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HEADLINE: THERMAL BRIDGING; FILLING THE GAP

Thermal bridging has become a catch phrase for energy loss between different densities of materials. Many green builders have known about this issue for years, as have the proponents of the Passive House program, who have and are taking the development of a whole house envelope to unheard of levels for energy efficiency, levels unknown as little as five years ago.

I receive a steady stream of e-mails and phone calls on proper insulation. Inquiries range from R Value to the benefits of various kinds of insulation, with spray foam recently leading the percentage of questions. First, let's better define the term. Thermal bridging is the effect when different materials have a significantly higher heat transfer than the materials abutting or surrounding it, hence reducing the overall efficiency of the insulation value. That's a generic book term. In basic English, if you live in a wood frame home with 2x4 walls and batt insulation between the studs, you may have been told your walls were insulated to R12. In fact, on average the wood studs make up close to 25% of the external wall and, at R5 for the wood studs at best, your real insulation value on the exterior walls of this home is significantly less. Tests have shown upwards of 20% less. Wood studs allow heat to flow through, something close to three times faster than most batt insulation.

The next question I get and, while it may seem simple, many do not understand what the "R" factor means. R value is the measure of how well your insulation resists the heat flow across/through this particular insulation. The insulation manufacturers advertise specific R values, when in fact this is a lab condition evaluation. I have seen many, many walls where the friction fit batts are not fitted evenly; so much for the advertised R value when installed in this manner. Proper installation of any insulation, be it batt, blown loose fill or sprayed, are reliant on the quality of the installation.

So what is the solution? In short, the answer is a continuous blanket of uninterrupted insulation. That is a quick answer. In fact, it's far from that simple. This continuous blanket or wrap over the walls is recognized as the single most effective method to reduce air loss and, in doing so, reducing the energy costs in a home. By keeping the outside air out and the inside, conditioned air in, the result is a four season benefit, adding overall comfort to a home.

This has become the driving force behind most new home construction, especially when they must meet EnergyStar standards for every new home that is

built today. These homes are tested with a blower door test for confirmation of certification. Adding a layer of rigid foam insulation, correctly joined and taped can be easy. Adding an R5 foam board to the wood exterior studding, in calculation can add nearly a 50% increase in the overall effectiveness of the exterior wall.

Upgrading an older home is not quite as simple. The exterior cladding must come off and, if this is aluminium or vinyl, it's not quite as costly as brick. Replacing the brick would likely be cost prohibitive for most older homes. There is an alternative. That would be gutting the interior of the home, which would be a major cost factor, too, so would only done if the home is due for such an upgrade. Again, as in a new home, start with an energy evaluation and blower door test.

There are numerous manufacturers of rigid foam boards, insulated sheathing and insulated house wrap on the market today and most are very effective. I have used ISO-Board with good success and have heard that Tyvek Thermal Wrap works well. We are back to the installation of these advanced foam boards and here is where professional application and understanding of the need for a "fully" sealed exterior clad is not only important, if not done well, it can substantially reduce the effectiveness of this effort to blanket the older home.

My second suggestion, if you are considering this exterior upgrade, will substantially reduce your energy costs. While the siding is off, replace all the windows and doors at the same time. This will add a cost, no question; however, the actual openings in the external walls are, next to the sill plates and attic, one of the largest single heat loss areas. It's very unlikely that the window installation, if original, is energy efficient. I have done this in more than one instance. While it does make the window and door opening slightly smaller, fitting strips of rigid foam insulation around the entire frame opening, even to the interior walls, wrapping with one of the self-adhesive membranes and then tuck taping, will greatly enhance the energy value of the opening. We install the windows on two heavy beads of urethane seal, fit scraps of wood to hold the window in place and then begin two or three applications of low pressure spray foam. Today's foam is structurally stable and, if done correctly, the use of any metal fastener is not needed to support the window, again reducing yet another thermal bridge condition.

One consequence of major improvements in the thermal bridging is that the surfaces in a home, usually the external walls, windows and doors, can reach temperatures that allow condensation of water vapour from the indoor air. Condensation control is a major factor for any home, as collected moisture can

cause air quality issues, mold and rot. Should you undertake to make this substantial upgrade on an older home, it will have major energy cost savings. I recommend an energy evaluation and a blower door test done once again when the work is complete. At this point the evaluator may recommend some manner of air exchange; likely an HRV.

A properly done continuous external wrap of a home is probably one of the most effective insulation upgrades available today.

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