Breaking the Thermal Bridge

This R-30 wall is inexpensive and easy to build

BY STEPHEN BONFIGLIOLI

You might say I've always been ahead of the curve as far as building performance goes. When I started building in 1977, my houses had 2x6 walls and R-19 insulation, while code-built homes had 2x4 walls with R-11 insulation. Other builders, subs, and suppliers said I was crazy for installing more insulation than the building code required, but I've always thought that building energy-efficient homes made perfect sense. In my quest for efficiency and comfort, I tried just about every high-performance wall assembly there was, all of which seemed overly complex and expensive. Then one day 12 years ago, I asked myself, "What if I fur out the interior wall with strips of rigid foam and strapping?" I reasoned that the foam strips would address thermal bridging, add thickness to the wall to accommodate high-density fiberglass batts, and cost less than alternative methods. I have been building my walls this way ever since.

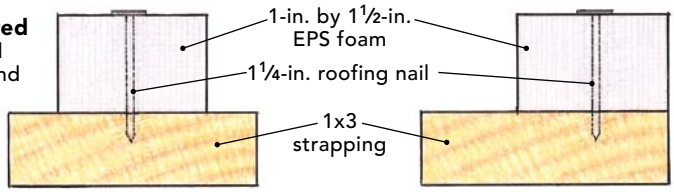
Foam selection

I assemble lengths of 1-in.-thick high-density expanded polystyrene (EPS) foam and 1x3 strapping picked up from my local lumberyard. While the strapping is readily available, the high-density foam isn't always a stock item, so I buy my foam from Insultech in Bridgewater, Mass. (insultech-eps.com). This foam resists compression more than regular EPS, and it comes in convenient 1½-in. by 4-ft. pieces. Alternatively, I could cut full sheets of rigid foam into 1½-in.-wide strips on a tablesaw.

While it may appear to make sense to use extruded polystyrene (XPS) or polyisocyanurate insulating strips, both of which have higher R-values, R-value matters very little in

TWO KINDS OF FOAM-BACKED FURRING

The foam strips are assembled by arranging 1x3 strapping on sawhorses and then fastening the foam strips to the strapping with a roofing nailer and 1¼-in. roofing nails.



Centered For wall studs and cripple studs

Offset For corners, top and bottom plates, and around windows and doors

Drawings: Vince Babak

this application. EPS is the least expensive type of rigid foam, and with an R-value of R-4 per in., it creates enough of a thermal break to sufficiently slow heat transfer through the framing.

Speed and strength

Once we have a new house dried in or a remodel gutted, we can add the foam strips to an entire 3000-sq.-ft. house in a day or less, saving us considerable time and money when compared to more-complicated wall assemblies. Also, because the foam strips are covered with 1x3s, drywall and trim can be installed with conventional fasteners instead of using long nails or screws to find the framing behind the foam. The 1x3s also allow the homeowners to hang pictures and shelves more easily later on.

Don't forget the air barrier

Air-sealing is paramount when using fiberglass batts (see "Making Fiberglass Work," *FHB* #246), so we fill any holes or gaps with spray foam before installing the high-density R-30 batts. We're careful to fill the stud cavities completely with minimal compression.

Our locality requires vapor retarders on the interior-facing side of exterior walls, so we use MemBrain vapor retarder (certainteed.com) in combination with air-sealing tape and acoustical sealant to create a complete air barrier that prevents warm interior air from condensing in the wall cavities during the winter. MemBrain is a so-called smart vapor retarder with a permeability that increases as humidity rises to promote drying. To ensure drying to the exterior, we complete the assembly with plywood, carefully detailed housewrap, and wood siding.

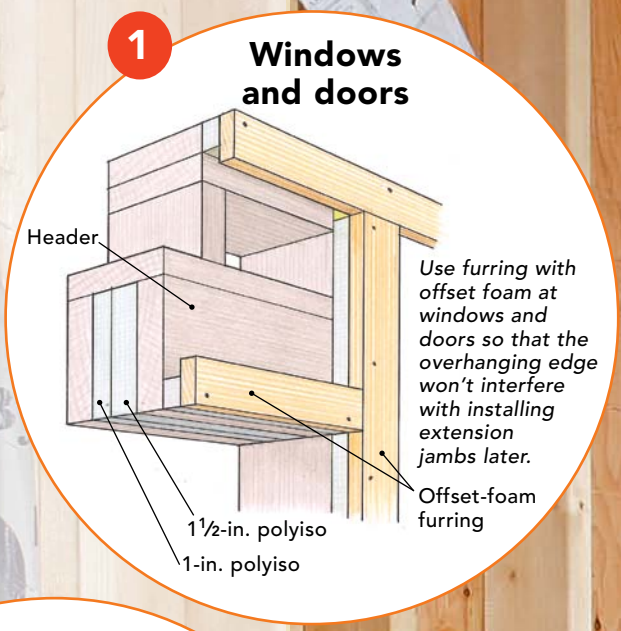
Cost comparison

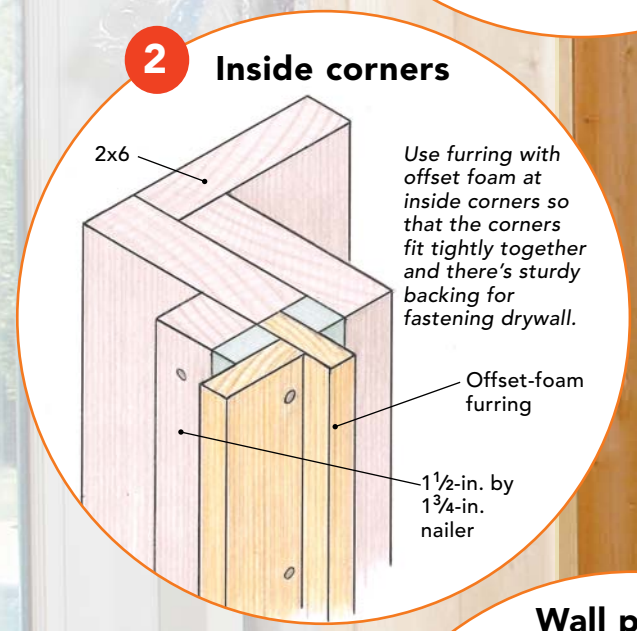
My wall is much less expensive than alternatives such as SIPs or exterior foam. Labor and materials—including the foam strips, strapping for attaching trim and drywall, and batts of high-density R-30 fiberglass insulation—cost $1.50 per sq. ft. of living space. For comparison, installing 1½-in. or 2-in. rigid insulation over plywood or OSB sheathing and adding blocking or furring for windows, siding, and trim costs more than $3 per sq. ft. of living space. □

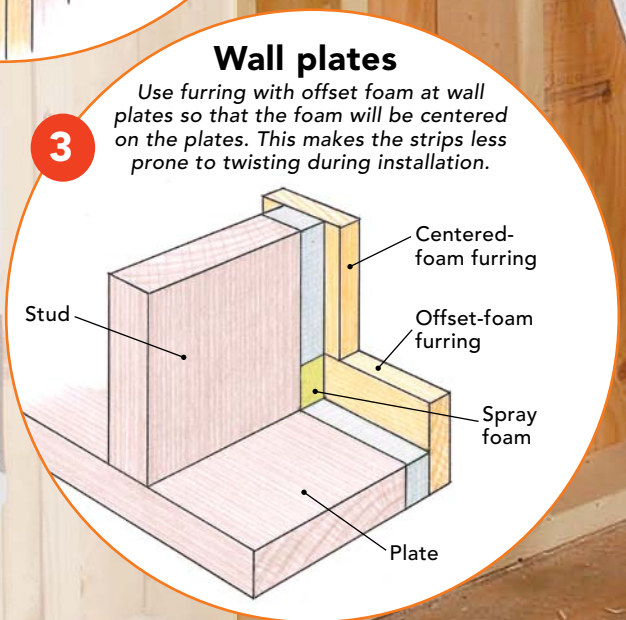
Stephen Bonfiglioli is a builder in Middleboro, Mass. (meadowbrookefarm.com). Photos by Patrick McCombe.

INSTALLATION DETAILS

Attach offset foam furring strips first to the top and bottom plates with cement-coated 3½-in. ring-shank nails. Then, working from one end of the wall to the other, nail the foam-backed strips into corners, onto studs, and around doors and windows. Space the nails about every 12 in. to 16 in.







What about electrical boxes?

Adding foam-backed furring strips—and building an air-tight assembly—hamper the typical electrical-box installation. We modify our installation method with plywood blocking and Lessco airtight and vapor-tight enclosures.

Start with a plywood scrap. *A piece of 3/4-in. plywood is nailed to the side of the stud to provide a solid installation point for the nail on electrical boxes.*

Install the enclosure and box. *The green enclosure, which helps air-seal the electrical box, is nailed to the furring; then the electrical box is nailed to the plywood scrap. The last step is sealing the cables with foam.*