

Beyond OSB: Wall Sheathings That Multitask

Can a product that provides structure, housewrap, and even insulation save you time and money?

BY CHARLES BICKFORD

Remember when somebody started selling peanut butter and jelly in the same jar? Well, a few manufacturers have recently developed sheathing products that combine two or more functions in one product. In part, it's an effort to simplify the increasingly complex business of building a house.

It didn't used to be so complicated, but then, it used to cost only pennies to heat a house, and mold grew only on cheese and not inside walls. These days, it's in everyone's interest to make houses as tight and as energy efficient as we can. To that end, the materials and the processes of home building have become a lot more complex. Take the evolution of sheathing materials and exterior-wall assemblies over the past 100 years. That subdermal layer of a house's skin has gone from solid 1x boards with the siding nailed directly over them to 4x8 sheets of engineered plywood or oriented strand board (OSB) with a carefully woven collection of housewrap, rain screens, tape, and flashing materials that make an exterior wall perform better and last longer. Plain old OSB still has the lion's share of the national sheathing market (about 60%, according to the Engineered Wood Association; www.apawood.org), but it's interesting to see how the industry responds to the evolving building system.

I recently investigated three new structural-sheathing products. Of these materials, one has been on the market for some time, and two will be distrib-

uted nationally by the time you read this.

What's sheathing supposed to do?

Historically, sheathing's primary jobs were to prevent the house's frame from racking and to create a sturdy substrate for siding. These days, building codes are specific about the strength required of sheathing materials, and the number and type of fasteners that must be used to attach the sheathing to the house's framing. Also, in certain seismic and coastal weather zones, building codes specify even more stringent fastening schedules.

Sheathing also plays an important role in the movement of air through the walls of a house. Common sense tells us that sheathing should block outside air from invading the wall cavity and the house's interior. However, OSB or plywood alone cannot sufficiently prevent air infiltration—hence, the need for builder's paper, housewrap, and sheathing tape.

Depending on their composition, sheathing materials can also speed or retard the flow of water vapor from one side of a wall to the other, a characteristic that's referred to as permeability and is measured in perms (see "What's the Difference?" p. 92). The higher the perm rating, the more diffuse the material. For example, OSB has a perm rating between 2 and 3; rigid polyisocyanurate-foam insulation has a perm rating of 0.01. A house built with brick veneer in Texas should have sheathing with a low perm rating to prevent water vapor from being driven inward by the sun's heat. In Massachusetts, the house should probably have higher-perm sheathing that allows the wall cavity to dry in either direction. (For an elegant explanation of this issue, read "Understanding Vapor Barriers" by Joseph



INSULATION AND SHEATHING, TOO

Dow introduced **Structural Insulated Sheathing (SIS)** in early 2008; meant to provide structure, insulation, and a weatherproof barrier, it consists of polyisocyanurate foam that's sandwiched between a thin weather-resistant barrier and a 1/8-in.-thick pressure-laminated backer (think of it as a milder hardboard). It's meant to be cut with a circular saw, but it weighs about 30 lb. less per sheet than OSB. Dow offers SIS in two thicknesses, 1/2 in. and 1 in. By the time you read this, it should be available nationwide.

Eric Smith, a builder with David Weekly Homes in Coppell, Texas, has been using Dow's SIS product on an experimental basis for the past few months. Previously, he had used a combination of OSB for shear walls, 1/2-in. rigid foam between the corners, and housewrap over everything. Now, he's trying the 1/2-in. SIS as continuous sheathing. Due to his limited experience with the new product, Smith couldn't say if it was cost effective. But he likes that the finished wall assembly was promised to have a slightly higher R-value (R-3.5 vs. the R-3 claimed for Dow's 1/2-in. rigid-foam board), that the product creates a better

air barrier, and that he can now skin the whole house with insulated sheathing.

The rigid-foam sandwich is code-approved as a structural material for seismic zones. If used in California and other earthquake zones, however, additional wall bracing must be added. SIS can't be used as a nail base, either; siding must be fastened to the framing. Because SIS's structural classification derives from a backing that's 1/8 in. thick, I asked about nailing schedules and how far Smith's crew had set the nails. Smith said that they were able to set the compressor pressure so that nail guns would send the nail head through the foam and set it against the backer. John Hammer, marketing manager for Dow Building Solutions, said that even though nails create holes in the surface, the foam tends to close around the nail head, sealing itself, and didn't pose a significant reduction in performance.

To complete the air barrier, seams must be sealed with Dow's Weathermate construction tape; Dow recommends flashing around doors and windows with its Weathermate flashing system.

New material on the horizon

In a few years, you could be nailing old carpets onto your 2x frame instead of plywood or OSB. Well, make that recycled post-consumer nylon carpet fibers that have been mixed with VOC-free resins and pressed between two fiber mats.

Nyloboard (www.nyloboard.com) is gearing up for nationwide distribution in the next year and plans to offer structural sheathing, a combination siding and sheathing product similar to T-111, tongue-and-groove boards, and exterior trim. Sheet

STRUCTURAL INSULATED SHEATHING (SIS)

Dow Chemical
<http://building.dow.com>

What: Polyisocyanurate foam bonded to a 1/8-in.-thick pressure-laminated backing, faced with a nonreflective, water-resistant layer. Available in 1/2-in. and 1-in. thicknesses.

Installation: Edges must be fastened 3 in. on center for structural effect; cannot be used as a nail base; can be used structurally only in seismic zones A, B, and C.

R-value: 5.5 (for 1 in.); R-3 for 1/2 in.

Perm rating: 0.03

Weight: 16 lb. per 4x8 sheet

Warranty: 15 years

Price: About \$18 for a 4x8 sheet, or about 60¢ per sq. ft., including tape.



Georgia-Pacific's new sheathing, Nautilus, consists of its OSB product with a woven housewrap glued to one side. It's meant to be installed as you would any OSB sheathing; GP's proprietary housewrap tape is applied to all seams as you would with regular housewrap. Doors, windows, and other penetrations must be flashed with code-approved flashing tape. Unlike regular housewrap, you cannot cover flashing tape with the wrap.

The manufacturer recommends cutting sheets with the housewrap face down to avoid delaminating the housewrap layer, and that when possible, site-cut edges be oriented down and always sealed with housewrap tape. (The latter tip is meant to replace the protective sealant that GP uses to coat the edges of its OSB; fresh cuts are more likely to absorb moisture and swell.) The product is guaranteed against delamination for 90 days in the weather.

I was able to find only one builder who has used Nautilus. Chad Bell with Blue Sky Construction builds custom homes in Gainesville, Ga., and has participated in the test market for Nautilus. He told me that this sheathing takes a step out of the process, so now he can seal the building envelope faster. Previously, he used regular OSB and a separate housewrap; now he's been able to eliminate one cost, the housewrap subcontractor he used to hire. But despite his streamlined sub list, he says that using Nautilus is comparable in cost. Still, he likes the fact that his lumber piles are protected from the weather.

GP announced the debut of Nautilus in January 2008 and should have nationwide distribution by the time you read this article.

NAUTILUS WALL SHEATHING

Georgia-Pacific
www.gp.com

What: Polyolefin housewrap bonded to 7/16-in. OSB.

Installation: Same fastening schedule as OSB (6 in. on center on edges, 12 in. on center in field). Cut edges should be oriented downward and sealed with tape.

Perm rating: 0.75 for the assembly

Weight: about 50 lb. per sheet

Warranty: Exposure up to 90 days without delamination; limited-lifetime warranty for owners.

Price: GP did not have price information by the time we went to press.



dimensions range from 3/8 in. to 3/4 in. thick in 4-ft.-wide sheets 8 ft. to 12 ft. long. Nyloboard claims that the material is waterproof and is extremely resistant to mold and insects. A 1/2-in.-thick 4-ft. by 8-ft. sheet weighs about the same as a

sheet of OSB; their Web site specifies that the panels be installed with screws, then sealed with elastomeric caulk. The only thing Nyloboard hasn't figured out is a price, but a company representative assured me it's at the top of their to-do list.

Wall-to-wall goes exterior. Nyloboard LLC has developed a building material made from recycled carpeting, no-VOC resins, and a fiberglasslike matting. It has the strength and weight of plywood, is rated for structural use, and helps to reduce landfill content.

Lstiburek at www.buildingscience.com.)

Sheathing even can be used to insulate a house. Depending on the house's location and type of wall assembly, structural sheathing might be necessary on the corners of the house. Under these circumstances, a builder might choose to sheathe the rest of the house with rigid-foam insulation to increase the walls' thermal performance.

Innovation is an ongoing process

For many builders, market turmoil and the steep learning curve of green building have made building houses more challenging than ever. New products touted to perform better and cost less are abundant, but for most builders, there's a risk in trying something new. Even if a product has been on the market for a year, it takes more time for anecdotal acceptance to trickle down to those in the field.

The sheathing products shown here are designed largely to make builders' work easier by cutting out steps while still producing walls that perform well. As with any aspect of building a house, however, success lies in the details. As you'll see, the installation details of the products shown here are one of the hurdles, at least with the builders that I talked to. Other concerns include performance and cost.

Still, these materials hold promise, and there are more new materials, such as Nyloboard (sidebar p. 64), on the horizon. Maybe someday, someone will make structural sheathing with an integral rain screen or a material whose perm rating can be programmed by computer. Stay tuned. □

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When Huber Industries rolled out AdvanTech sheathing products a few years ago, builders discovered a panel product that wouldn't buckle, bubble, or warp when left out in the elements. So it's not surprising that some builders have made the short leap of faith to Huber's newest product, the ZIP System for walls and roofs. According to Huber, the ZIP wall panels are made of OSB that has an outer-membrane layer of resin-impregnated paper called Stormex bonded to the exterior face; this outer layer is meant to take the place of housewrap.

The sheathing is specified for use with all types of cladding, except adhesive-attached EIFS (synthetic stucco), which requires an additional drainage plane to qualify for warranty coverage. Seams and flashing must be installed with Huber's proprietary tape for a continuous air barrier. Huber recommends a maximum exposure of 120 days, the same as most housewraps. One handy feature of the ZIP System is a 1/8-in. tongue along the perimeter of each

sheet, which means that installers don't have to maintain an expansion gap between sheets.

Chris Van Staaldin of Black Diamond Builders in Everson, Wash., decided to try the ZIP System; the thought of not having to deal with housewrap blowing off appealed to him. He says that for a 2000-sq.-ft. house, the ZIP System costs a couple of hundred dollars more than the price of buying and installing CDX plywood and housewrap, but ZIP System panels take less time to install.

Convenience seems to be the major attraction for many of the builders I talked to, and the product seems to be standing up to performance claims. Hans Porschitz, an engineer with Bensonwood Homes in Walpole, N.H.,

ZIP SYSTEM WALL PANELS Huber Engineered Wood www.huberwood.com

What: 7/16-in. OSB faced with a bonded layer of Stormex (phenolic-impregnated kraft paper) that forms an air- and water-resistant barrier.

Installation: No expansion gaps necessary; ZIP System panels include a tongue that allows movement when panels are butted tightly. Nail heads that penetrate deeper than 1/8 in. must be taped.

says that the ZIP System allowed them to reduce the number of components in their factory-assembled walls. Instead of covering wall sections with housewrap and tape that often need repair later, they can build walls in the shop, transport them to the site, assemble them, tape the remaining seams, and have the house dried in quickly. Both Porschitz and Greg Graham, production coordinator at South Mountain Company on Martha's Vineyard, Mass., said that blower-door tests indicated that the ZIP System was creating a much tighter build-



ing than OSB and housewrap. Graham said that they achieved even better sealing results by following the tape applicator with a laminate roller (photo above).

Although everyone I talked to agreed that the system created a great weather barrier, when it came to flashing, more than a few expressed doubt that the tape would provide an adequate drainage plane. Van Staaldin said that he still runs a piece of housewrap above penetrations up to the eaves to cover the flashing tape. Other builders seemed to think that an extra layer of housewrap was just good insurance against sloppy installations. As Russ Gamel of Ideal Homes in Norman, Okla., put it, "It takes the human error out of the equation."

Available in: 8-, 9-, and 10-ft.-long sheets

Perm rating of OSB substrate: 2-3

Perm rating of Stormex: 12-16

Weight: 55 lb. per 4x8 sheet

Warranty: 15 years (system), 30 years (panels)

Price: approximately \$12 per sheet, or about 45¢ per sq. ft., plus the cost of tape.

The age of tape

Ever notice that a house under construction can at times resemble an ornately wrapped Christmas gift? Housewrap tape, flashing tape, red tape, blue tape, wide tape, thin tape. The good part is that unlike decorative wrapping, these house tapes serve an important function: to keep water and air outside.

Housewrap performance depends on the tape, which must be installed to the manufacturer's specifications: on a substrate that's free of dirt, oil, and other contaminants. Most, if not all, tapes are meant to be used with a specific housewrap and aren't warranted anywhere else. In the cases of Dow's SIS, Huber's ZIP System walls, and Georgia-Pacific's Nautilus, which all have an integral layer that acts as a housewrap, the tape completes the air barrier.

When these products are used without a separate housewrap (one that can't be peeled back, anyway), the flashing around windows and doors relies on tape to keep water from getting between the flashing and the sheathing. Like housewrap tapes, flashing tapes are usually specified to be installed with a particular product. Installation is limited by temperature (most can't be installed below 20°F), and some must be used with primers (often a form of spray contact cement) in certain conditions. All tapes are tested and code-approved for adhesion and water resistance, but some builders I talked with remained skeptical about the durability of the tape's adhesive over time. They use an additional layer of housewrap to cover the flashing tape over penetrations.



Weathermate Construction Tape (for housewrap) and **Straight Flashing Tape** belong to Dow's Weathermate Weather Barrier Solutions line that includes housewrap, sill pans, and sealants. Flashing tape requires a contact-adhesive primer when used on OSB. Both products have a 10-year warranty.



Georgia-Pacific's Nautilus seam tape is also used to seal the edges of Nautilus panels. It's an inch wider than most housewrap tapes (3 in.). Georgia-Pacific does not warranty this tape.

ZIP System tape comes in two widths, 4 in. and 6 in., and is used for sealing seams and for flashing penetrations. Its heavier weight makes it more like typical flashing tape and less like housewrap tape. A tape gun (about \$150) is specified for installation and is the easiest way to apply the tape, which has a 15-year warranty.

