who knows what else). These particles easily find their way into living spaces.

Homes with blown in insulation are even worse. Fine paper particles are constantly introduced into the living space through infiltration, can lights, duct leaks, and so forth. What's worse, these fine particles contain nasty chemicals added to fireproof and also deter insects and rodents, and keep them from nesting. If you live in one of these homes you're breathing this stuff every day.

Since we've lived in a foamed house, we've never experienced such clean air. Dust in our home builds at a very slow pace. When I venture up to the attic, I'm amazed at how

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clean the top of the sheetrock is — and there's no for little nasty things to hide. The bottom line: I'm thrilled living in my home. In spite of recent rate hikes, our utility bills are lower than in our previous home, which was half the size.

Ventilation Is Key

One caveat about a tightly foamed house: you must mechanically provide air changes. This can be done using heat or energy recovery ventilators, but oftentimes, as in my home, that isn't enough. To positively pressurize a home you may need to bring in additional outside air.

We accomplished this using barometrically-controlled air intakes tied to the return air systems. While there's a small energy penalty for this, it's nothing compared to the "wild" air that enters and exits most homes through the worst possible places.

With controlled ventilation, you

decide where the air comes from, and how much comes in.

HVAC System Design


Another key factor to be aware of with a foamed home is HVAC system design — in particular, sizing. Make sure not to oversize the equipment! This usually entails setting your load calculations to the lowest possible infiltration values. I also recommend returns in every room where a door can be closed, and using zoning in larger homes.

One final comment about my HVAC system: Even using the best designs and installation practices, the initial delivered SER™ (System Efficiency Rating) was around 75%. After the system was tested, adjusted and balanced, my SER rating reached 97% — one of the highest we've measured.

Here are a few web sites where you can learn more about this topic:

- www.insulation-r-values.com
- www.ncfi.com/techinfo
- www.ornl.gov/sci/roofs+walls/insulation/ins_16.html
- rvalue.net/

The thing to remember is that insulation, whether it's foam or some other kind, impacts your HVAC system design. You can have a greater and more positive impact on you customers if you take this into consideration. They'll save money and be comfortable, and you'll make money and be a hero.

And who knows, you might even win a Quality Home Comfort Award! 

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