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EIFS Under Scrutiny

by Chris Kidder

Foam and stucco failures have created an uproar in North Carolina

Last August, Allen Golden, assistant director of the New Hanover County, N.C., building inspectors' office, reported to the municipality that nearly all of the area's 3,200 houses sided with exterior insulation and finish systems (EIFS) might have damaging moisture inside their exterior walls.

Spurred by homeowner complaints, Golden had inspected 31 houses covered with EIFS. He had found excessive moisture in all but

two, and several had substantial rot. Although Golden's initial sampling was not statistically sound, his results proved to be accurate. Since August, inspectors have found moisture problems in 98% of 300 randomly selected EIFS-sided houses in Wilmington, Charlotte, Greensboro, Raleigh, Fayetteville, and the Outer Banks.

In most cases, according to the building professionals who inspected the homes, damage affecting structural members could not be visually detected without cutting

continued



North Carolina investigators examining wood structures beneath EIFS exteriors have uncovered hundreds of hidden problems. Moisture levels above 50% are common, inspectors report.

CONSTRUCTION INTERFACE SERVICES

Watch for Changes in the 1996 *National Electrical Code*

by Chuck Green

National codes change regularly, but builders often don't hear about the changes until an inspector finds a violation on site. The 1996 *National*

Electrical Code has introduced more than 2,000 changes, many of which might apply on your next job.

I found a good illustrated guide to the changes, *EC&M Illustrated Changes in the 1996*

National Electrical Code, by Frederic Hartwell (EC&M Bookstore; 800/654-6776). But the changes are complicated: Even after reading the book, I still needed to consult with an electrician and an electrical inspector for clarifications.

To learn all the changes, you'll have to study the code. But this short list of important changes might help you avoid some unpleasant surprises:

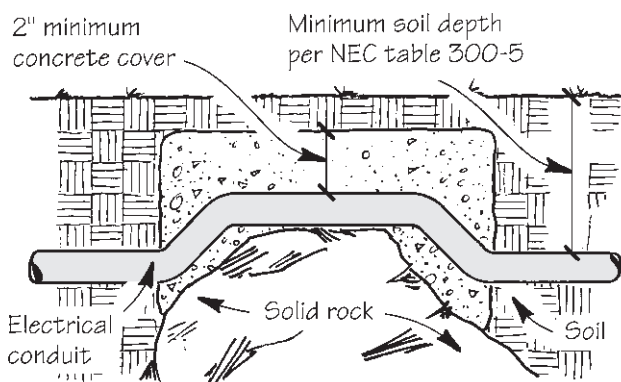
- **When running an underground service line**, the changes make it easier to deal with interference from solid rock. The wiring must be in an underground raceway up to the rock, but can then run over the rock, covered with 2 inches of concrete (left).
- **No open conductors** or

open wiring can be run for temporary use (except for emergencies and tests). Hartwell points out that this rule "will also, if enforced, obstruct virtually every hard-wired Christmas and other seasonal lighting display in the country."

- **Construction site requirements** are changed. All existing receptacles used for construction work must have GFCI protection. However, you can meet the requirement by using a listed GFCI cord set (the language of this change is confusing, but the intent is clear).
- **All kitchen countertop receptacles** must have GFCI protection, not just those near a sink. Refrigerator and

continued

New Rules for Buried Feeder Lines



The 1996 NEC allows underground electrical service lines to run directly over rock, covered by a 2-inch concrete cap.

STATE BY STATE

Virginia. Workers comp rates here dropped an average of 13% in January. Rates for the assigned-risk pool fell 17.3%.

Michigan. The CABO Model Energy Code (CABO/MEC), approved by the state's code commission in July 1995, has been repealed by the state legislature. Builders had complained that implementing the code was costing \$4,000 to \$5,000 per house. The law repealing CABO/MEC directs the state's administration to develop more cost-effective energy standards and emphasize voluntary consumer education strategies for energy conservation.

Washington. A tough property-rights proposal was defeated by state voters in a referendum last November. The measure, which would have required the state to compensate landowners for loss of property value caused by state regulations, was created by a popular petition and had been approved by the legislature. But a majority of voters apparently agreed with critics who believed the measure would have destroyed local communities' power to zone construction and control growth.

Arizona. Development fees for homes in a 110-square-mile tract in north Phoenix will jump from \$2,400 to \$8,400 under an agreement between city planners and area home builders, reports the *Arizona Business Gazette*.

How's This for Inside Work?

If location is the key to selling houses, Gastineau Log Homes of New Bloomfield, Mo., has found the ideal spot. In November, they erected a 2,600-square-foot model home in the Mall of America in Minneapolis, Minn., where it was toured by 4,000 Christmas shoppers daily.

Of course, you'd have to be a very good little boy or girl to get a log home package in your stocking. Not counting labor and site costs, Gastineau's basic packages start at about \$30,000 — a bit more than most people spend on Christmas presents.

Even so, the Gastineau sales ploy accomplished its mission. One gentleman was so impressed with the package that he surprised his girlfriend with a diamond engagement ring as they toured the house, promising to buy one for her if she would agree to share it with him.

How could she refuse? It's solidly built, it's brand-new, and, best of all, it's close to the shopping. □



Gastineau Homes (800/653-6533) erected this log home package inside the Mall of America in Minneapolis, Minn.

Next: The Self-Cleaning Bathroom

First there was the transistor radio, then the Walkman. But according to a report in October 23's Tokyo *Nikkei Weekly*, the latest technological breakthrough from Japan is really going to revolutionize things. Get ready for bathroom tile that cleans itself.

The science behind Japan's latest new product line is simple, if you have degrees in physics and biology. The secret is in the optical catalysts, substances like titanium dioxide that release energized electrons when struck by light. If the electrons manage to hook onto a

passing oxygen molecule, they turn it into what's called a "free radical" — a highly reactive form of oxygen that stimulates combustion much more strongly than ordinary oxygen.

What that means in plain English is that bathroom tiles coated with titanium dioxide can burn off dirt, mold, and mildew. In tests, coated tiles stayed clean for seven months, while adjacent uncoated tiles became slimy with mold within weeks. Toto, Ltd., the Japanese ceramics company, has already begun selling the

catalytic tiles to hospitals, where they not only stay clean but kill germs. Other Japanese firms are working on developing windows that don't get dirty and cups that eliminate odors in drinking water.

A Toto Ltd. spokesman says the self-cleaning tile will be shown at next month's Kitchen and Bath Industry Show (Atlanta, Ga., May 3-5). It won't be for sale right away, but that could be a good thing. After all, this product could destroy the soap industry — and what would that do to daytime TV? □

Homes Destroyed as Deep-Pier Foundations Give Way

And you think you've got problems ...

The first sign of trouble for two brand-new homes in Overland Park, Kan., came when the ground behind a neighboring home suddenly gave way. As last July's *Permanent Buildings and Foundations* magazine (Kansas City, Mo.) tells it, the next-door home's backyard fell into a 20-foot ravine, taking a two-story deck with it.

From there it was all downhill. Groaning and creaking sounds foretold the

nation of factors led to the disastrous slide: unstable bedrock, heavy rain, high groundwater, and loosely compacted fill.

The houses were supported by deep pier foundations: One house sat on 50 piers, some of which were 30 feet deep. While the piers were adequate to resist the gravity loads, they evidently were no match for the force exerted by tons of soil moving laterally as the hillside gave way.



Shifting rock and soil caused the dramatic collapse of this new home in Overland Park, Kan.

inevitable: The two residences slumped into the ravine, borne on a wave of saturated soil and rock.

One house was standing empty, but the other had recently been occupied by its new owners. Fortunately, no one was hurt in the building collapse.

Unstable footing. The City of Overland Park retained Terracon Consultants, a soil engineering firm, to study the situation when early signs showed that trouble was imminent. According to Terracon engineer Craig Denny's final report, a combi-

Rules observed. *Permanent Buildings and Foundations* reports that builders had followed the rules every step of the way: The city had inspected both houses and issued an occupancy permit for the completed one. Engineers the builders hired to evaluate the foundations at the city's request had noted no problems with the design, the magazine said.

But the *Kansas City Star* quoted one Kansas City engineer as saying he had expressed grave concerns about the use of fill on a neighboring lot in the development. □

FROM WHAT WE GATHER

Louisiana-Pacific's legal woes are a windfall for Washington State wood researchers. As part of a settlement agreement with the Washington attorney general in a consumer-protection lawsuit involving Inner-Seal siding, L-P has agreed to provide \$1 million to help fund Washington State University's wood materials and engineering research program. The siding manufacturer has also agreed to pay a civil fine and attorney's fees, and to stick to specified fair business practices in making and marketing its siding.

U.S. and Canadian trade negotiators are continuing to bargain about the price of imported Canadian softwood. U.S. timber companies have charged Canada with unfairly subsidizing its lumber exports. But analysts say any agreement will not be felt in wood prices: The lumber industry newsletter *Random Lengths* reported that previous changes in Canadian stumpage fees and trade duties had virtually no long-term effect on prices at the lumberyard.

It used to rain in Egypt. How do we know? From the report of master roofer and sometime amateur archaeologist Martin Obando following his recent visit to the ancient temples of Isis in Aswan, Egypt. Government experts at the site told Obando that the area was a desert when the temple was built. They were confounded when he pointed out to them that the structure's roof was built watertight and had a pitch of 6 inches in 20 feet — not to mention 6-inch rain scuppers cut through solid rock. "Clearly, this temple was designed to handle a substantial amount of rain," the roofer concluded. Now let's have a mason look at this thing.

\$950 million and still growing: That's the jackpot in the class-action suit against polybutylene plumbing manufacturers Shell Oil Co., Hoechst Celanese Corp., and DuPont Co. A November settlement raised the ante after a Texas judge threw out an earlier \$850 million settlement. *Contractor* magazine reports that a typical homeowner may receive no more than a few hundred dollars in the case. Lawyers for the plaintiffs, however, are expected to reap over \$100 million.

There's a big new competitor in the remodeling market. Knight-Ridder reports that Century 21, the giant real estate franchiser, has closed a deal with Dallas-based Amre Inc., to market home improvement services to real estate customers under the Century 21 name. Amre until recently was the main remodeling contractor selling under the Sears name. The newly created "Century 21 Home Improvements" will offer its services out of 5,000 Century 21 real estate offices nationwide.

Web-heads take note: The National Association of Home Builders (NAHB) is now online with a World Wide Web home page, called (what else?) "The Home Page," located at <http://www.nahb.com>. Expect to find a wealth of information and links to related sites.

Faucet Makers Agree to Eliminate Lead

California settlement will affect fixtures nationwide

Eleven national faucet makers have settled a California environmental lawsuit by agreeing to change their manufacturing methods so that the products will no longer leach lead into drinking water.

Seven of the faucet makers whose products already were relatively lead-free had agreed to the settlement last August. The four holdouts, who relied on a brass-casting process that involved higher amounts of lead, have now joined the agreement, citing fears that they would lose market share if they did not go along.

California has by far the strictest lead laws in the country. The faucet makers generally were in compliance with federal lead standards, but allegedly violated the California dose limit of 0.5 micrograms of lead per day in drinking water.

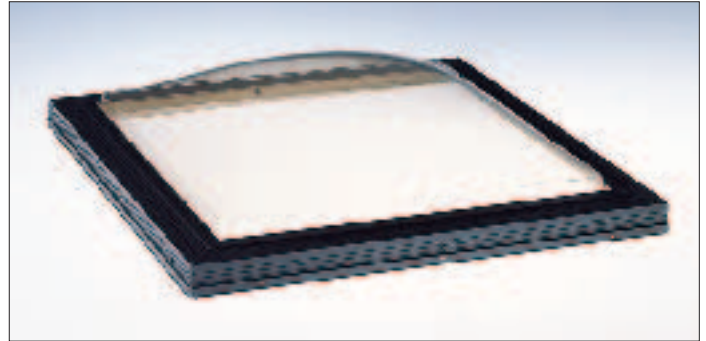
However, the faucet makers say that to cost-effectively produce enough lead-free fixtures for the California market will require them to modify most of their manufacturing facilities nationwide. So most faucets sold nationwide will now begin to comply with California law.

Contractors whose customers are concerned about possible lead in the drinking water have a ready source of information to turn to. A four-page EPA pamphlet, "Lead in Drinking Water," is available from the EPA Safe Drinking Water Hotline (800/426-4791). The pamphlet explains the health issues around lead, and gives advice on having the water tested and correcting any problem. Even if lead is detected, faucets and other plumbing may not have to be replaced: Flushing out standing water before taking a drink is often a sufficient precaution. □

Tough Skylight Earns Dade Hurricane Approval

Florida's Sun-Tek Industries, Inc., is introducing a line of skylights that pass Dade County's tough standards for wind, water, and impact resistance.

a chain of events that can end in total destruction of the building. However, Dade-approved products attract customers not only because of their resistance to storm



Sun-Tek's new skylight line can survive being struck by a 2x4 launched at 50 feet per second.

To earn the Dade approval, samples of the product had to survive rigorous tests that included bombarding the units with flying 2x4s and subjecting them to 3,500 cycles of up to 66-psf air pressure.

Penetration of roofs by storm-blown debris has been identified as the first step in

damage, but also because the tougher glazings provide better security against break-ins.

Sun-Tek engineer Jim Morrison says customer inquiries from around the country prompted the company to develop the new product line. For product information, call Sun-Tek customer service at 800/334-5854. □

Code changes, continued

- other wall receptacles near floor level do not need GFCIs.
- **Receptacles above countertops** must be within 18 inches of the counter. Where there is no feasible way to mount a receptacle above a counter, one can be mounted up to 12 inches below (but check with your local inspector).
- **Rules for multiple outlets at kitchen islands and peninsulas** in the 1993 NEC were tough to implement. Now, any size island or peninsula needs only one outlet.
- **All receptacles at grade-level** in unfinished buildings (such as a shop or garage)

must have GFCI protection. There are two exceptions: a dedicated circuit's single dedicated use outlet, such as we sometimes run for a stationary shop tool, and ceiling-mounted receptacles for garage door openers.

- **Bathroom receptacles** must be on 20-amp circuits, including any receptacle on a medicine cabinet or on a vanity area light fixture. This change could affect your bids: Remodelers may no longer reuse a bathroom's existing 15-amp circuits for receptacles, and will almost always have to run a new circuit.
- **A bathtub exclusion zone**, extending 3 feet beyond a tub horizontally, has been

expanded in height to 8 feet above the tub rim. No tracks for track lighting may be run within the zone. Paddle fans are prohibited, and due to a problem with the rule's wording, so are ceiling fans. Hartwell recommends talking with the local electrical inspector before locating a ceiling fan.

- **No conductors other than service conductors** may be attached to a service mast. A separate telephone mast may be needed.
- **Sheet-metal screws** may not be used for grounding conductors in a box.

The messiest change is a correction for a mistake

in the 1993 edition that Hartwell says "had inadvertently mandated all receptacles in a kitchen to be on a small appliance branch circuit, even including a receptacle for a garbage disposal or a cabinet-mounted microwave oven." Putting those special receptacles on small-branch circuits is a violation of the 1996 edition, Hartwell explains. Outdoor receptacles must also be separate from small-appliance branch circuits. A refrigerator, though, may be on a 15-amp circuit. □

Remodeler Chuck Green owns and runs Four Corners Construction in Ashland, Mass.

EIFS Under Scrutiny, *continued*

into the wall. But under a seemingly intact surface, moisture readings of 50% or more were common.

Golden has concluded that the problem is generic. He found that it didn't matter who built a given house, who applied the EIFS, or which of the more than 50 EIFS systems on the market was used — all were susceptible to damage.

Alarmed reactions. In response to Golden's report, one Wilmington bank stopped making loans to contractors for EIFS-clad spec houses. Some homeowners and spec builders, fearful that EIFS would keep their houses from selling, removed the EIFS and re-sided with other materials.

By October, EIFS homeowners had formed SHOC, the Stucco Home Owners Committee. (In North Carolina, where true three-coat stucco is virtually unknown, homeowners have commonly called EIFS "stucco," in spite of its different nature.) Because homeowners insurance coverage specifically excludes rot and latent defects, homeowners looked elsewhere for compensation. A few have sued their builders, EIFS manufacturers, and even the county building inspectors; others are considering a class-action lawsuit.

Claims have been filed against builders' liability policies, but none have been settled, says John Hicks of Glasgow Hicks Co., insurance agents in Wilmington. "The contractors' insurance companies are very concerned. We don't know how long it will take. It could be settled next month, or it could drag on for years."

Same old story? Though they came as a surprise to North Carolina builders,

architects, homeowners, and code officials, the problems Golden found were not news to the EIFS industry. In commercial construction, where it was first introduced, EIFS has a long history of water-intrusion problems. "There are published reports that contain everything I'm discovering now," says Golden.

But Keith Hayes, a spokesman for the EIFS Industry Members Association (EIMA), says the North Carolina case is an extreme example. "There have been isolated problems with houses in other areas but never a preponderance of houses leaking in one location,"

except one: The problem with EIFS, if there is one, is that the product's waterproof finish won't let water out of a wall once it gets in. Water leaks into EIFS-covered exterior walls around window or door frames, roofs, penetrations like hose bibbs and electrical outlets, and other architectural details. The inability of EIFS to drain or evaporate moisture leads to moisture readings in excess of 20%.

No certain fix. Experts cannot agree about what will fix existing problems, especially in cases where moisture readings are below the rot threshold. "I suspect that just

"It doesn't take a rocket scientist to figure you'll have rot," says Allen Golden

reports Hayes. "From our perspective, this is a very unique situation."

The industry estimates that 3.2% of the nation's single-family wood-frame homes are sided with EIFS. A study released in January by the National Association of Home Builders (NAHB) acknowledges problems nationwide but says the extent of the damage in other areas is unknown.

Source of the problem. EIFS is a generic term for a group of synthetic stucco-based wall systems consisting of exterior sheathing (usually plywood), adhesive, and expanded polystyrene, covered with a membrane of plasticized Portland cement reinforced with fiberglass mesh. A pigmented acrylic polymer topcoat usually provides the final weather seal.

There is disagreement within the industry on almost every aspect of the North Carolina EIFS situa-

putting caulk around windows won't solve the problem," says Tom Kenney, an engineer at the NAHB Research Center in Maryland.

While early reports from Wilmington pegged the "average" repair cost at more than \$25,000, that number now appears to be too high. Inspections by EIMA support Golden's statistics about damage incidence, but EIMA says that roughly half the homes with moisture problems can be repaired for less than \$3,000.

Experts also say the problem is preventable with good installation details. "There are some pretty easy fixes for future construction," Kenney says. "We know now that there's clearly a level of detailing required to successfully use EIFS." NAHB and EIMA are both working on builder training and installer certification programs.

One synthetic stucco expert we spoke with believes reported problems in North

Carolina result from faulty installation and detailing. He says there are hundreds of EIFS homes in his city and few reported problems. But Golden counters that while many builders told him that their EIFS homes were problem-free, when Golden inspected those homes and probed beneath the siding, he encountered excessive moisture in most cases. He predicts that many undetected problems will surface around the country over time.

Golden believes that EIFS' moisture problems are inherent, and should be solved by the manufacturers. He says that EIFS was not intended for use over a wood frame, and he wants North Carolina to impose a statewide moratorium on its use in residential applications. "When you put up a waterproof jacket but only use water-resistant details, you're going to have problems," argues Golden. "If water gets in, and it does, it doesn't take a rocket scientist to figure you'll have rot. That's why brick, vinyl, and wood all have drainage systems."

Amid the disagreements, almost everyone questions the common claim that EIFS is "maintenance-free." Even if EIFS installation is perfected, unless sealants and building components are improved, someone will need to regularly monitor their performance.

The NAHB report, "Investigation of Moisture Damage in Single Family Detached Houses Sided with Exterior Insulation Finish Systems in Wilmington, N.C." and other EIFS information is available through the HomeBase Hotline (800/898-2842). Additional information is available from EIMA at 800/294-EIMA. □

Reporter Chris Kidder covers real estate and construction issues in coastal North Carolina.