An insulation contractor blows wet-spray cellulose into stud cavities.

Wet-Spray Cellulose Insulation

by Chuck Reiss

Thorough preparation and a skilled installer are the keys to a worry-free installation

The first time I heard about wet-spray cellulose, I wanted more information — it sounded too good to be true. But as I sat in my first informational meeting about wet-spray cellulose, I became a believer.

Advantages of Wet-Spray

Wet-spray cellulose has a slightly higher R-value than fiberglass — blown onto a 2x6 wall, it gives you about an R-21 (compared with R-19 for a 6-inch fiberglass batt). But more important, wet-spray cellulose fills in around wires, blocking and everything else, leaving no voids. By doing so, it effectively eliminates air infiltration and air movement in the stud cavity in the same way that sprayed-in foam does, but at a much lower cost. And the actual warmth and tightness of a wet-sprayed home is measurably superior to the same home insulated with fiberglass batts.

Wet-spray cellulose is treated with boric acid, a mineral that is harmless to people or pets, but protects the material from rot or termites. Boric acid repels ants and rodents, and is also a fire retardant. Tests show that houses insulated with wet-spray resist fire significantly better than fiberglass-insulated homes (fiberglass, though it doesn't burn, can melt and allow the fire to move through the walls). Cellulose insulation absorbs sound better than most other insulations, too, resulting in quieter homes.

Cellulose is also considerably better for the environment than either fiberglass or foam. It's made from recycled newspapers, so it actually reduces the amount of trash in our landfills. It takes far less energy to produce the material than to produce fiberglass or foam. And there's no concern about the blowing agents — it's blown in with nothing but fan-forced air and water.

Disadvantages. What's the down side? For one thing, wet-spray costs more than fiberglass. I've subbed out fiberglass at 50¢ per sq. ft., while wet-spray has run me about 75¢ per sq. ft. On a 2,500-sq. ft. house, the difference can add $500 to the home's cost. That may be a lot to some clients, though I think the payback in lower fuel bills makes the investment worthwhile.

The other worry I've had with wet-spray is, obviously, water. A good installer should spray the material on with a moisture content of around 50%. But it's possible to inadvertently miscalculate and load the walls up with extra moisture. Wet-spray is still new to many parts of the country — you have to be careful to get a competent installer.

Filling Irregular Voids

My first chance to use wet-spray came on a project that seemed ideal for it: a rehab job on a converted barn. The original walls had been framed with an assortment of

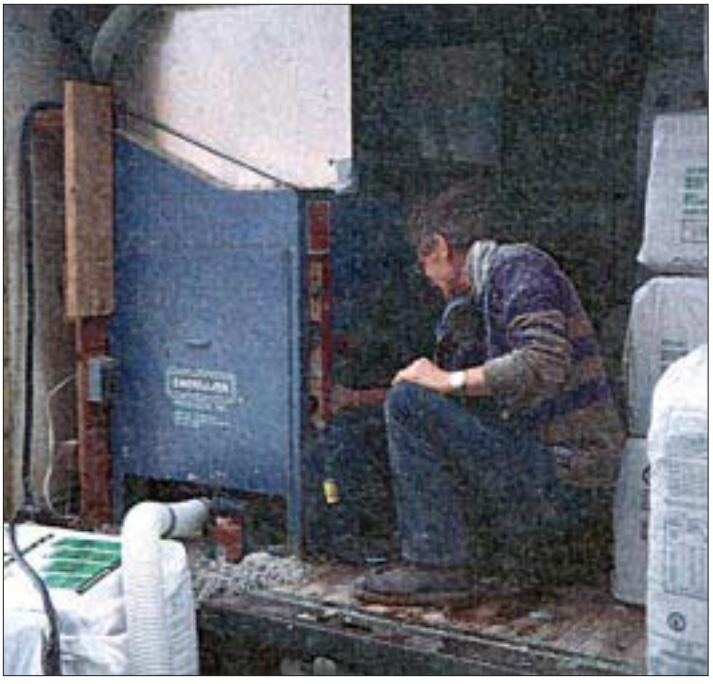

Figure 1. *Good wet-spray machines are expensive and take a lot of maintaining. A workman's glove or other foreign object that is accidentally returned to the hopper with floor sweepings can cause hours of delay.*

dimensional lumber. The south gable wall had been attacked by carpenter ants. We reframed much of that wall with 2x8s, leaving the original framing in most of the upper half of the wall. Looking at the finished repair job, I didn't want to get into cutting and fitting fiberglass. It was a perfect wall for wet-spray.

I could only find one contractor in my area who offered wet-spray. With my client looking over his shoulder, he took on the job of insulating our remodeled barn frame.

There's a trick to it. The process is amazingly simple. There are two hoses, a 4-inch hose that blows fluffed-up cellulose and a pressurized water hose feeding a set of spray nozzles. The cellulose and water mix in midair just before hitting the wall. As I found out, the trick is really in the water hose. Too much water and your wall can stay wet for months; not enough and the cellulose won't stay where it's put.

Applying wet-spray, I discovered, is an art. My contractor on this first job had some trouble with the mix. In places, the cellulose wouldn't stay put in the large bays and we had blowouts. In other spots the insulation was very wet. I wound up filling some voids with fiberglass, and leaving the walls uncovered a little longer than I had planned, to let the cellulose dry.

I was a little nervous when we finally did put up the vapor barrier and drywall, after about a week. The walls were still wet in places. But the insulation contractor told me that the moisture would escape through the sheathing by the time the heating season arrived. Since it was spring, I was pretty sure he was right, but the experience made me more cautious.

The next time I tried wet-spray, I decided to find an installer who had the system and technique worked out. I hired Tony Walker, a contractor from Shelburne Falls, Mass., who came highly recommended. Having heard him talk about wet-spray at an informational meeting, I knew that he had spent several years getting the bugs out and perfecting his technique. I was definitely more comfortable with this installer.

The building Tony insulated for me was a new home patterned after the house described in a publication, *The Project House*, by Builders for Social Responsibility, a group I belong to. My client had read the booklet and asked me to build a house with some of the features discussed in it, including radiant floor heat, a ventilation system, and wet-spray cellulose. It was a good opportunity for me to learn the ins and outs of insulating a new home with wet-spray.

This house is a cape. In insulating it we saw most of the situations you might encounter in a residential installation. There were some cold spaces above the first-floor living areas, and upstairs there were kneewalls, as well as sloped ceilings where rafter bays had to be insulated. Cellulose fit the bill nicely: Wet-spray took care of the walls, and blown-in dry cellulose was perfect for the ceilings.

Before insulating, we installed ProperVent (Poly-Foam Inc., 116 Pine St. South, Lester Prairie, MN 55354; 612/395-2551) under the roof sheathing so that air could flow freely from the soffit vents to the continuous ridge vent. We stuffed fiberglass insulation into the space between the ProperVent and the exterior wall top plates to prevent cellulose from getting blown down into the soffit and blocking the air flow. (Some people have suggested that roof venting is unnecessary when using blown-in cellulose to insulate rafter bays. I see the venting as cheap insurance that can't hurt.)

Next, we installed vapor barriers and drywall on the ceilings that were to be insulated. We would access the spaces from the attic, except for some of the first-floor ceiling areas, where we left out a strip of drywall, planning to blow insulation in through slits in the vapor barrier.

Our last task before the insulation crew arrived was to thoroughly clean up the job site. This is a crucial step, because any insulation that doesn't stick to the wall, or any overspray that is scraped off, usually gets swept up, recycled back through the hopper and blown back through the tube. Any debris that accidentally gets fed back into the blowing machine (see Figure 1) could seriously damage the equipment. Even if the machine isn't damaged, clearing a jam can take hours.

Not Too Wet, Not Too Dry

Once the insulating began, I was happy to see that Tony had the excess moisture problem under complete control. After a few minutes of fine-tuning at the beginning, the spraying went without a hitch. The material stayed in place well, but wasn't wet — if you took a handful of it, it felt damp, but you couldn't squeeze any water out.

When the mix is right, the bays fill up quickly, without a lot of material falling off and with only a moderate amount of overspray. The overspray is scraped off with a special tool called a scrubber (Figure 2, page 34). The

Dry-Pack Cellulose: One Step Better?

Cellulose insulation's advantages make it an attractive choice for builders. But there are drawbacks: With wet-spray, moisture can be a problem, and it can be hard to find an applicator who's got the fine points down. The problem with blown-in dry cellulose is that if the wall is already drywalled to contain the insulation, then you can't see if you're filling up the whole cavity. But if you leave the drywall off and blow the cellulose behind just the vapor barrier, the plastic can belly out so badly that drywall installation becomes an ordeal.

A new method for blowing dry cellulose into walls seems to have overcome those difficulties. Richard Munson, vice president of Par/PAC, a newly formed subsidiary of Norfolk, Neb., cellulose manufacturer Parco Inc., says his *DryPac* system gives all the thermal performance of wet-spray without the mess, without the moisture concerns, and without the need for installers to buy and master expensive blowing technology.

All an installer needs for dry-pack, Munson says, is a compressor, a pneumatic staple-gun and an inexpensive cellulose blower. The secret to the technique is the vapor barrier material: an inelastic plastic reinforced with polyester tire-cord, manufactured by Max Katz Bag Co. of Indianapolis, Ind. The no-stretch plastic has to be stapled securely to the studs with 1-inch air-driven staples. Then a slit is cut in the plastic at the top of each stud bay to accept the blower hose. The cavities are filled with cellulose and the slits are closed with duct tape.

PHOTO COURTESY PAR/PAC

For dry-pack cellulose, tire-cord-reinforced poly is stapled to the studs with 1-inch staples 6 inches on-center (top). Dry cellulose is then blown into the cavities through slits in the poly (above). The holes in the plastic are patched with duct tape.

Munson says tests at Tennessee Tech, in Cookeville, Tenn., have shown that the cellulose should be blown in at a density of 3 lbs. per cu. ft. in order to prevent the cellulose from settling in the bays. In practice, installers learn to judge density by rapping on the plastic as they blow the cavities. "When it's tight as a drum," says Munson, "you stop."

Wet-spray installer Tony Walker (see main story) points out that while wet-spray fills very small stud bays easily, with dry-pack you have to make sure in advance that studs aren't placed too close together for the hose to fit in. Those occasional spots in stick-frame walls where studs fall out an inch or two apart create problems for the cellulose man. Either leave the extra stud out or move it over, says Walker. But it's better to think of it in advance — not after the insulation contractor gets there.

Par/PAC licenses its system to the entire cellulose industry — builders can get the materials from just about any cellulose supplier. For more information, call Par/PAC at 800/850-8505.

— Ted Cushman

scrubber looks kind of like a giant rolling pin; its spiral grooves leave the wall nice and flat and the studs exposed.

While one man runs the spray gun, another follows along scrubbing and recycling the excess. A good operator can keep recycling to a minimum, which is more efficient and also avoids wetting the material twice.

My crew stayed out of the house during the spraying phase. The inside was a fog of cellulose, and while it isn't dangerous, it can be irritating to the eyes. By the end of the first day, most of the walls were done.

Blowing the second-floor ceilings on the second day was uneventful. But parts of the first-floor ceilings were more of a problem. One small section of the second floor was to be an unheated storage attic, outside the insulated envelope. I had laid plywood subfloor in this space, planning to insulate between the floor joists from below. But solid bridging between the joists divided the bays in half — each end would have to be insulated separately. We left a 16-inch strip of the ceiling drywall out where the bridging fell, to allow us to fill both sides of the ceiling from the center out. When the dry cellulose was blown in, the pressure was too great and a few screws popped. When we tried to put the 16-inch section of drywall up, the cellulose was pushing down below the ceiling joist and we could not get the drywall joint flush. We ended up slicing the vapor barrier and removing some of the cellulose by hand to get the small section of drywall flush with the rest of the ceiling. The vapor barrier was repaired with Tyvek tape.

I learned two lessons from this experience. One is that wet-spray blowers, when used with the water pump off for dry-packing, are much more powerful than the conventional blowers used for blowing cellulose into attics. If you're not careful, you

Figure 2. *Excess cellulose or "overspray" is removed with a scrubber (left). Powered by an electric drill, the scrubber's spiral groove brush creates a smooth face even with the plane of the wall studs. The excess material is swept up (right) and sent back through the hopper to be blown onto the next wall.*

can put too much pressure into a cavity (Figure 3). The other lesson is that when you blow dry cellulose into closed-up cavities, solid blocking in inconvenient locations can cause problems. Next time I have to insulate a ceiling space like this, I'll figure out a way to leave an access point from above, and I'll take care not to pack the material in too tightly.

Figure 3. *Here, dry cellulose is blown into a cathedral ceiling with a wet-spray blower. Wet-spray blowers can exert more pressure than conventional blowers used for dry cellulose. In this case, strapping has been installed to prevent the vapor barrier from bulging or breaking.*

It took part of a third day for the insulators to finish and clean up. They left us a bag of floor sweepings in case we bumped into a wall before it was covered, and they were on their way. In all, for me, the job had been straightforward and problem-free. I was well satisfied.

Sizing Up Wet-Spray

With a good installer, the moisture problem that had bothered me the first time doesn't seem to be an issue. I reached into one of the walls Tony sprayed before closing it up for good, and found it was barely damp. And a few months later, when I opened the wall from the outside while making a change to the front entry, I found that the insulation was dry and there was no sign of moisture on the sheathing. We used a porous sheathing and a vapor-permeable housewrap, which allowed moisture to escape easily. But in any case, when the material is applied correctly, the moisture is minimal to begin with and most walls dry out quickly.

My other concern had been cost. To get an idea of the offsetting energy savings, I took a look at my client's heating bills for the house's first winter (1993-1994). A new home's first winter isn't really representative of normal heating costs, since a lot of heat is used up in drying out newly installed wood, joint compound, and the like. And in the case of this home, the heating unit, a Weil-McLain Gold Series boiler, ran continuously for almost four days in October just to heat up the first floor's radiant slab. After that, the downstairs was kept at 70°F and the upstairs, heated with hot-water baseboard, at 65°F. For the five months ending in March, the coldest months in years around here, this 2,400-sq. ft. house cost about $160 a month for heat and hot water. I'm convinced that cellulose insulation has significantly lowered the energy use of the building.

The cellulose also made the house remarkably quiet. Oddly, my client's first comment was that the appliances were noisy. In fact, they are all brand new and are mostly designed with low noise ratings. It was the absence of any outside noise coming through the walls that made the mechanical sounds so easy to hear. I view the noise-absorbing quality of cellulose as an additional mark in its favor.

Although I did have to schedule subs a little differently (for instance, the drywall had to be installed in two phases), this minor inconvenience was more than made up for by the comfort level of my crew, who didn't have to work in the presence of fiberglass dust.

All in all, I think wet-spray cellulose is an excellent material that is well worth its cost. I'll be trying hard to convince my clients to choose it from now on. ■

Chuck Reiss is a builder in Hinesburg, Vt., and acting director of Builders for Social Responsibility.