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Sealing the New Home

RICHARD KADULSKI



HOME BUILDER

Air barriers are more important than vapour barriers in controlling how much moisture gets into the home.

We have learned that air and vapour barriers are key elements of the building envelope. Failing air and vapour barrier systems are major reasons for building problems. In extreme cases, failure means structural deterioration to the point of collapse; in others, it may mean damage of construction materials.

A common mistake is to lump air and vapour barriers together — but the two are very different. Vapour barriers resist the diffusion of water vapour through the building materials, while air barriers resist air movement through the envelope. These two functions may be performed by the same elements, or by separate components.

The air barrier is meant to stop the air movement through the envelope — in most cases, warm moist air moving outward to a colder environment. When warm air is cooled it can't hold as much moisture, so it will deposit its moisture against any cold surface, much like the condensation against a cold bottle you put in the fridge.

Now Energy Code Clarifies Air Barriers

The proposed 1995 National Building Code has been re-written to clarify and define the principle of air barrier. The continuity of the air bar-

rier is probably more important than that of the vapour barrier. Why? Because the greatest source of moisture within the construction is driven by the movement of warm, moist air — not by vapour migration through the material.

The air barrier must extend across the ends of the floor and walls where they intersect the building envelope. This requires additional attention to the continuity of the air barrier where each floor assembly meets the building envelope. While this is currently being done by R-2000 builders, it is not typical for many others.

Tests done at the National Research Council showed that, compared to diffusion, air movement is responsible for 100 times the quantity of moisture entering the home.

Poly Not Necessary for Vapour Barrier

Most builders will identify the vapour barrier with polyethylene, in common use for 20 years or so. What is less well understood is that you don't need poly for the vapour barrier — you can use any other material, such as plywood, that resists vapour flow.

A weakness of relying on poly for both the air and vapour barriers is that if the caulking, sealing and attachment of the poly are not done

carefully, wind pressure can loosen the poly and deteriorate the air seal over time.

Typically, the poly is located on the interior surface, just below the drywall finish. However, vapour-resistant sheet materials are allowed anywhere in the construction as long as it is on the warm side of the dewpoint. For example, in frame-wall strapped on the inside, the poly can be on the face of the studs, with the strapping services and additional insulation on the inside, so that the vapour barrier is part way in the wall.

Often the poly is relied on to do double duty, being both the vapour and air barrier, but it need not be so. In fact, sometimes there are advantages to having separate air and vapour barriers.

A procedure commonly used in Western Canada is the airtight drywall approach (ADA). In this system, the continuous air barrier is achieved by making sure all structural elements are caulked and sealed. Gaskets are used on the inside, so that once the interior drywall is installed, there is a continuous structural air barrier. The vapour barrier could be a poly sheet on the studs (without the need to caulk and seal the poly) foil-backed drywall, or it could be appropriate low permeance paints applied on



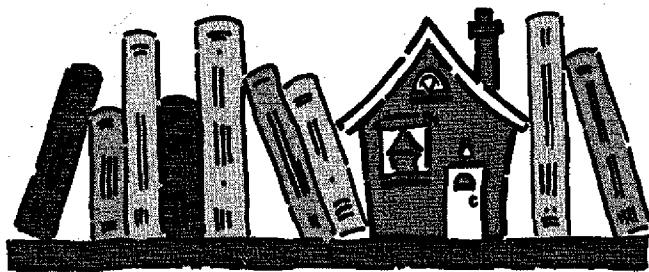
ICTNENE

Insulation foam being sprayed inside the walls.

the interior surface. ADA provides structurally sound solutions to air sealing.

ADA can be used to tighten any new house. For major air leakage areas around windows, doors, plumbing vent stacks and ducts, the best sealing method is expanding foam insulation. These are mostly polyurethane insulation and come in small packs, convenient to use on a job site. You just walk around and foam the large cavities, such as the gap between the window or door frame and the framing around duct and plumbing penetrations.

Got an innovative housing idea stuck on the shelf? You could be eligible for up to \$20,000 to get it moving.



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Call Canada Mortgage and Housing Corporation (who provides financial support to the program) at (613) 748-2321; the Federation of Canadian Municipalities at (613) 241-5221; the Canadian Home Builders' Association at (613) 230-3060; or the Canadian Housing and Renewal Association at (613) 594-3007.

Call today. Because no idea can be of value if it just sits on a shelf.

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Use The Proper Sealant — Foams are Among the Best

It is important to use proper materials. Caulks are not expensive — the price difference may only be \$2 or \$3 between different types. Acoustical caulking is only suitable for use in sealed locations to caulk two pieces of poly. If you are caulking a wood sill plate to the subfloor, an acrylic caulk should be used, since it will bond to wood and is paintable. Neither of these are suited if you need to caulk a wood plate against the concrete. In the case of fireplace and furnace flues, air sealing must be done with sheet metal flashings and high-temperature silicone.

A problem area for insulation and air sealing, and one that is becoming more common as the use of engineered wood products increases, is how to seal around the end of wood I-joists and floor trusses. The spray-in foam insulation offers a simple and effective method of both insulating and sealing, where the foam



"Tests done at the National Research Council showed that, compared to diffusion, air movement is responsible for 100 times the quantity of moisture entering the home."



fills all the nooks and crannies. Where there are large areas for insulation and sealing, using a qualified installer is recommended.

An insulation system developed in Ontario may provide all the insulation and air sealing needs. The Icynene Insealation Foam (**Icynene Inc.**, of Mississauga) provided by qualified installers only, was used effectively on the Advanced House in Hamilton. Icynene contains no CFCs, HCFC or formaldehyde and will seal to any surface, including steel.

Another approach is to air seal the building from the outside, using popular housewraps such as Tyvek (from **Dupont Canada**), Typar (from **Reemay Inc.**) or Housewrap (from **BPCO**). But to be effective, joints must be sealed. **HB**

Richard Kadulski is a Vancouver architect and publisher of Solplan Review, an independent journal of energy conservation, building science and construction practice. Kadulski was architect/manager of the B.C. Advanced House.