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AIR SEALING STARTS WITH INSULATION

Last week's column on thermal imaging drew a number of inquiries from readers. As well, a number of these e-mails inquired about air sealing and insulation in general; some readers wanted some basic understanding of insulation in lay terms.

There are more different kinds of insulation in the marketplace now than there have ever been. In my nearly 40 years around homes, while I have not seen it all, the list is getting shorter! With respect to attempts at insulation, I have seen the use of dirt, stones, newspapers, straw, wool, cardboard and even a home built before WW2 that was completely lined with cork. While we have many more products on the market today, it doesn't help that each insulation contractor is committed to selling their product as the answer to all your insulation needs. With so much to choose from, making the decision as to which kind is most effective can be a difficult task for the homeowner.

A little understanding of heat flow can help one understand how insulation works and, from there, which type would be best in a particular application. There are three mechanisms to consider. Conduction is the way heat moves, such as in a fork that gets too hot to handle when left on the side of a hot frying pan. Convection is the way heat moves through the air, by liquid and in a gaseous form. Lastly, radiant heat travels outward and warms the solid area around it, like a wood stove that warms a room by heating the mass in the room.

Insulation is designed to slow the conductive air movement. Some insulations work by containing the heat; foil wrap or foil backed rigid foam board, for example. In a sentence, you can lower your energy costs by reducing the air flow, which is where insulation becomes the number one factor in any building. The bulky insulation like fibreglass and cellulose use their volume to reduce the conductivity and to some degree, the convection or air flow. Most of the rigid insulation is designed to resist conductive flow and when you add in a foil backer, the radiant factor becomes a benefit.

Understanding the terms used for insulation values can help too. In Canada, until we went metric, we used the term "R Value." Today, you will often see the metric term "RSI" used instead. The greater the R or RSI value, the more resistance the insulation has to reduce the air flow, which contains heated air. For example, an inch of fibreglass in batt form has an R value of 3-3.7, or, in RSI terms, 21-26. For the purposes of this article, I'll stick with R value as it's still the most commonly known term.

The most common kinds of insulation today are fibreglass in batt or loose fill form, cellulose and mineral wool and they all have very similar values per inch. The only one I hesitate using in an attic is the fibreglass loose fill. By experience I know that aggressive air movement from ventilation or natural stack effect can affect its R value, although it does take some amount of time. All the loose fill insulations are well suited for attics, as they can be blown in and will settle into, and around, areas that are difficult to access. In order to attain the desired final level, cellulose is usually blown in to a level slightly thicker than needed, since it will settle the most over time.

With the introduction of other insulation products in the past few years, the original fibreglass in batt form has changed considerably. Formaldehyde was commonly used as the binder, but today that's almost non-existent. The use of recycled materials has become popular. In some cases, up to 40% of the fibreglass content is recycled. Probably the most "green" product from its introduction is loose fill cellulose. It's made primarily from recycled paper and then treated with boric acid as a fire retardant. For years, cellulose was primarily used in attics, though today, with the addition of a wetting agent - mostly water, this material can be sprayed in wall cavities, too. This latter process requires a professional installer, whereas an attic installation can be done by a handy homeowner. Most lumber yards rent the blower to install loose fill cellulose.

The advent of spray foam over 20 years ago brought a new dimension to insulation; the addition of air sealing in one application. An inch of spray foam, on average, has an R value of 6 or better. Spray foam manufacturers are working on better formulas for their pigment-vehicle blend. Some still have off gassing that is an issue for some people. That said, I would not hesitate to use spray foam in

most applications. The energy value per inch is difficult to attain with any other method of insulation, coupled with the air barrier benefit in certain applications, it's the best answer.

The popularity of rigid foam board has risen simply because, when applied over an exterior wood frame wall, it dramatically reduces the thermal bridge factor that wood frame homes have. It can also be used for interior walls in basements. The most common rigid foam board is either blue or pink and is not susceptible to dampness, which is a plus in any basement. This material is, also, often cut and fitted on top of the hatch door to an attic. With insulation values from R-4 to R-6.5, you get good value per inch with this material.

Today, we strive for no less than R-40 in an attic and R-60 is becoming more popular. In wall cavities, we do everything we can to get it up to R-30, which can be attained by use of different kinds of wall insulation, wrapping the exterior with rigid foam board and taping every joint.

In years gone by, we were not as particular installing insulation, especially batts. Today, carefully fitting every piece and not allowing any gaps is essential to the insulation job. The main intent is to arrive at an even, continuous insulation level around the entire envelope of the home.

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