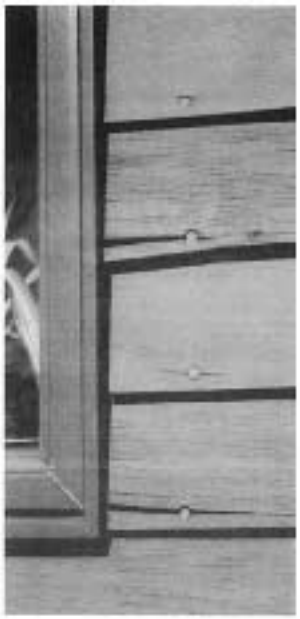
Cracking Clapboards

by William A. Lotz

We have known for several years that there is a compatibility problem between wood clapboards and extruded-polystyrene sheathing. When the two products are installed tightly together, the clapboards can fail by splitting, shrinking, cupping, curling, and popping the nails.

The failure of the clapboards is more severe on the sides of the building that get sun—especially morning sun. The problems are worse when the siding has a dark stain or dark paint, or is left



Splitting (above) and nail popping (right) are common on horizontal wood sidings installed directly over foam sheathing. One solution is to put the foam on the inside.

unfinished. The problem is also worse when the nails are driven too hard.

The foam-insulation manufacturers claim there will be no problem if you: back-paint the clapboards, predrill the nail holes, use the specified size and type of nail, and do not over-drive the nails.

Frankly, I do not know *any* builder who will take the time to predrill clapboards. So when the clapboards fail, the manufacturer can say the clapboards were not installed per specifications.

I was an expert witness on a case in Kentucky earlier this year. The owner of a dozen buildings with failed clapboards was suing a major extruded-polystyrene manufacturer for $2,000,000 to repair the damage. The case was settled out of court at the eleventh hour just before it went to trial. I assume the manufacturer paid big bucks to avoid a public court battle.

The problem on the Kentucky project was with cypress clapboards. *NEB* has published articles that discussed the same problem with redwood and cedar clapboards.

Closer to home, about a dozen miles from my office is a house that had pine clapboards over extruded polystyrene. The clapboards had been patched and refinished a couple of times and continued to split, shrink, cup, and pop nails. Wind-driven rain was soaking the interior of the house, and the insulation color was visible through the splits in the clapboards. Not a pretty picture! Based on my recommendations, the owner hired a builder to remove all of the clapboards, install 1/2-inch CDX plywood, new trim and window framing, and new clapboards.

Basics

Wood clapboards are hydrophilic—they absorb moisture. Extruded polystyrene is hydrophobic—it does not absorb (much) water.

During the nighttime, dew settles

on the clapboards and they absorb moisture. In the morning, the sun hits the clapboards and quickly warms and dries their exterior surface. But the interior surface of the clapboard is still cool and moist. The polystyrene effectively prevents heat and moisture transfer from the back side of the thin clapboard. The resulting stresses in the thin wood clapboards—cool and moist on the back and warm and dry on the front—cause splitting and warping.

If the carpenter is heavy-handed when nailing the clapboards, the result is localized compression of the foam. Combine this stress with stresses from heat and moisture, and the nails pop out. The manufacturers recommend a ring-shank nail to prevent the popping.

I have read several technical papers written by manufacturers and researchers. They all are in the public record and should be available to you if you get involved in a lawsuit.

The first are from Dow Chemical:

1. Aug. 18, 1976, report by F.S. Wang.
2. 1976, rebuttal memo re Masonite Corp. report.
3. Nov. 14, 1977, report by William R. Strzepek.
4. 1977, "Styrofoam Brand Insulation Replaces Conventional Nonstructural Sheathing in the Dow Residential Insulation System."
5. 1978, "Sheathing with Styrofoam Brand Insulation."
6. June 11, 1981, letter from Dow sales representative re Yoder residence.
7. June 23, 1983, letter from Dow Research Center to G.C. Dalgleish.
8. 1983, "How to Get Better Performance from Wood and Hardboard Lap Siding."
9. Jan. 26, 1984, letter from Dow Research Center to Max Hartz.
10. Jan. 24, 1986, deposition of Albert A. Hill in lawsuit of Thomas N. Thompson, et al., case no. 84-C1-0171 Commonwealth of Kentucky, Daviess Circuit Court. 195 pages plus exhibits.

From the National Forest Products Association:

Oct. 6, 1983, "Guidelines for Installation and Finishing Wood and Hardboard Sidings over Rigid Foam Sheathings."

From the Forest Products Laboratory:

Jan. 1980, "Redwood Siding Applied over Polystyrene Foam Sheathing," by Joseph Cern.

And from PALCO (Pacific Lumber Company):

1. Apr. 6, 1978, "So-Called 'Rigid' Foam Plastic Sheathing Presents Problems."
2. Nov. 13, 1979, "Wood Siding Applications over Rigid Foam Plastic Sheathing."

Reading this material can be frustrating. The foam manufacturers blame everything except their own product, and the wood industry points the finger at the foam insulation. When they get sued, they both point at the builder.

In my opinion, the best way to keep out of the middle is easy—don't install wood clapboards nailed to extruded polystyrene.

If you need to do remedial work on a job where foam was applied on the exterior, there are a couple of options.

1. Install the clapboards on 1-by sleepers nailed over the foam. One caution: If the framing is 24 inches on center, don't use hardboard siding or it may warp.
2. Install plywood between the foam and the clapboards. Here, you would still need to use extra-long, ring-shank box nails to get sufficient penetration into the studs.

In either case, you'll need to nail through the foam with 16d nails, which must be done gingerly or the foam will compress unevenly. Neither of these options is likely to please your carpenters.

Foam is an excellent insulating material if used correctly. My preference is to install it on the inside of the wall under the drywall. ■

William A. Lotz, a consulting engineer, lives in West Newfield, Maine.