ing—rarely does an adequate job. These notorious heat thiefs merit a double dose of protection. So seal them from both outside and inside.

Aluminum and vinyl-clad windows generally install by nailing through an exterior flange. A bead of caulk gunned under the flange seals these units well and with minimal effort. Similarly, a bead of caulk under the exterior casing on all-wood units may do the trick. But in these a little more care is needed at joints and miters in the exterior trim.

On the inside, aim for an airtight seal between the jamb and rough opening. Some builders choose to foam this gap. This is best done with a small bead shot deep into the gap where the window unit can resist the forces of the expanding foam. (Windows have actually cracked!) As extra protection, a tight-fitting length of wood can be tapped into the window jamb to hold it true while the foam sets up. The remainder of the space can then be stuffed with fiberglass.

If the poly barrier is sealed intact to the window jamb, then fiberglass alone should suffice in the rough opening. To achieve a good seal here, run the vapor barrier right across the window opening and make diagonal cuts from window corner to corner. Insert these flaps between the window jamb and the extension jamb or between jamb and interior casing. Trim the excess with a sharp knife. A low infiltration window, sealed thus, should leave you and your smoke stick draft free.

Interior finish

Airflows seem to ignore baseboards, drywall joints, and miscellaneous interior trim, so seal your vapor barrier well to subfloors and lap it at corners between walls and between wall and ceiling.

At this point, things are looking pretty good except for those messy cuts around pipes and electrical boxes. These necessary evils to a well-sealed home can be dealt with in several ways. Strapping out the drywall ¾ inch off the studs and vapor barrier adds both an insulating air space and a convenient conduit for plumbing feeds and wiring. Shallow boxes can be installed here without puncturing the vapor barrier. Some have had good luck with slitting an X in the plastic and taping the flaps to the inside of the electrical box with polyethelyne tape. Use a plastic box (without all the holes) and caulk where the wire enters the box. A shallow plastic pan, designed to fit around and seal off electrical boxes, is manufactured in Canada. The Vapor Barrier Box™ is available from NGR Saver Distributors, Box 50, Group 32 RR 1B, Winnipeg, Manitoba R3 C4A3 (204) 338-5960.

Electrical boxes should be sealed on inside walls as well, but without a vapor barrier, different strategies apply. Caulking or foaming plastic boxes to the drywall should do the trick. The foam gaskets work okay if electrical box and drywall are lined up just right. On ceilings, try to keep wiring and shallow boxes on the warm side of the vapor barrier by strapping over the poly.

Seal off plumbing where it crosses from unconditioned to conditioned spaces. Plumbing in outside walls will prove harder to seal and exposes pipes to possible freezing. One or two strategically-placed plumbing chases will make it easier to recognize and seal these leaks.

Conservation at work

Craig Eymann of Ambassador Homes takes great pride in the design and construction of energy-conserving and passive solar homes in the Kansas City area. Eymann puts conservation notions into practice, using 150 to 300 tubes of caulk in all his homes, spec and custom alike, and competes successfully in a tough housing market (over 250 homes sold since 1972). In a typical shell detail, Eymann overhangs the box sill over the foundation wall to line up the 1-inch insulating wall sheathing with the 2-inch foundation insulation (Figure 1). The foam sill sealer is extended out to sandwich between wall and foundation insulation to add security to this troublesome detail. Bath and dryer vents are exhausted to the attic, using a simple sock-type backdraft damper. Airtight fireplaces draw combustion air from outdoors.

Eymann estimates that his comprehensive three-step caulking program adds about $550 to the cost of a 2000-square-foot home, while reducing air infiltration rates to 0.15-0.30 air changes per hour.

Eymann has the framing subs include caulking in the roughing bid. He subcontracts interior caulking to the insulation contractor on a per tube basis. Foam is used only when absolutely necessary due to its greater cost. He stresses the importance of educating subs as to the logic and importance of the caulking efforts so that they can take pride in a tight job.

Blower door sleuthing

Trying to take some of the guesswork out of the battle against air leaks, solar designer Terry Brennan of Red Wing in upstate New York puts his homes, half completed, to a blower door test and routinely finds the equivalent of a 1- to 2-square-foot gaping hole in leftover cracks—even after a conscientious sealing job has been done on the shell. Brennan prefers to run the test with exterior walls insulated and drywalled, and interior partitions open. Subfloors are still exposed and the attic is uninsulated to allow access to ceiling and partition leaks. Leaks appear at junctions of floors, walls, ceilings, and around chimneys and electrical fixtures. He has found interior partitions as leaky as exterior walls—due primarily to unsealed holes in top plates. On more than one occasion, he has found wide open recessed light fixtures (required to be left open by code) installed contrary to specifications. So much for specifications! Brennan is currently hard at work building a test cell to try and find the most efficient way to keep things tight and avoid redundant procedures. We wish him luck.