

Wrap 'Em and Strap 'Em

by Jeffrey K. Armstrong

Using 2-inch strapping to create a space between the finish wallboard (or plaster) and the air/vapor barrier is now familiar, at least in theory, to many builders. Such a wall leaves space for added insulation, reduces conductive heat transfer through the framing, and — because the electrical wiring can run within the strapping space — makes it easy to install an unbroken vapor barrier.

Our building firm, Drerup Armstrong in Ontario, Canada, uses two strapped wall systems: one using 2x2-inch strapping, and another using 2x3-inch strapping. We've found that these systems give much better thermal performance than single-stud framing at relatively little added cost.

The Basics

The illustration below shows the main elements of the strapped wall system we use. Before we install the poly, we pop horizontal chalk lines across the studs to mark where the strapping will go; this is much easier than chalking later, because chalk doesn't stick well to the poly.

Then we staple a poly air/vapor

barrier to the studs, caulking all the seams. We try to use large sheets and take them as far as possible to reduce seams. Next, the strapping is installed horizontally on either 16-inch or 24-inch centers.

The Rule of Two-Thirds

When planning such a wall, it's important to remember that two-thirds of the total insulation should be on the cold side of the vapor barrier, or you risk condensation in the warm-side insulation cavity. In other words, you should always have at least twice the R-value on the cold side, as you have on the warm side.

For example, if you want to use 2x3-inch strapping with R-7 batts on the air/vapor barrier's warm side, you must have insulation totalling at least R-15 on the cold side — so it won't work to use 2x4s with R-11 batts for the main wall, unless you add at least R-4 foam sheathing. Of course, most energy-efficient builders use 2x6-inch walls with R-19 batts for the outer wall anyway, so R-7 or even R-9 in the strapping space poses no problem.

A typical wall, then, might have (moving outside to inside) R-7 exterior foam sheathing, R-19 batts in the 2x6 stud wall, the air/vapor barrier, R-7 batts in the 2x3 strapping space, and finally the wallboard — a relatively simple R-33 wall.

Close It Quick

The advantages of this wrap-and-strap approach, as we call it, aren't limited to energy. We've found we can close in a building more quickly with it than with other energy-efficient wall systems, mainly because the exterior walls are framed and sheathed in a conventional manner. (The one peculiarity is that you must make sure to frame the corners so that they'll catch the strapping.) The walls are up, the roof put on, and the doors and windows installed before we tackle any of the strapping or other time-consuming energy details. In addition, we leave our non-load-bearing interior partitions until after we've insulated the walls, further speeding "close-in." We've found this a big advantage in our severe climate and short building season.

Leaving the partitions out until after the air/vapor barrier is installed also allows the use of large sheets of poly on the ceiling and walls, minimizing the number of potentially leaky joints between sheets. We also buy extra insurance on the air/vapor barrier by covering all caulked seams with strips of scrap plywood, as shown in the photo. This gives us a mechanical seal should the caulk later fail. We couldn't do this without the strapping space.

The Downside

Once a building is closed in, the wrap-and-strap approach does change the normal construction sequence. If you don't stay on top of things, this can increase costs and complicate scheduling.

For example, our insulating contractor charges us a premium for coming to the site twice: first to insulate the structural wall, then to insulate the strapping space after the electrical inspection. The added cost is minimal, but two visits means two chances for that trade to throw off our schedule. It can also mean an extra trip from the inspector if your jurisdiction requires an insulation inspection. Framers must also return an extra

time to install the strapping.

You must also convince the subs, particularly the electrician, to take care not to puncture the air/vapor barrier. We use only subs experienced with airtight construction, and we give them bright felt-tip pens to circle any punctures so that we can fix them later (the punctures, not the subs). We also have to install sturdy vertical blocking wherever electrical boxes or cabinets will be hung, since they are generally designed to be hung on vertical framing.

Keeping the Drywallers Happy

We used to install vertical blocking at all inside corners to support the drywall. But this was labor-intensive, and made it hard for the electrician to get wires around the corner. So we recently developed a new technique. We take a drywall corner bead and turn it backwards to provide a place to screw the sheet edges, as shown in the photo, next page. This way, the electrician simply runs the wire around the back of the bead.

Our drywallers, however, complain that the 1 1/4-inch leg on a standard corner bead (we can't find bigger) is not quite wide enough to catch the screws on the second sheet in. One way around this is to use drywall clips instead of the reversed corner bead. But the corner bead does have the extra advantage of keeping the electrician's wire from "cutting the corner" and getting in the way during drywall installation.

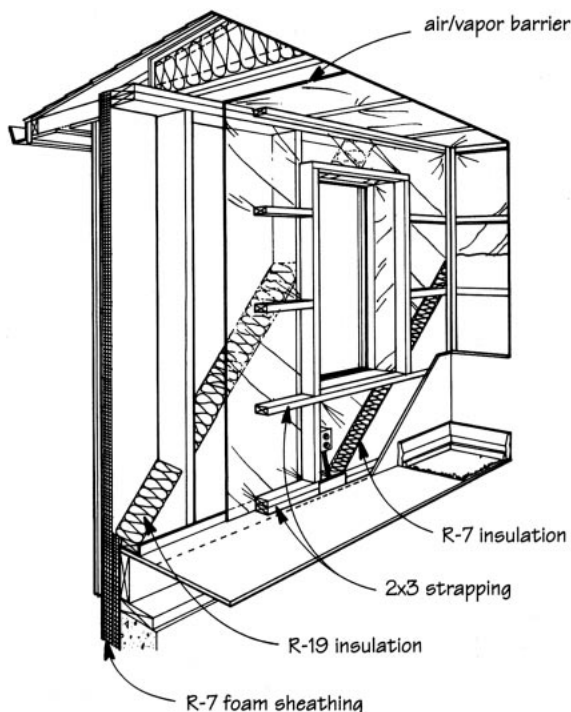
Our drywallers prefer to install their board vertically, even over horizontal strapping. The disadvantage of vertical drywall is that the joints don't fall at waist level, which would make for easy mudding, and you can't use 12-foot sheets to reduce the number of joints.

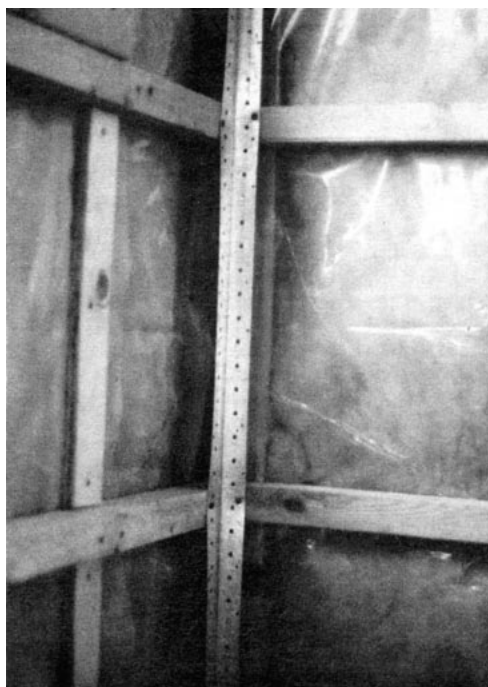
The advantages of vertical drywall, on the other hand, are that no vertical strapping is required at sheet ends; small baseboards do not "lean in" as they do when applied over horizontal wallboard's tapered edge; and there are fewer time-consuming butt joints. We've found that drywall comes out as well on 24-inch centers as on 16-inch centers, so we use 24-inch centers to reduce costs.

A Good Start

Several of our crew feel that the wrap-and-strap method makes for a "cleaner job," because the building is carefully sealed before the interior partitions are built and the subcontractors arrive. This sets a high standard of quality for the job early in the going, establishing a positive tone that affects everyone on the site.

R-33 Strapped Wall





To ensure a permanent seal, the author nails narrow plywood strips over the caulked seams in the air/vapor barrier. Reversed drywall bead provides a backing for the drywall at corners. Wiring is easy to run behind this bead.

The Fine Points

I should mention a few details about the two different systems we've used.

Two-by-two strapping. The smaller strapping is easier to find and cheaper to buy. It is also easier to install, since we can use air guns or, if necessary, nail it manually with 3 1/2-inch spikes.

True kiln-dried 2x2, on the other hand, can sometimes be hard to find. We often get KD 2x4s that have been resawn. We try to avoid this, since resawing changes the stresses in the wood, which can produce warping and inconsistent dimensions.

Some other details:

- We use a 2x4 on edge for the bottom strap to give a nailing base for baseboards. If the ceilings are strapped with 2x2s, we also use a 2x4 at the top of the wall.
- Electricians aren't crazy about the 2x2 system. They must work close to the air/vapor barrier and use shallow boxes. These boxes permit only two connections per box and are physically more difficult to work in. It's also necessary to protect the air/vapor barrier from tabs and grounding screws that project from the backs of these boxes. We give the electricians pieces of cardboard or 1/2-inch foam board to slip behind the boxes for this purpose. This system also means that when we drill through the bottom strapping to run wire from one floor to another, the wire will come within 1 1/2 inches of the back of the wallboard — close enough that code requires us to protect the wire from drywall screws. To do this we nail a thin-gauge

metal plate — typically the back of an electrical box — onto the face of the strapping where we are drilling through.

- The 1 1/2-inch space made by the strapping is hard to insulate. Fiberglass batts that thin are hard to get (and expensive) and tend to fall out while you're waiting for the drywallers (or while they're working), particularly when the strapping is on 24-inch centers. Foam board works better for these small spaces and gives a higher R-value.

Two-by-three strapping. This larger strapping, nailed on edge against the studs, presents a different set of challenges. The main disadvantage is that 2x3 is hard to find in our area, and often expensive. This stock also takes longer to install because we can't use power nailers, and sometimes tends to twist on edge.

The big advantage, on the other hand, is that a 2 1/2-inch space is easier to insulate. The R-7 fiberglass batts that go in this space are easy to find and inexpensive.

Other details:

- We use two 2x3s together at the bottom of the wall to provide nailers for the baseboard.
- The electrician can use regular-size boxes, and can work uncrowded by the air/vapor barrier.
- The plumber can run a 2-inch or smaller vent in the strapping space, if needed. ■

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