

Cellulose insulation winning market share in Colorado

I am a kind of burr. I shall stick.
-Shakespeare, Measure or Measure

When opportunity knocks, you've got the headphones on.
-Murphy's Laws

A decade ago, only a scattering of custom builders opted for cellulose insulation. Today, about one-third of all new homes get the gray stuff sprayed into walls and blown into ceilings.

The user list includes Centex, John Laing, KB, Lennar, McStain, Oakwood, Pultc. Trimark, Villate and more. Dean Fraley, sales manager for Allied Insulation estimates that 35 percent to 40 percent of their builders opt for cellulose walls and 50 percent to 60 percent for cellulose attics.

This transition didn't happen without its share of battles. In fact, during the 1980s and early 1990s, the fight between fiberglass and cellulose was bloody. Think Omaha Beach. But now, when the largest insulator in town offers either cellulose or fiberglass, the war seems to be waning. In fact, the momentum is shifting toward cellulose.

Builder perspective

Don Carpenter, director of product development for Oakwood Homes, says the company has been installing cellulose insulation in all their homes for the past three years. "We think it's a superior product, based on house testing. It helps us achieve another quality point for our homes. Once we educate our customers about the product - such as showing cellulose behind Plexiglas in our model homes - they see it as a plus."

In wall applications, the cellulose is covered with netting after it's sprayed into the cavities. "It doesn't go in very wet," said Carpenter. "Just leaving the wall open for inspection means there is some drying time. We schedule the same amount of time for

cellulose as for fiberglass insulation. The cost is either a wash or it costs less. Overall, we're pleased."

Rob Kabza, director of construction for the Colorado division of Pulte Home, reports they've been using all cellulose insulation for over two years. "Costs have a lot to do with it, as the costs for fiberglass were going up and up. We were turned on by some of the benefits, especially the good coverage and sound muffling features. We've had great success with the product and haven't had any issues with it. It was pushed and is a saleable item. Some model complexes have wall section cutaways showing cellulose."

Rusty Crandall, executive vice president of KB Homes, said, "Half our homes have cellulose and half don't, primarily because one of our major insulators won't install it. Two years ago, cellulose was more expensive than fiberglass, but fiberglass has gone up considerably, so now it's a wash." Crandall reports no field issues with cellulose, except that repairing or replacing something in an insulated wall cavity can be a messy nuisance.

"A few years ago we called Joe Lstiburek and grilled him about cellulose," said Crandall. "He thought it was a great product and that mold wouldn't be a problem. KB started using cellulose over a year ago. Today, when we do our pre-drywall walkthroughs with buyers, the stuff looks really nice and clean in terms of coverage vs. the packed and stuffed look that fiberglass often has. I'll use cellulose in my own home."

In Centex Homes' Linden Park subdivision, built to the EPA's Energy Star performance level, their 2x6 walls and attics are insulated

with cellulose. Said Centex's Justin Jones, "We use cellulose everywhere except against crawlspace walls. and we cover over the cellulose in our rims with batts, to keep the material from falling out. By the way it's installed, cellulose automatically fills the wall bays full with no gaps, voids or compressions.

In fact, Centex uses cellulose in all their subdivisions, in part due to its tightness benefits. "Because cellulose can be easily installed with no defects, we feel that it gives us an overall better insulating package. This is very important in our Energy Star a neighborhood, Linden Park, and our other E-Star a neighborhoods where we build to strict air-sealing standards."

Village Homes started using cellulose when they joined the Built Green program early last year. Said Village's Scott Scinelli, "Our site inspections showed that batts tended to get compressed in wall cavities. With cellulose, you know exactly what you're getting: an R-13 is an R-13, vs. an R-15 batt that may be less than it's rated."

Scinelli reports that Village pushes cellulose during their sales process. "When we went Built Green, switching to cellulose earned us a lot of points, which got us over the hump. We achieve a cost savings - between \$200 and \$600 per house - compared to R-15 batts in walls and fiberglass blown in our attics."

Background

Most cellulose insulation consists of ground, recycled paper (primarily old newspapers) plus a chemical added for fire retardancy. The ratio is roughly 85 percent paper to 15 percent chemical additive. This heavy ratio of recycled material gives it a points edge in the Colorado Built Green program.

Cellulose is blown dry into attics and damp into walls. The dense material typically generates an R-13 wall. Since cellulose blown in the attic provides more R-value per inch (R-3.6/inch), it tends to give a little higher R-value for the first foot in from the perimeter.

The war that the fiberglass industry waged on cellulose raised a number of issues. The insulation settles over time. The sprayed products are prone to gaps. The product can burn, joining in ceiling ties. The fire retardancy "escapes" (sublimates) from the product over time. Where is the quality control to assure the proper amount of fire retardant is added in the first place? What prevents mold when you install the material wet in walls?

The cellulose gang counterattacked. Fiberglass insulation fibers are suspected carcinogens. Air movement reduces the R-value of low-density blown fiberglass in ceilings. Batt is prone to many gaps and compressions that can seriously undermine the product's stated R-value. Etc.

In this writer's experience, lab-based and in-field research studies have supported the observation that both products can achieve rated performance when properly installed. The entry of large corporate entities behind the cellulose industry has substantially reduced QC concerns about cellulose. Walls insulated with cellulose tend to achieve more uniform coverage.

Since cellulose is a denser product, it enjoys an edge when it comes to house tightness. Dense-packing trouble spots - garage ceilings beneath living spaces, fireplace and entertainment center bump-outs, rim joists. etc. - with cellulose contributes to house tightness. Factoid: the tightest house tested in the state last year, an Engle production model, relied on a combination of good air sealing plus use of cellulose in all the trouble spots listed above.

Poly vapor barrier?

Forensic engineer Joe Lstiburek (Building Science Corp; Westford, Mass.) argues that the installation of a polyethylene vapor retarder over sprayed cellulose insulation should be avoided in non-mountainous climates in Colorado.

"Damp spray cellulose insulation should only be used in wall assemblies that are able to dry toward the interior or toward the exterior. If a vapor-impermeable sheathing is installed on the exterior of a wall assembly,

a vapor diffusion retarder [e.g., sheet polyethylene] should not be installed on the interior. Dry spray cellulose can be used in wall cavities with netting and can be used with any type of sheathing.

"Cellulose is not a vapor diffusion retarder. That means if you need a vapor diffusion retarder on the interior of the building assembly [in climates with over 8000 heating degree-days; e.g. Eagle and colder], you should use polyethylene or low per (vapor retarder) paint." [Builder's Guide: Cold Climates. v-2001, p. 206]

Worst-case success story

Some have expressed concern that walls staying wet a little too long could cause mold growth. Good concern, but experience hasn't shown a problem yet in Colorado. Consider this worst-case evaluation performed by this writer.

During one wet April back in the late 1980s, an infill custom home in Denver had its 2x6 walls sprayed with cellulose. The rookie installer seemed to think that if some water helped make the cellulose stick to the cavities, more would be better, so he soaked the walls. At day's end, pressing a pen against the base plate squeezed water to the surface.

To compound the worry about very wet walls here, a layer of interior polyethylene was stapled up right after the cellulose spray. One final major concern: the exterior was wrapped with two layers of 4x8-foot foil-faced sheets of foam with overlapped joints. So the wet wall would be extraordinarily slow to dry either to the interior or exterior - a worst-case scenario.

The following December, infrared testing showed a few wet spots remained in the

walls - not surprising given the construction sequence. Some selective holes cut in closet walls showed that indeed the walls were still wet. But no mold was evident. Reason: the borates used as a fire retardant also serve as a mold inhibitor (fungicide).

The following winter, three wet spots were still located in the walls. Again, selective deconstruction showed no evidence of mold 20 months after the wet insulation had been installed.

One example does not make an ironclad case. But the lack of mold in this worst-case application was a positive finding.

Codes roadblock

Several code jurisdictions effectively preclude use of cellulose insulation in wall systems. Douglas County, Castle Rock and Lakewood were cited by several builders as jurisdictions where they can't use cellulose.

One common constraint is reliance on a strict interpretation of a prescriptive energy code such that building officials don't allow for the usual tradeoff or "systems analysis" (e.g., E-Star energy rating) compliance options. Such options are spelled out in both the 1995 Model Energy Code and the 1998-2002 International Energy Conservation Code. Yet code officials in Douglas County require that you travel the building highway their way. They insist on no less than R-15 wall insulation, and cellulose typically achieves an R-13 in 2x4 wall assemblies. Given the other benefits cited above, that's shortsighted.

"After the walls are sprayed, a brush cleans off the studs and over-spray, leaving the cavity filled with a uniform covering of cellulose. The brushed-off material is recycled back into other walls."