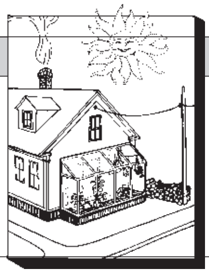

# Fat Wall Finesse

by Chuck Silver

I design superinsulated houses. After trying many methods of achieving high R-value walls, I have settled on a system that I am comfortable with. The following represents some details that I've developed to make it painless to build with extra-thick walls. First, I'd like to explain why I build this way.

There are several approaches to getting an R-30-plus wall. Any method should be evaluated in terms of cost, ease of construction, and effectiveness. In addition, you should consider how much it differs from standard building practices. Include in this whether subs will need to make extra visits to the site, and whether the normal sequence of construction must be altered. Finally, consider whether the wall system works well with your roof, ceiling, and foundation systems, so that the whole package works together. The three options I will explore are not the only ways to achieve good results. (I'll look at some even less-conventional systems in a future column.)

The technique I use most is a 2x6 wall, framed 2 feet on-center, with unfaced fiberglass batts and rigid foam board across the inside face. For one thing, wood sheathing on the whole exterior makes for a much stronger wall.

## Fat Walls

One approach is to build a fat cavity so that a large quantity of loose-fill insulation (fiberglass, cellulose, etc.) can be used. This adds to framing costs, but lets you use relatively low cost insulation. For example, fiberglass batt is about one-quarter the cost *per R* of most high R-value foam boards. Cellulose is similar.

There are several ways to accomplish fat cavities. One reason you don't find anyone suggesting a 2x10 stud wall is that even if the insulation level between studs exceeds R-30, the framing would only be at around R-10 to R-12 and the amount of framing in the wall may be 15 to 20 percent. These "thermal bridges" through the R-30 wall create "short circuits" for heat to escape, bypassing the insulation. This effect becomes more critical as we strive for higher and higher R-values.

A more typical approach uses a double wall—two studwalls separated to eliminate this thermal bridging. Usually this is assembles as two 2x4 walls spaces 3-1/3 inches apart for a total wall thickness (without facings) of 10-1/2 inches. This approach may represent the best option for you depending on lumber, insulation, and labor costs. It should be noted, however, that there is a penalty in lost floor space with this method, so that foundation and roof need to be larger to enclose the same net floor area.

## Foam Wrapper

Another option is to wrap a 2x6 studwall with rigid insulation on the outside. This is frequently installed in place of plywood or OSB sheathing. When this is the case, it's important to provide bracing strength for the building frame. My experience is that the metal "T" strap bracing just doesn't cut it. The houses where I've tried this approach move around some, I know this from repeated problems with the drywall. If you're sold on exterior foam, consider using let-in 1x4 bracing or better still, 1/2-inch CDX in the corners with 1/2-inch foam over it and 1-inch foam everywhere else. Another option is 1-inch foam over the plywood sheathing and 1-1/2-inch foam elsewhere.

In either case, wood sidings should not be installed directly over the foam (see *JLC/NEB*, 6/86, p.29; 6/87, p.20). Strap out the wall with furring strips before siding so that an air space is maintained behind the siding. This will help prevent cupping and curling due to excessive moisture retention or heat buildup.

What I like about this technique is that the rigid insulation runs right over the rim joists and sill, thereby creating a complete skin over the entire shell. One thing I don't like is that the electrical boxes and wires run through the fiberglass batts making it harder to do a thorough insulation job. In addition, it is very difficult to maintain a reasonable seal at all the electrical penetrations in the vapor retarder.

## Foam Facing In

The technique I use most is a 2x6 wall, framed 2 feet on-center, with unfaced fiberglass batts and rigid foam board across the inside face. For one thing, I like having wood sheathing on the whole exterior. It makes for a much stronger wall in terms of racking resistance, and prevents a good impact to the outside of the building from coming right through the wall.

We use Koppers Rx foil-faced phenolic foam board since it has the highest R-value per inch and is reputedly free form "thermal drift," that incredible euphemism for losing R-value over time. In addition, it's better in a fire than the polyisocyanturate foam boards. Since I'm paying for the foil facings, I like to get my money's worth by using the face as my vapor retarder (foil is the best). We tape the seams with foil tape or 3M contractor's tape, and don't have to dance around with huge sheets of polyethylene.

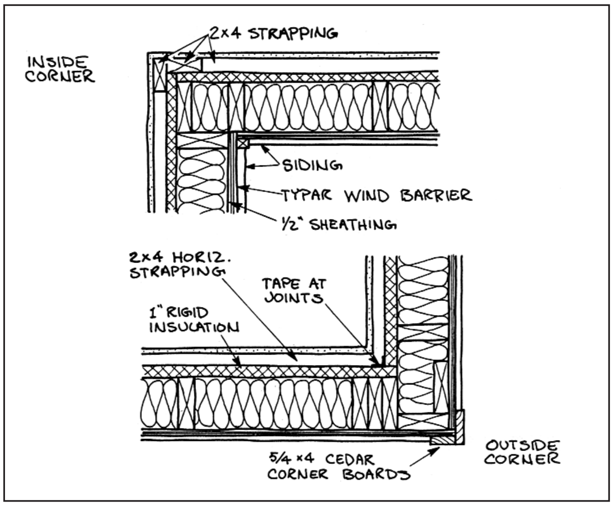


Figure 2. Corner details. *Inside and outside corners are detailed such that fiberglass insulation can be added from the inside, after the sheathing is on.*

The drywall can be installed directly over the foam, but his doesn't solve the problem of electrical penetrations and wire in the insulation. Instead, we apply 2x4s horizontally, 2 inches on-center, over the foam. This performs several valuable function.

First, it creates a 1-1/2-inch chase behind the drywall in which to run electrical and other services. We use 1-1/2-inch-deep electrical boxes (they're wider to create the same volume) so they never penetrate either the vapor barrier of the insulation. In fact, the exterior walls are usually closed up before the mechanical subs ever get to the job.

Besides this, we get an additional R3.5 from the foil-faced air space. Another advantage is that we can run this interior strapping system around the entire perimeter of the building, thereby eliminating leaks and voids in the vapor retarder wherever partition walls intersect exterior walls. As in standard construction, we interlock the wall plates, but we leave out the last stud, the one fastened directly to the exterior wall. We install this stud *after* the foam and strapping are done. It need only be fastened to the strapping, eliminating the need for additional studs in the exterior wall, usually added to create nailers for the drywall corner (see Figure 1). I also don't need to worry about whether the framers remembered to insulate this spot before sheathing over it.

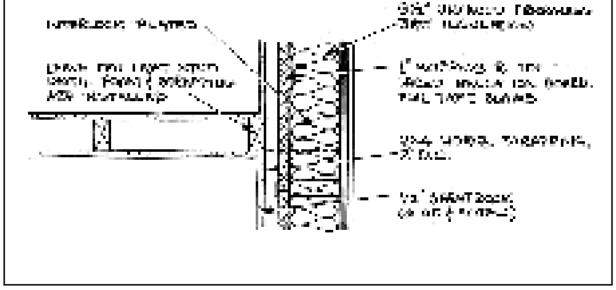

Figure 1. Partition framing. *Leave out the last stud in an interior partition where it joins an outside wall, until the foam and strapping are installed.*

Last, since the drywall is not installed over polyethylene, it may be fastened with adhesive, and with fewer fasteners. This make a better job with fewer nail-pop callbacks. In the rim-joist area, we insulate with 5-1/2 inches of fiberglass and then use sill-band sealer blocks (made of polyethylene foam) or rigid insulation cut to fit between the joists. This seals the area and extends the vapor retarder up to the bottom of the plywood subfloor.

Since the strapping and rigid insulation add 2-1/2 inches to the wall thickness, I sometimes cantilever the 2x6 out past the deck 2 inches to reclaim most of this space. This keeps me from having to enlarge the foundation and floor deck to get the same net floor space, but I don't do it all the time since it makes dimensioning more confusing.

## Corners and Other Details

I have a modified corner detail (see Figure 2), that allows you to install insulation from the inside after the building is sheathed. In addition, it is important to provide a stud approximately 10 inches in from the corners so that there is adequate nailing for the strapping.

At a juncture in the building where

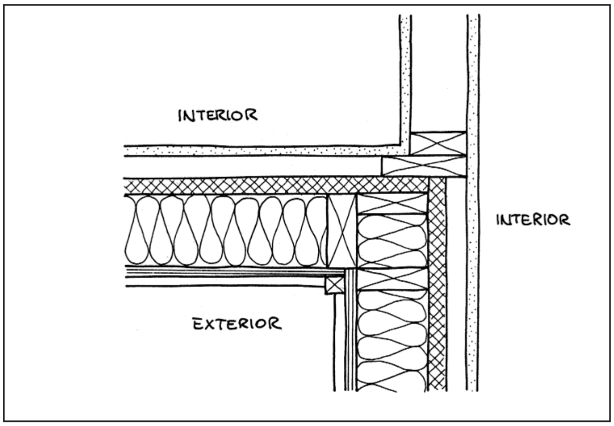


Figure 3. Wall alignment. *An inside partition needs to be offset 2-1/2 inches to keep its inside face aligned with an exterior wall.*

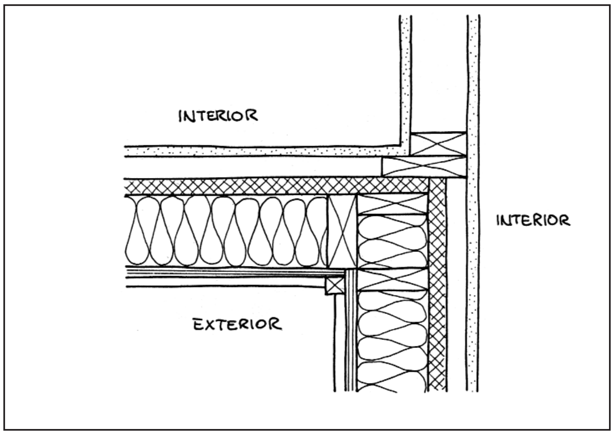


Figure 4. Drywall returns *are economical and attractive Use USG's No. 200 metal trim, which is made to receive mud, or use a standard J-bead.*

an outside wall is continued into the building as a partition wall, the inside wall should be jogged 2-1/2 inches to compensate for the insulation and strapping so that the wall continues in the same plane (see Figure 3).

If plumbers and hvac contractors are brought in before the walls are foamed and strapped, they must be advised of the exterior wall system so that rough-ins are accurately located. Also, wherever something is to be centered between two walls (a window, built-in, sink etc.), you must consider whether the sidewalls are to be strapped or not in order to find the true centerpoint. This should be noted by the designer on the plans.

## Windows and Doors

Like all other thick wall systems, the penetrations through the exterior walls are deeper, and will cost more to finish. Clients usually like the added depth to the windowsill. There are two ways I usually trim out the windows. The first is to order jamb extensions from the manufacturer and apply casing and sill on site, just like everyone else. The added cost for this is invariably much lower than what it costs to extend the jambs on site, and there is usually no delay in getting the window order.

The second method may be even less expensive and creates a more contemporary finish. In this instance, the windows are ordered without jamb extensions and we create drywall returns back to the window frame. We do this on the top and sides, but then install an oak will. To get an even alignment with the window frame without the use of shims, we install a J-bead at the window where the drywall ends. This is screwed through the bottom of the "J" right to the window frame, and then the drywall is inserted into it (see Figure 4).

Doors are treated with extensions or drywall returns just like the windows. There is no problem with sliding or terrace-type doors, but with single inswinging doors, the added wall thickness limits the door swing. Some door manufacturers may offer extended jambs, but check to see if the jamb extension is on the interior or exterior. If it's on the inside, the door will not be able to swing 180 degrees back to the wall. However, this rarely presents a problem since many front doors open against a perpendicular wall or have sidelights. A minor related problem is the latch plunger dragging against the extension jamb. Leaving a slightly wider reveal where the drywall return meets the wood jamb will prevent this.

I realize this sounds like there's a lot of added complexity to building a house this way. Like learning anything new, the first time may slow you down a little. We've done about 12 houses with this system and I'm firmly convinced that it's the best way to go, assuming you're looking for an R-30-plus wall with an unbroken vapor retarder and uninterrupted insulation. I've worked with many different builders on these houses, and it's been nice to hear many of them tell met that if they ever build another house for themselves, they'd use this system. ■

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