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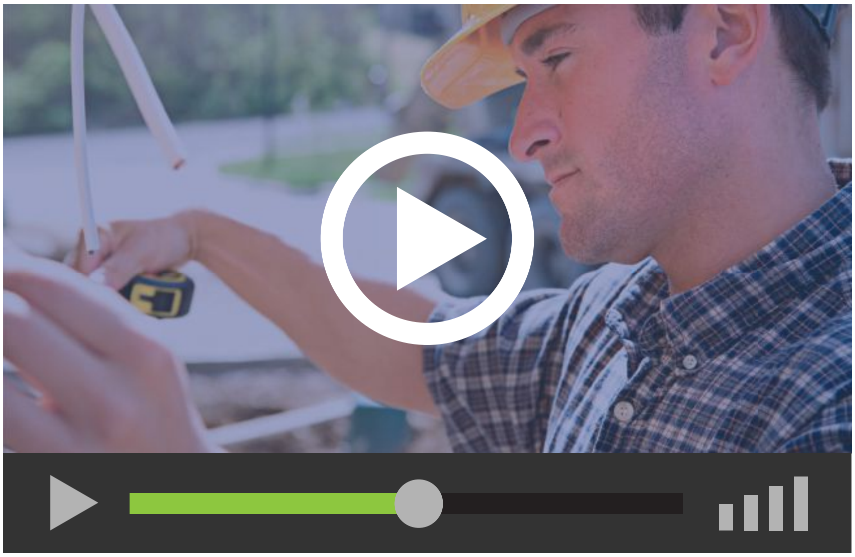

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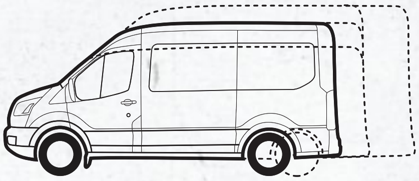

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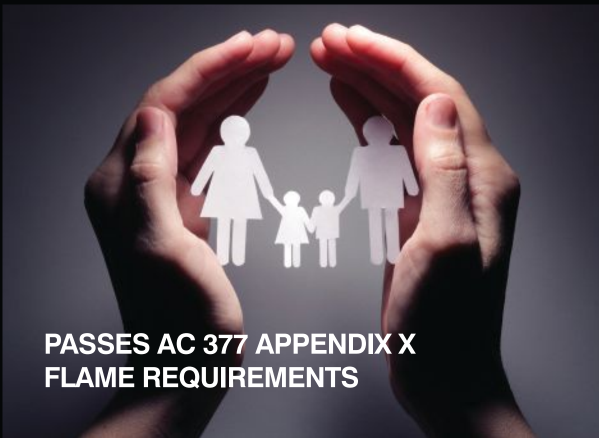

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On the cover: Jorge Alejandro Valdez, of Risinger Homes, in Austin, Texas, installs vertical siding over a rainscreen made from horizontal strips of Coroplast. Photo by Matt Risinger.

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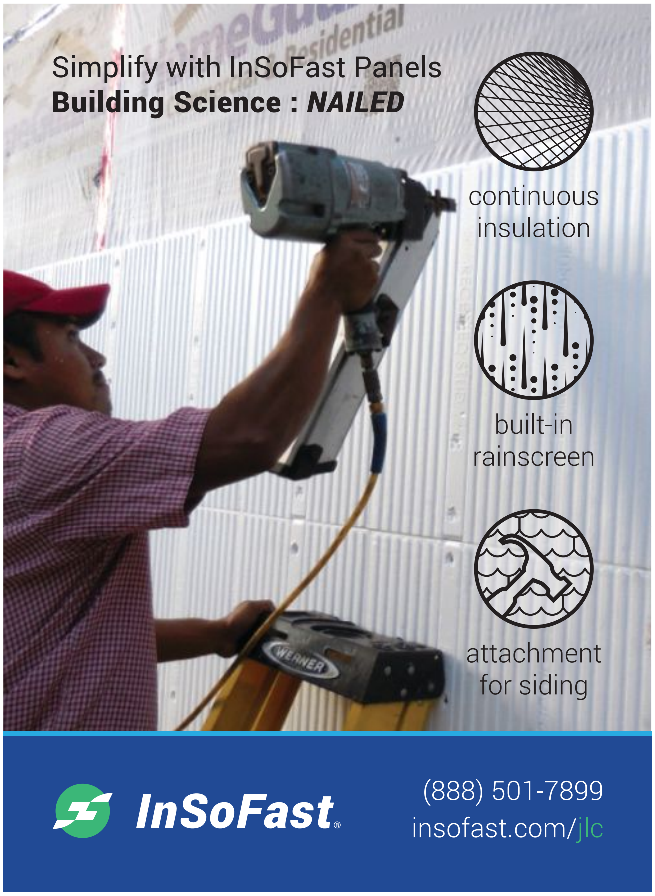

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Group Editorial Director, Residential Construction
John McManus, jmcmanus@hanleywood.com
Editor Clayton DeKorne, cdekorne@hanleywood.com
Managing Editor Laurie Elden, lelden@hanleywood.com
Chief Design Director Aubrey Altmann, aaltmann@hanleywood.com
Illustrator Tim Healey, thealey@hanleywood.com
Senior Editors Jefferson Kolle, jkolle@hanleywood.com; Roe Osborn, rosborn@hanleywood.com
Graphic Designer Kim Lofgren, klofgren@hanleywood.com
Chief Editor—Products Lauren Hunter, lhunter@hanleywood.com
Contributing Editors Michael Byrne, Michael Chotiner, Ted Cushman, David Frane, Bruce Greenlaw, Dave Holbrook, Joe Stoddard, Jon Vara, Charles Wardell, Andy Wormer

Senior Web Developer Braddock Bull, bbull@hanleywood.com
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Editorial & Advertising Offices:
The Journal of Light Construction,
186 Allen Brook Lane, Williston, VT 05495, 802.879.3335,
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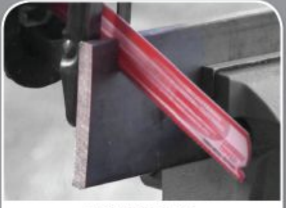

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Letters

Reader Feedback
The following excerpts are taken from comments in response to the JLC articles referenced.

Q&A: "WALKING ON ATTIC CELLULOSE," BY MICHAEL UNIACKE (NOV/12)

hndymn (online, 4/5/15): A good tool for smoothing compressed cellulose as you leave an attic is a toy rake duct-taped to a long length of ¾-inch quarter round or a similar long, lightweight piece of wood. The ¾-inch molding is plenty ridged at 10 feet long. Just remember to ask for your child's permission to use the rake.

"PRE-HANGING EXTERIOR DOORS," BY GREG BURNET (ONLINE, 3/4/15)

Jason Laws (online, 3/22/15): For me, if it is a wash cost-wise, then I don't think many of my current customers (or future ones) would go for it. I totally agree with your points. But many people in my area tend to prebuy everything because they "got a good deal," and just have me install it. Or, they want to control the cost of everything.

Almost everything that I do is pre-hung. The only time that I can remember doing custom doors was when I built portable sheds and cabins. But they were almost always the same and I could build them production-style. And for me, driving around with most of my tools all the time, I need to have things delivered—no room at all for a door.

I agree that the skill set of the carpenter is getting smaller all the time, and it would nice to build more things from scratch. Using pre-hung everything and trusses doesn't make you think enough.

"LUMBER LIQUIDATORS IN MORE HOT WATER," BY JEFFERSON KOLLE (ONLINE, 4/10/15)

Nathan Hertel (online, 4/12/15) : I really doubt there's much of a health risk to using these floors—if you're replacing 20-year-old carpet with cheap Lumber Liquidator's engineered wood, I doubt the formaldehyde in the new floors poses health risks close to the carpet you're tearing up. If you're ultraconcerned about microscopic levels of emissions and products from China, why are you purchasing flooring from Lumber Liquidators? Don't go to the Kia lot and expect to get Lexus products. And shame on the people working hard to ensure that families of more-limited means need to pay more for their flooring.

Kingflynn (online, 4/12/15): Maybe so, but I wouldn't put this in the room where my kid sleeps in a million years.

"WHAT WILL OSHA'S SILICA RULE COST?," BY CLAYTON DEKORNE (ONLINE, 4/3/15)

Endo Alley (online, 4/6/15): Most drywall compounds do not have silica listed as an ingredient. So why is it considered silica by the law? I understand it is important to wear proper safety equipment even around dust from drywall mud. But is it really as dangerous as silica is claimed to be?

Clayton DeKorne responds: Don't rely on what you read on the side of the bucket or the bag. Building-material labeling laws (at least on packaging) are not necessarily like food labeling laws. According to the Centers for Disease Control (CDC), drywall joint compounds are made from several ingredients, such as talc, calcite, mica, gypsum, and, yes, silica, that may be associated with varying degrees of eye, nose, throat, and respiratory-tract irritation.

You can verify that most joint compounds contain silica by looking not at the packaging but at the Material Safety Data Sheet (MSDS) that manufacturers are required by OSHA to provide (these are typically available online). You will find there explicit language about silica: "This product contains quartz (crystalline silica) as a naturally occurring contaminant. Chronic exposure to crystalline silica in the respirable size has been shown to cause silicosis, a debilitating lung disease … " (taken from the MSDS for National Gypsum's Ready Mix Joint Compounds).

These safety sheets (which you should be downloading and filing into each job folder as a matter of due diligence) not only list all harmful ingredients but describe basic measures for workers' personal protection—the primary one being respiratory protection. But as you can imagine with such a legal document, manufacturers do not spare mention of any ingredient that might cause any conceivable harm, and the document includes every conceivable protective measure you might need, including gloves and safety glasses. The MSDS is, after all, a document that could be used in litigation to spare manufacturers from liability as much as it is a document to guide worker protection.

Mr. Common Sense (online, 4/12/15): This article inspired me to do a bit of research and I was surprised at the health effects of some particulate dust such as silica, which leads to silicosis. Common sense directs me to wear protective gear in some situations and I for one do not need the government to direct me by law. I

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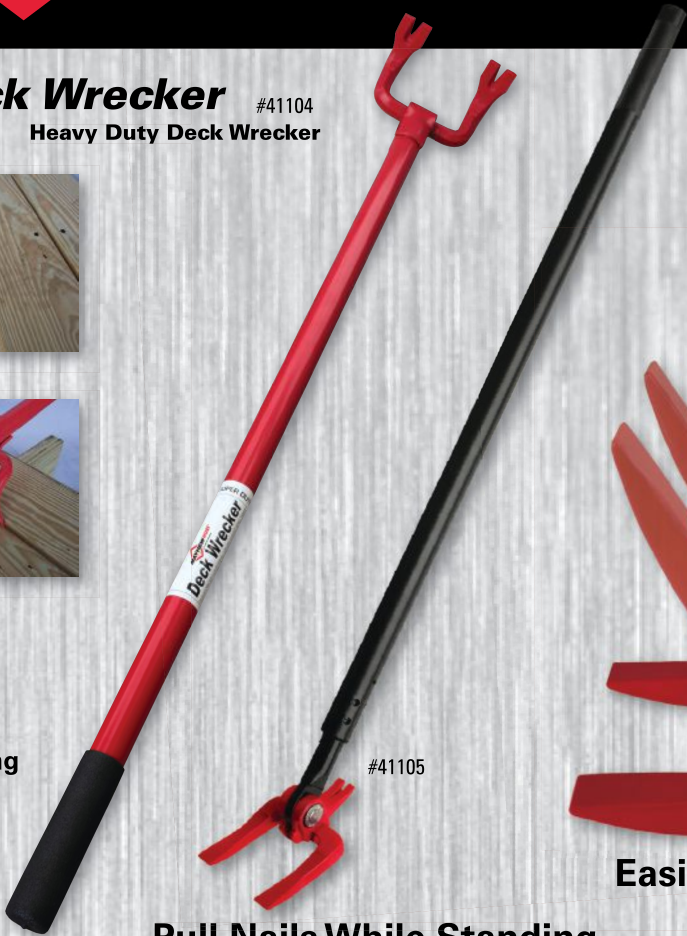
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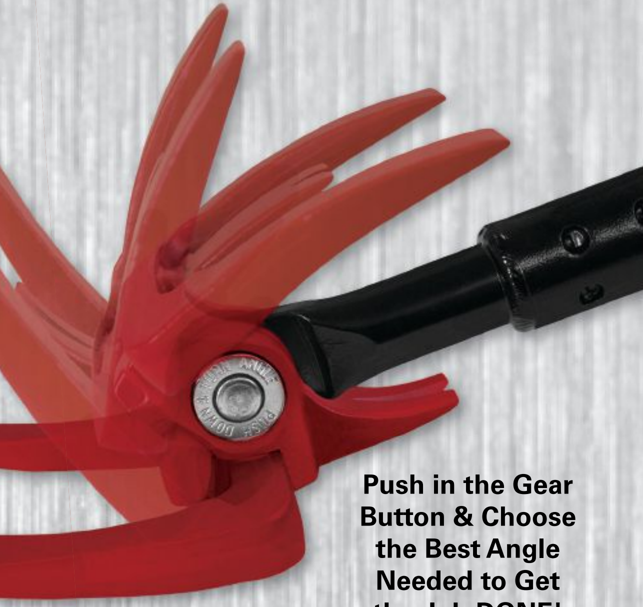
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“FIRE PROTECTION FOR LIGHT-WOOD FRAMING,” BY CLAYTON DEKORNE (ONLINE, 4/10/15)

dzbeta (online, 4/15/15): Lots of approaches for fire-resistant framing offered here. However, all could be simplified if apartments were designed and built with cold-formed steel framing instead.

Clayton DeKorne responds: Not exactly. While it’s true that steel framing will not ignite and doesn’t add fuel to a fire, it will melt fairly easily in a roaring fire, so fire-rated assemblies allowed by code for steel framing don’t look that much different from assemblies that use wood. See page 81 of “A Guide to Fire and Acoustic Data For Cold-Formed Steel Floor, Wall & Roof Assemblies” (Steel Framing Alliance; steelframing.org). A 1-hour fire-rated steel-framed wall can be simplified a little—you don’t need the resilient channel—but you do still need to cover both sides with ⅝-inch Type-X drywall. A 2-hour fire wall can’t be simplified; it still needs two layers of Type-X on both sides.

“WOOD SHINGLE ROOF,” BY MATT RISINGER (ONLINE, 2/25/15)

Charles Gravel (online, 6/2/15): In the second picture there are quite a few shingles that are almost stacking. Don’t codes want at least a ¾- to 1-inch minimum offset? Other than that, it looks very nice.

Mike Guertin (online, 6/12/15): I second Charles’ comment. Several photos show shingles with joint offsets that are much too close. The IRC and the Cedar Shingle and Shake Bureau (CSSB) are specific regarding wood-shingle joint offset on roofs. Joints between shingles must be at least 1 ½ inches through two successive courses (see 2015 IRC R905.7.5 “Application”). The joint offset has been in the code and CSSB for at least 15 years. And the shingle manufacturer’s instructions align with code and the CSSB (see Fire Smart Roofing’s “Application Instructions for Cedar Shingles”). It’s a tough standard to meet, as shingle widths have become narrower and installers must be conscientious to get the offsets right.

It’s unfortunate that *JLC* titled the email newsletter that featured this article “Best-Practice Wood Shingles” when the shingle installation shown doesn’t even come close to code minimum.

Matt points out the importance of using stainless steel fasteners. He used 304 stainless—an appropriate choice for Austin, Texas, according to the manufacturer’s recommendations. However the IRC and CSSB instructions have changed over the last few years and now require all fire-retardant-treated and pressure-treated shingles to be installed using 316 stainless fasteners. And 316 stainless fasteners must be used to install wood shingles or shakes on any roof within 15 miles of salt water. Here in Rhode Island, that provision would apply to well over half of the entire state.

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Q Earlier this year there was a discussion on *JLC*'s website regarding the proper width for flashing tape that's used to seal around windows. Can you settle what is recommended and what is required?

A Mike Guertin, a builder and remodeler in East Greenwich, R.I., and a presenter at JLC Live, responds: The 2015 IRC does not list a specific minimum width for flashing tape, but it does give us some prescriptive guidance. Section R703.4 subsection 1, entitled "Exterior Window and Door Openings," says: "Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier complying with Section 703.2 for subsequent drainage."

This means simply that the flashing tape needs to extend from the window and onto the surface of the siding or onto the housewrap.

The same subsection goes on to note: "Flashing at exterior window and door openings shall be installed in accordance with one or more of the following: The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions."

In other words, follow the instructions that come with the window or with the flashing tape.

The subsection then states: "Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashings shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides."

This requires the bare minimum of sloped pan flashing with additional flashing properly installed at the sides and head of the opening.

The problem—and frustration—arises when you look for guidance from product manufacturers. I checked the instructions from several window manufacturers as well as instructions provided by housewrap makers and the makers of flashing tape to see if any specific dimensions were provided for a minimum flashing-tape width—and found none. The only common dimension I saw was for the upturned jamb legs of a sill pan (most manufacturers called for 6 inches).

But the biggest quandary for me was that many of the manufacturers' instructions tell installers to follow the local building code or the flashing-tape instructions. Then the flashing-tape instructions often refer back to the window manufacturer's instructions and the local building code, with the code leading you back to the window or flashing manufacturers in an endless circle of passing the buck.

My recommendation is to check all three sources: your local building code (in the event it is more stringent than the 2015 IRC); the window manufacturer's instructions; and the flashing-tape maker's instructions. Then follow the one that calls for the widest width flashing tape (if any dimensions are available at all).

The narrowest flashing-tape width that I'm aware of is 4 inches. Given that most window flanges are less than 2 inches wide, 4-inch tape is wide enough to meet the code requirement that the flashing extend to the surface of the housewrap.

For what it's worth, I use 4-inch flashing tape for the side flanges and 6-inch tape for head flanges when the housewrap is installed before the windows are installed (so-called Eastern install). When the windows are installed before the housewrap (Western install), I use 6-inch tape on all sides unless the instructions direct me otherwise.

Q Is there a proper sequence for painting room interiors? I always paint ceilings first, but after that, do you do walls before trim or vice versa? And why?

A Scott Burt, owner of TopCoat Finishes in Jericho, Vt., and a presenter at JLC Live, responds: I find it best to work in a "top down" approach, starting with two coats on the ceiling. From there I apply the first coat on the walls and then apply two complete coats on the window and door casings as well as on any other trim besides the baseboard, such as crown or chair rail. Next, I apply a final coat on the walls and then I do the baseboard last.

Finishing the baseboard last allows you to protect it from spatter during wall rolling, and also results in the crispest lines when you are cutting back into walls.

To protect the baseboard, I use a 1½-inch-wide low-tack tape, such as 3M 2080 Delicate. I do not rely on the tape to establish the cut line, but instead use the tape to cover most of the top of the baseboard, leaving me the baseboard-to-wall line to cut to as I apply the wall paint.

Besides keeping the spatter mess to a minimum, this sequence also lets me cut in the tightest lines.

The line between the wall and the trim is usually established by a bead of caulk, and I always trust my eye to establish the cut line rather than trying to follow one of the exact "lines" that are present where the caulk meets either the wall or the trim. Because those lines are never perfectly straight, following them would yield a cut line that is not straight. And by the same token, the straightest visual line most likely won't follow the exact center of the caulk because of irregularities in the wall or in the trim.

The true craft involved in cutting in is creating a line that is straightest to your eye. When you look directly at the edge of the casing from 3 feet away, neither the wall color nor the trim color should look proud—just crisp and straight. And never try to create a line by taping. A freehand, straight, tight, crisp line is best. My mantra for cutting in is: "The faster the cut, the straighter the line."

When I cut in, I generally leave no overlap on adjacent surfaces. Overlapping trim onto wall or wall onto trim is a bad idea because there are always differences in sheen and in color. These differences can create coverage issues as well as "flashing," where the luster of the paint changes in the area that was overlapped. I try to make tight cuts on every round, establishing the straightest line.

Cutting in the wall to the ceiling is even more critical to do well because this line is the most visible. The drywall joint is never perfectly straight, so you can't just cut to the joint. But you want to avoid letting the wall line creep up onto the ceiling joint—our eyes find that in a hurry. It's best to hold the wall line down a hair.

When you are cutting the wall-to-ceiling line, also keep in mind that you are working from a ladder and looking at the wall-ceiling joint from eye level. The view from the floor is an entirely different perspective—and the most important one. So you should be sighting your line each time you step off the ladder.

When I cut the first coat of wall paint to the ceiling and trim, I try to cut it fast and get the line to what I consider to be 98% of the finished line. On the final coat, I bring the line home to 100%, straightening out any slight variations with the last cut.

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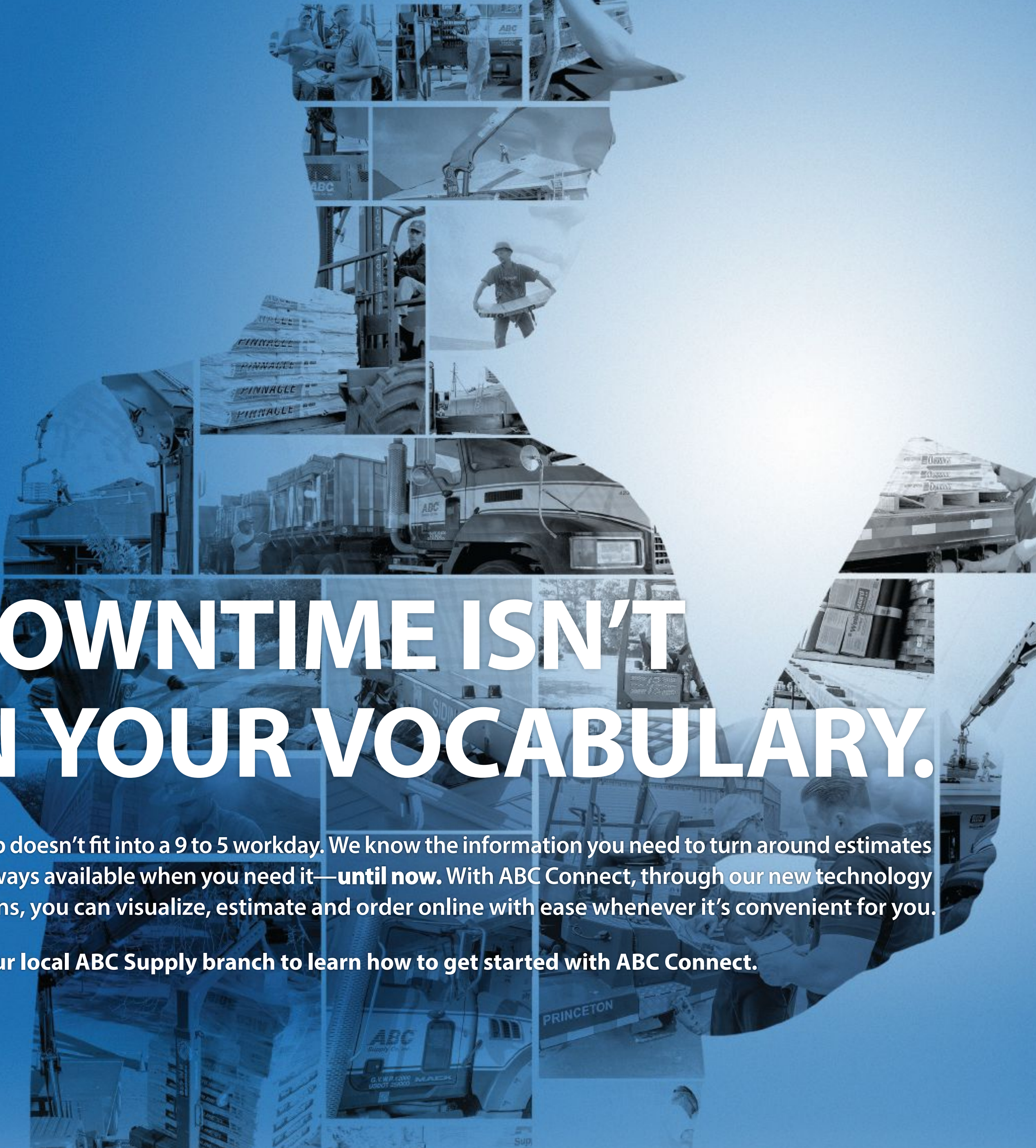

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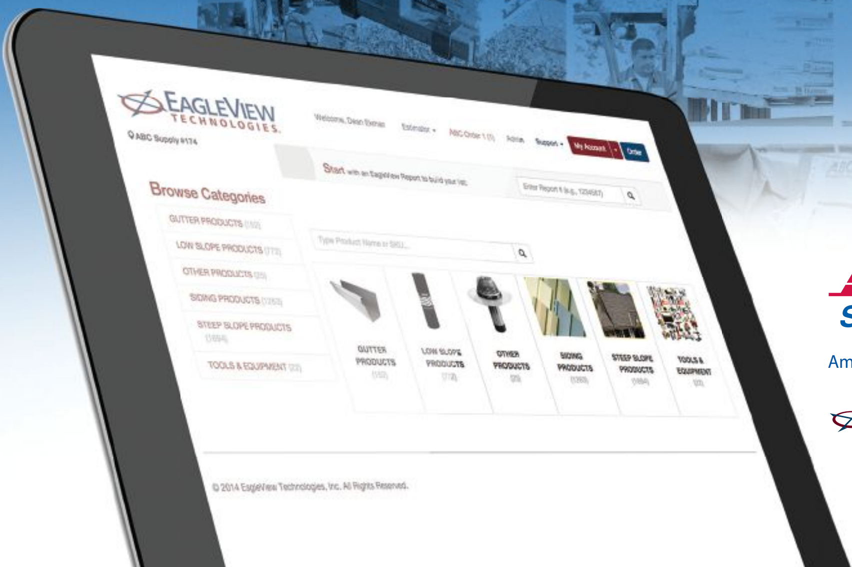

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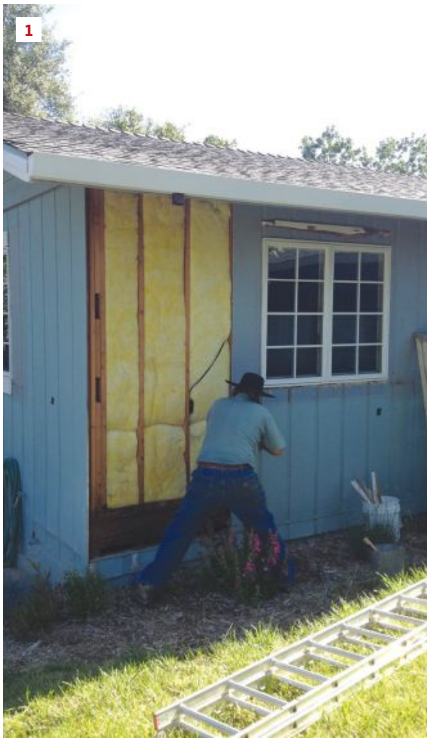
BY JOHN LATORRE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Repairing Sheet Siding

During the building boom in northern California in the 1970s and 1980s, builders were often asked to provide houses as quickly and as economically as possible. In my area many of the houses built during that time were clad with plywood siding (T1-11), which is inexpensive, durable, and easy to install. Recently I was asked to repair the T1-11 siding on a house that exhibited all the usual problems I see with decades-old sheet siding: cracks, cupping, rot, and delamination.

LACK OF MAINTENANCE IS THE CULPRIT

The paint on this house had not been kept up, and without that protection, moisture had gotten under the surface of the siding, causing the laminations to swell and the glue to deteriorate. Then the sun dried the swollen wood, and it shrank, cracked, and delaminated.

Minor cracks in the surface of T1-11 can be caulked and repainted. And sanding and caulking works well to fix medium-sized cracks. But the wood beside wider cracks curls as it shrinks, so caulking actually highlights the problem. Sometimes the best solution is to remove and replace the panel.

This house had another common problem: insufficient backing behind the horizontal panel joints. The walls of the house were 9 feet tall, and the builder saved money by installing 8-foot plywood panels above a 1-foot strip along the bottom of the wall. This strategy would have worked if there had been sufficient backing behind the panels, but unfortunately the 1-foot strip was attached only to the studs, every 16 inches. With no lateral support between the studs (as from a plate), this narrow strip of plywood was not stable enough to resist bending.

ADDING A WEATHER BARRIER

My first task was removing all the first-floor paneling that had deteriorated **(1)**. We removed both the 1-foot strips and the 8-foot sheets and replaced them with

Photos: John LaTorre

full 9-foot panels. (T1-11 is available in 8-, 9-, and 10-foot sheets.)

When we removed the old panels, we discovered that no water-resistive barrier (WRB) had been installed. The building code calls for a WRB—such as 15-lb. felt, building paper, or housewrap—behind the siding. So after removing the siding for this repair, I stapled a layer of housewrap to the outside of the studs **(2)**.

WINDOW DETAILING

The windows were still in good shape, so we kept them in place. After the housewrap was installed, we removed the nails from the bottom flange of each window and slid flashing behind the flanges **(3)**.

We installed flashing tape around the rest of the window, working from bottom to top in the usual fashion **(4)**. Like a lot of the houses in this part of the country, this one had 2-foot overhangs, which go a long way toward protecting windows from moisture intrusion. Given those deep overhangs, we did not add any supplemental drip cap over the windows.

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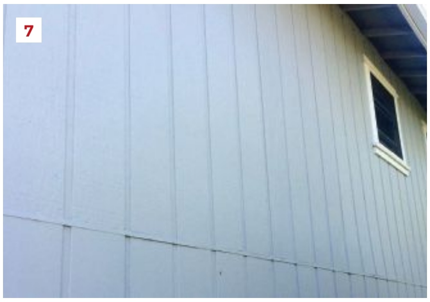
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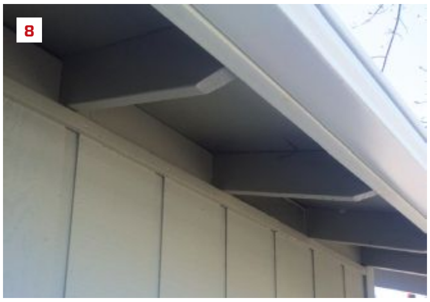
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WORK FROM THE CORNER

After the walls were prepped, I carefully checked the stud locations to make sure there were studs at every 4-foot interval for attaching the edges of the panels. If any additional backing is needed, it has to be done before the panels go on. I also marked out the stud positions on each sheet before setting it in place.

We started installing the panels at an outside corner of the house. To position each sheet, I set it on 2-by blocks about ½ inch lower than was needed. Then I used a crowbar on another block to lever the panel up and hold it in place while I drove nails in the corners.

Because the panels are installed parallel to each other, it's imperative that the first one be perfectly plumb—that is, unless the walls themselves are not plumb **(5)**. I always tack the first two or three sheets with nails in each corner so that I can make adjustments if the panels start to run out of line.

NAILING THE PANELS

Once I was satisfied with the panel placement, I drove the tacks home and nailed off the rest of the panels with 7d galvanized ring-shank nails. A typical nailing schedule for plywood siding calls for nails every 8 inches along the edges and every 12 inches in the field, but I like to shrink the nail spacing to every 6 inches on vertical edges and every 8 inches in the field. At the stud-location marks I'd made earlier, I drew vertical lines using a long level **(6)**, to guide my nail placement in the field.

I also add extra nailing along the top and bottom edges of each sheet. The "board" sections on this board-and-batten-style siding were 8 inches wide, and I drove two nails at the ends of each flat board section. These nails will prevent the siding from expanding and buckling at the grooves, and they also help to tie the top plate to the bottom plate, which is often required on an engineer's shear schedule.

FINISHING DETAILS

The house had a two-story section, and where the plywood siding extended up the tall walls, I installed the bottom sheets first, with metal Z-flashing on top **(7)**. The top sheets then rested on the flashing.

The rafters and eaves blocking on the houses I work on never line up perfectly. So I didn't try for a tight fit when cutting the sheets to length. Instead I left a gap of about ¼ inch. To finish that detail, I caulked the gap and ran 1x3 trim along the top edge **(8)**. Again, as the top edge was under a 2-foot overhang, I wasn't too concerned about moisture intrusion.

The corner boards installed right over the new siding, and I added trim—in a style that the owner preferred over the original—around the windows. As a final step, the painter caulked all remaining gaps before painting the house.

One word of caution: If you plan to spray-paint reverse board-and-batten plywood siding, use a brush in the grooves to get good coverage. Trying to spray into the grooves inevitably puts too much paint on the board surfaces, resulting in drips and runs.

John LaTorre is a carpenter in Tuolumne, Calif.

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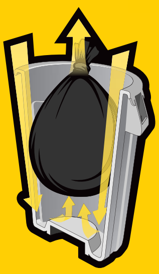

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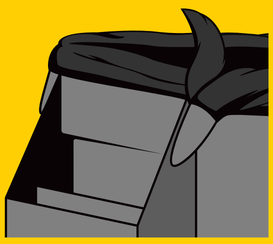

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Code's Eye View

BY GLENN MATHEWSON

Neutral Necessity: Dead-End Switches

There are many different wiring diagrams for switched circuits, including three-way and four-way switching, and these diagrams have guided electricians and others for decades. They've also remained largely unchanged for decades. But with many switch and device arrangements, complicated with jargon such as "travelers" and "switch legs," these installations have been known to go sour after the fixtures and switch trim are installed; for example, when a three-way switch won't respond to the second switch being tripped. With the 2011 National Electric Code, these ubiquitous but often misunderstood wiring arrangements were tweaked, and in 2014 they were revised, rendering many of the old diagrams obsolete—particularly when a switch is placed at the end of a circuit.

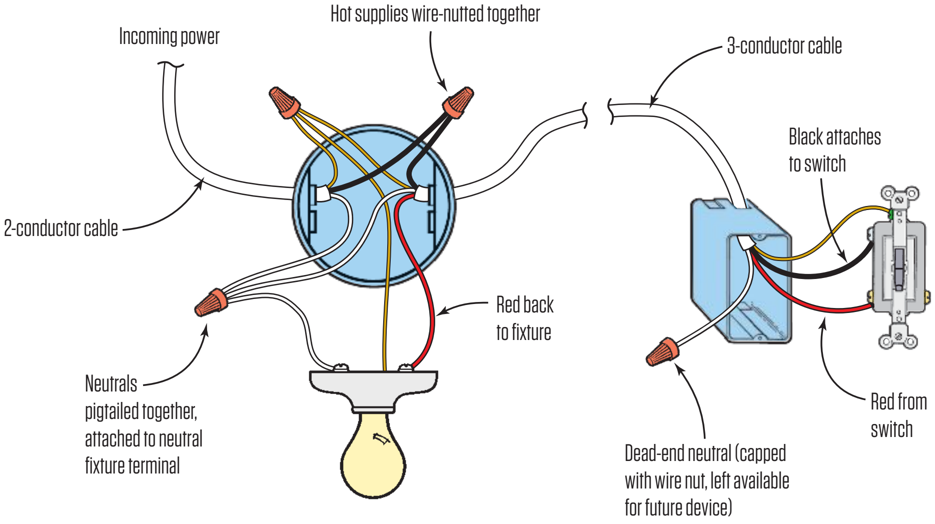
TECHNOLOGY-DRIVEN CHANGES

So why the changes? Codes are regularly updated to stay in step with society's changing expectations of safety, affordability, and convenience. Codes also adapt to changes in technology.

Consider a 1950s home, with just a couple of duplex receptacles typically installed in each bedroom. Back then, a couple of receptacles was plenty to satisfy the needs of an average person. Fast-forward 65 years, my daughter in that same bedroom wants (needs) to power the fish-tank light and filter, her alarm clock, a night light, a phone charger, a tablet charger, plus a desk fan and reading light. (I would vote for her to have a spare outlet for the vacuum cleaner too.) As the laundry list of electrical demands increased, the code began to require that receptacles be spaced more closely together; having more receptacles installed on the walls in turn reduced hazards like overloaded receptacles and extension cords that are located where they could be tripped over.

Similarly, changes in technology have precipitated changes in the wiring of a switch placed at the end of a circuit. Technology and energy-conservation measures, for instance, have prompted a movement toward home automation. Today's complex devices—motion detectors and smart switches that can make your morning coffee—require complex wiring. Instead of acting as

New Dead-End Single-Pole Switches


Incoming power
Hot supplies wire-nutted together
3-conductor cable
Black attaches to switch
2-conductor cable
Red back to fixture
Neutrals pigtailed together, attached to neutral fixture terminal
Red from switch
Dead-end neutral (capped with wire nut, left available for future device)

When a switch is placed after a fixture in a single-pole scenario, the updated code calls for a dedicated neutral conductor in the switch box. A three-conductor cable between the fixture and the switch makes this possible, with the neutral conductor capped off in the switch box for future use.

simple drawbridges to control the current traveling to electrical devices, switches are becoming devices in and of themselves. The bottom line? Every switch box in a habitable room or bathroom must now have a neutral (more accurately referred to as a "grounded conductor"). But many common, more traditional switch arrangements don't allow for this.

HOW IS IT WIRED?

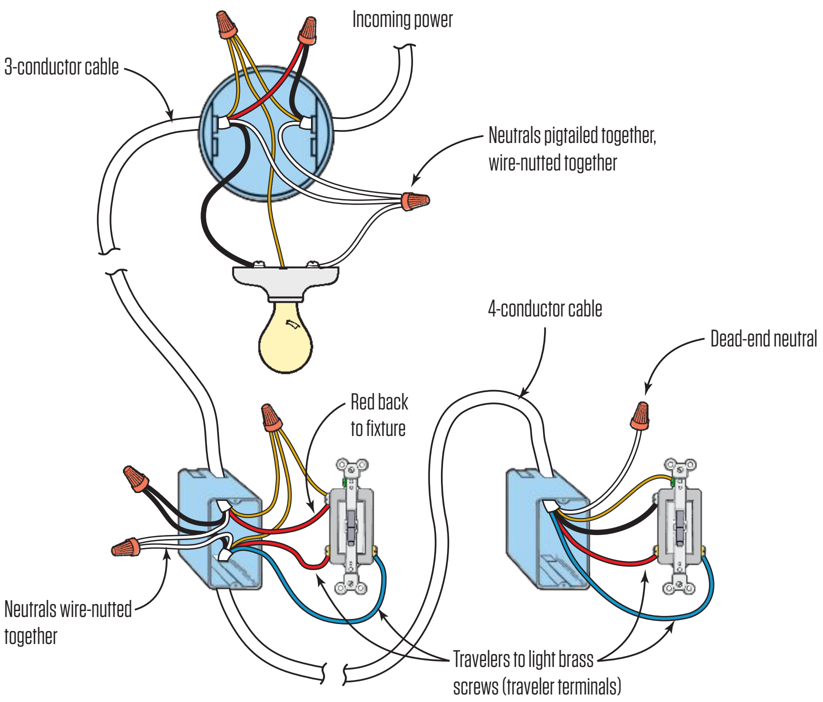
In the past, when a switch was placed after a device (such as a light) in a circuit, the white conductor was re-identified and used as the hot wire. But now, for a single-pole switch, a three-wire cable (with ground) is required between the light and the switch.

In the device box at the light, the black conductors from the supply and the three-wire are connected together so that the power skips the light and heads to the switch. The neutral (white) is pigtailed to the neutral terminal on the light and connected to the white conductor in the three-wire (see Single-Pole Switch, page 25).

At the switch box, the black and red conductors of the three-wire connect to the switch, and the red then sends the switched power back to the device box where it is attached to the other light terminal. The white neutral in the switch box is capped with a wire nut, leaving it available if needed.

The wiring arrangement for three-way (and four-way) switches is similar (see illustrations, above and on page 27), but you will need a four-wire (or five-wire) cable in these cases to keep the neutral path continuous throughout the entire switching arrangement. Most often, this requirement is primarily "future-proofing" in case a motion detector or some switching device that we can't even conceive of yet is added. When it's not needed, the lonely neutral conductor is terminated with a wire nut and left waiting to be called on in the future. Someday someone will probably be very happy to find it there.

Three-Way Switches After the Fixture


Incoming power
3-conductor cable
Neutrals pigtailed together, wire-nutted together
4-conductor cable
Dead-end neutral
Red back to fixture
Neutrals wire-nutted together
Travelers to light brass screws (traveler terminals)

In this three-way switch layout, both switches come after the fixture. To make a dedicated neutral conductor available in each switch box, a three-conductor cable runs from the fixture to the first switch, and a four-conductor cable runs between switches.

SAFETY FACTORS

Having a neutral in every switch box is not only about paying it forward; it can also be justified from a safety standpoint—protecting us from ourselves. Humans are clever, and when faced with installing a fancy new switch where there is no neutral conductor present, they frequently resort to commandeering the bare equipment-grounding conductor (EGC) and then repurposing it as the neutral conductor back to the previous box—a solution that is not code-compliant.

The outcome of this wiring strategy may be deemed successful when the switch seems to function normally. But it comes with compromised safety if the uninsulated EGC is ever subjected to a build-up of electricity from a switch that should have been connected to a proper neutral conductor.

EXCEPTIONS TO THE RULE

As the code's language is crafted, the goal is to describe a level of performance or expectation in a form that's generic enough to make the requirements understandable and effective. However, exceptions are often added to provide flexibility and to apply the code's intent and purpose more accurately, as has been the case with the requirement of providing a neutral in every switch box. Most of the exceptions listed below were added in the 2014 NEC as the first revision to the new rule.

A separate neutral wire is not required in the switch box in the following situations:

- Conductors enter the box through a raceway large enough to fit a neutral in the

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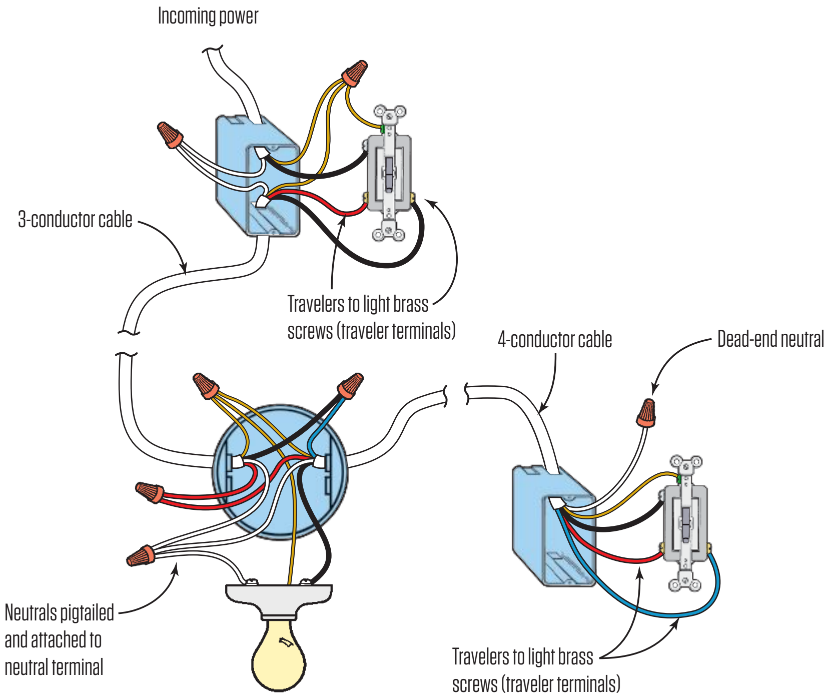
Three-Way Switches With the Fixture in Between


Incoming power
3-conductor cable
Travelers to light brass screws (traveler terminals)
4-conductor cable
Dead-end neutral
Neutrals pigtailed and attached to neutral terminal
Travelers to light brass screws (traveler terminals)

In the three-way switch scenario shown above, the fixture is placed between the switches. As before, a three-conductor cable joins the first switch and the fixture, but now a four-conductor cable runs from the fixture to the second switch. The capped off neutral is available in the second switch box should it be needed in the future for a device that demands more complex wiring.

future. (In other words, there isn't a problem if it will be convenient to add a neutral in the future.)

■ The box is accessible for the addition of cables without removing wall finish (for example, when there is an unfinished mechanical room behind the box).

■ There are snap switches with integral enclosures permanently mounted to the construction (such as you have with a can light, where you wouldn't be replacing a switch of this type without more serious construction).

■ Lighting is controlled by automatic means. (You don't need a neutral if a different type of automatic switch is already in place, such as a motion detector built into the light.)

■ The switch controls a receptacle outlet. (A switched outlet usually doesn't control the primary lighting in a room, so it is not likely to be used for an automated switch.)

■ Multiple switch locations control the same lights and are visible to the same area of floor. (This exception assumes that you can put a motion detector or smart switch at another switch location that has a neutral.)

Glenn Mathewson is a certified code professional and building inspector for the City of Westminster, Colo., and a frequent presenter at JLC Live.

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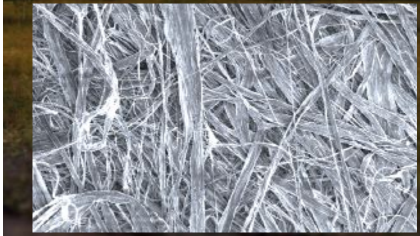

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BY MELANIE HODGDON

/BUSINESS TUNE-UP/

Price the Job Right, Starting With Overhead

Many contractors have learned that it's important to separate overhead costs (expenses) from those associated with production (Cost of Goods Sold, or "COGS"). Some of the production costs are pretty obvious. If you go to your lumberyard and buy framing lumber for the Jones job, for example, it's a no-brainer to assign that cost to a COGS account. And some overhead costs are pretty obvious—office rent, utilities, office supplies, and the like (see Overhead Cost?, top left).

Overhead Cost?

Type of Cost	Yes	No
Rent	X	
Utilities	X	
Production vehicle insurance		X
Job materials		X
Office supplies	X	
Marketing	X	
Payroll taxes paid on production workers		X
Office communications (such as landline)	X	
Trade contractors		X
Production staff cellphone subscriptions		X
Small tools		X
Workers' comp insurance on production workers		X
Professional fees	X	
Workers' comp insurance on office workers	X	
Wages on production workers	X	X
Payroll taxes paid on office workers	X	
Job permits		X
Office staff wages	X	

Sample Job Financials

Income	Money collected as a result of producing jobs	$100,000
Cost of goods sold	Money spent as a result of producing jobs	$67,500
Gross profit	Leftover money to use for covering overhead and contributing to profit	$32,500
Expenses	Overhead costs required to maintain the company	$27,500
Net profit	The "bottom line" dollars of profit when all costs are paid	$5,000

What about the costs that are associated with producing jobs, but are not necessarily associated with a specific job—costs such as small tools that will be used on multiple jobs, gas for the trucks, and communication plans for phones and tablets that are used on the jobsite? These are less straightforward to classify, but anything that is directly associated with the production process—even if it is not associated with a specific job—should be considered COGS, not an overhead expense.

Here's another way of looking at it. Let's suppose for a minute that you have absolutely no projects at all. It's a horrifying thought, but it's just to make a point. Pretend that you're going to switch from being a remodeler to selling ice cream. What costs would you still need to pay for in order to keep the company in existence? Thinking about it this way should make it a bit easier to decide whether a particular cost is related to production or not.

But why is it important to figure this out?

KNOW YOUR OVERHEAD TO FIND THE RIGHT PRICE

In the uncertain world of construction, there aren't many constant and predictable figures you can put your hands on. Income (sales volume) is an unknown. Because your production costs are tied to sales, COGS is unknown. But you can predict overhead, and this becomes the basis for your figuring out how to price your work. No matter what else happens, you know you must have at least enough dollars left over when you finish producing work to cover overhead (see Sample Job Financials, bottom left).

Hopefully, you'll also have some left over for profit. The next part in this series will show you how understanding your overhead will help you price your work so profit won't be left to chance.

Melanie Hodgdon is owner of Business Systems Management. melaniehodgdon.com

Guessing What Clients Want to Spend Could Be Costing You Thousands

BY JASON HARTZ

During a recent coaching session with one of my clients, a tile installer, we were talking about how a particular sale went off the rails. He said he lost control of the sale by trying to make the customer happy. I agreed that part of his job is to make his customers happy, but pointed out that in order to do that, he must ask questions that may make them unhappy or at least uneasy. The toughest of these is about money. Everyone is reluctant to talk about it.

Whether you've been in business for two years or 20, there has been at least one time when it was difficult to convince prospective clients to communicate how much money they wanted to invest in a project. The difficulty, however, isn't in asking the question, "What do you want to spend?"

The difficulty comes from the prospects' response to your budget inquiry, which can run the gamut from "I don't know, that's why you're here" to "I'm not comfortable sharing that information with you."

Sometimes you don't have much choice but to work up an estimate for a job, guessing about the quality of work the prospects' secret budget will support and hoping that you're not so high or low that they give the job to one of your competitors. And then, if they do call you back, chances are, they'll say, "Can you sharpen your pencil and work on the price with me?" In many instances, you will have spent hours of precious time trying to guess what amount of money the prospective customer would like to invest in his or her home.

Quite often, when confronted with customers' blank stares or claimed ignorance, many remodelers don't want to sound pushy, so they move forward with the rest of the sales presentation, then write an estimate without knowing the budget. Like a house built on a shaky foundation, the sale from there could be in jeopardy.

Lack of a questioning strategy before reaching the dreaded "What would you like to spend?" can derail a great opportunity.

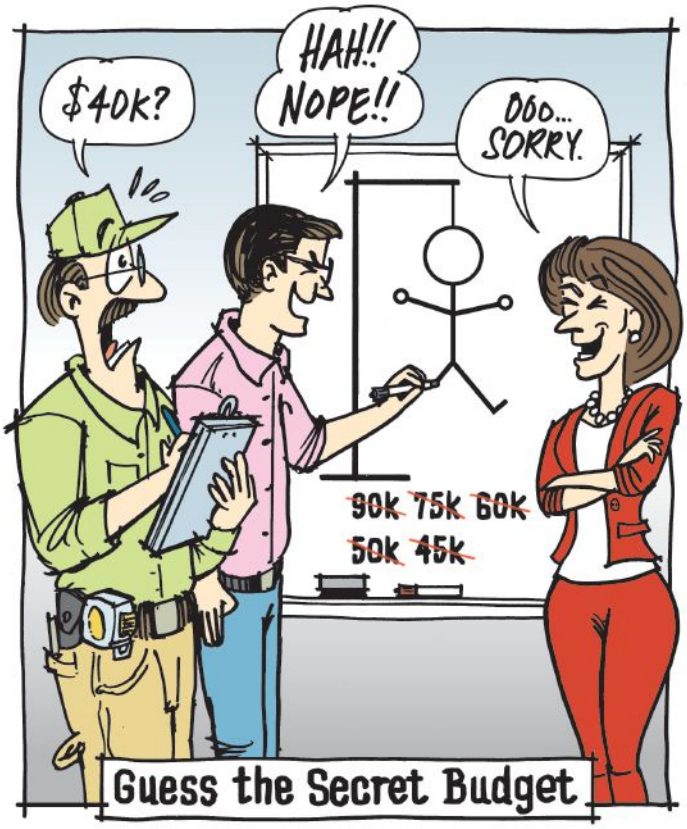
DEVELOPING CREDIBILITY AND TRUST

The secret to getting prospects to share their budget with you is establishing credibility and trust. The tricky part is how to do it. First, you need to use a questioning strategy before you talk money. Every time you ask a prospect a question and get the response, "That's a good question, I hadn't thought of that," your credibility as an expert goes up. You separate yourself from competitors by asking great questions.

Once you've established your credibility and addressed the project's scope—bathroom, addition, kitchen, and so on—the budget discussion can ensue. Prior to asking, "What would you like to invest?" ask, "Is there money allocated for the project?" followed by, "Would you mind sharing what that amount is with me?" Often, prospects will give you a price range, but if they still won't budge, there are four tactics or a combination of tactics to try.

They include the following:

- Bracketing
- Metaphors
- Third-party stories
- Remodeling history


$40K?
HAH!! NOPE!!
OOO... SORRY.
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~~50k~~ ~~45k~~
Guess the Secret Budget

Illustration: Tim Healey

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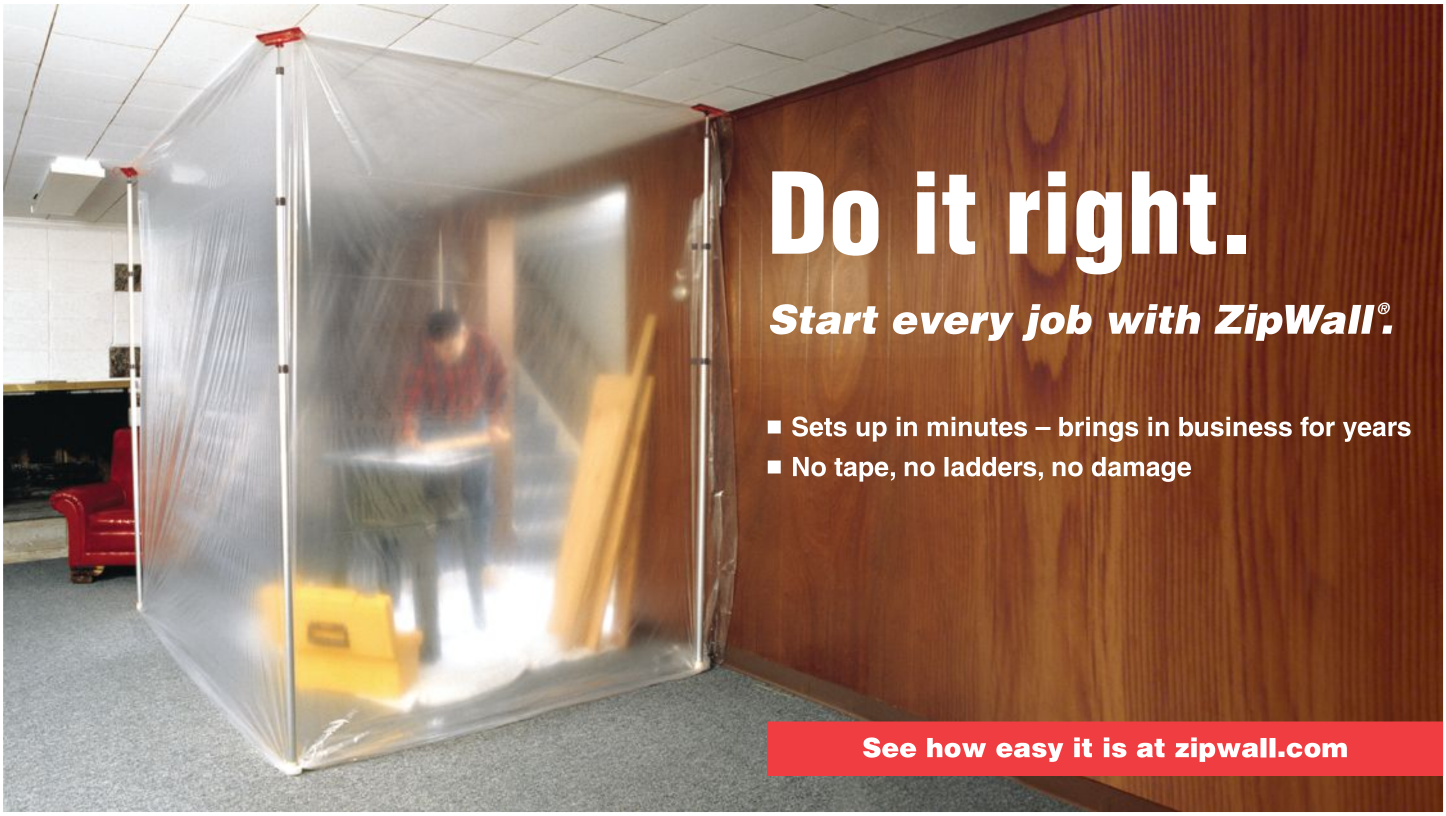

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BRACKETING

Often contractors provide a budget bracket that is too wide. If you say the cost will be somewhere between $20,000 and $30,000, you may unintentionally plant a low number in your prospects' minds before they receive your estimate, because they remember only the $20,000 figure. Prevent prospect "whiplash" by shrinking the range of the bracket to no more than $3,000.

Example: "This project can be done for $17,000 to $20,000 or for $27,000 to $30,000, depending on materials. Which range are you more comfortable with?" When they answer, say, "Help me understand why you picked that range."

Lack of a questioning strategy before reaching the dreaded "What would you like to spend?" can derail a great sales opportunity.

If a prospect says both brackets are out of range, and you know that you cannot do the project for less, protect your valuable time and energy and ask, "Should we end the consultation?"

METAPHORS

Paint a different picture to help prospects determine investment level.

Example: "We can do this project several different ways. How do you want to arrive at the dance: by limousine, taxi, or bike?" After the prospect responds, ask "What does that mean investment-wise?"

Or combine a metaphor with bracketing: "In my experience a limousine can cost between $27,000 and $30,000 and a taxi can run between $22,000 and $25,000. Is that what you were thinking? Help me understand why you picked that range."

THIRD-PARTY STORIES

Using a third-party story can paint a picture and tip your clients off to the size and scope of work you've done in the past. It can also further boost your credibility.

Example: "Last month I finished a similar-sized addition to the one you are proposing, and those owners spent $75,000. I'm guessing that's more than you wish to invest?" That gives them the opportunity to tell you they do have that amount of money or agree that it's more than they were planning to spend.

REMODELING HISTORY

Occasionally, you may find that prospects have never bought your type of goods or services. Discovering what prospects have done in the past that closely mirrors your quality of work or investment level can give you a good indication of not only budget but how they make decisions, too.

Example: "Given that you've never remodeled your kitchen before, but that you invested in your bathroom in your previous house, would you mind sharing your investment level on that project? Was that more or less than you had anticipated?"

DON'T WASTE YOUR TIME

Once you've implemented a successful questioning strategy and gotten the answers you need from prospective clients about their budget, your time with them won't have been wasted. They will have confidence in you, and you'll feel confident writing an estimate that's within their budget. And then, hopefully, you can work toward getting a signed contract and start the job.

Jason Hartz is a business coach in Waltham, Mass. jdhventures.sandler.com

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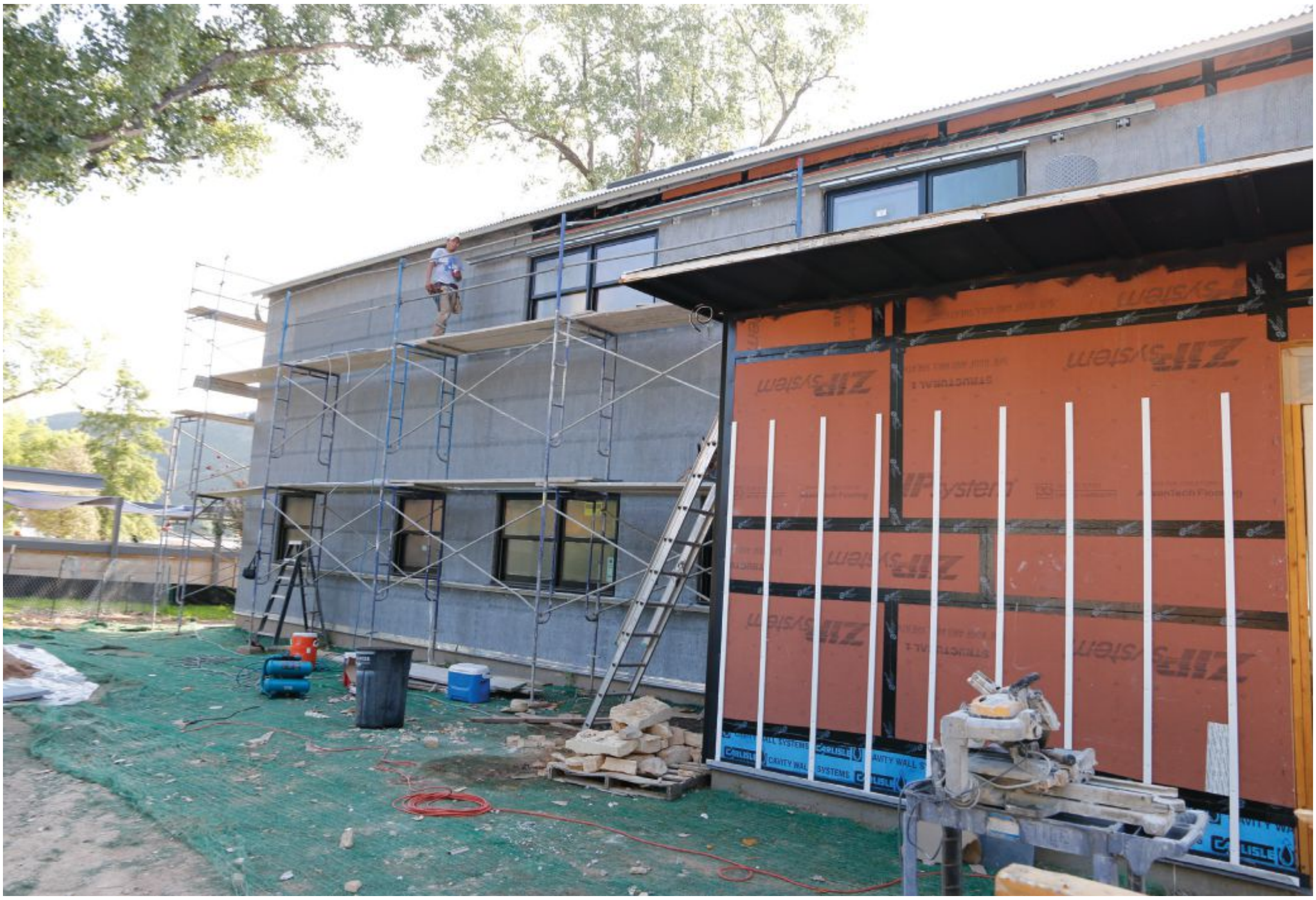

Weather Barrier Update: Good, Better, and Best

Choose the right WRB and use it with a rainscreen

BY MATT RISINGER

Water hasn't changed how it enters a house, but how we deal with it as builders certainly has. Let's start with an oft-mentioned truism: All wall claddings leak. What we might think of as a house's first line of defense against the elements turns out to be relatively defenseless. Regardless of your level of craftsmanship, water is going to find its way behind whatever you cover your exterior walls with—wood, masonry, metal, or vinyl.

In the not-so-distant past, when houses were not as well insulated or as tightly built as they are today, water that infiltrated behind the siding might have stained the flower-patterned wallpaper in the parlor, but chances are, the house didn't rot.

It's a different story with today's tighter and more energy-efficient homes. We began to understand this in the early 2000s, when mold was discovered in buildings throughout the U.S. With the mold came rot. Home builders remedied some of the problems by paying attention to things like ventilation and source control, which they previously had the leisure to ignore. But more than a few needed to buy back new homes from disgruntled homeowners.

And it got worse: As further measures were taken to improve building airtightness and energy efficiency, even more rot and mold problems arose.

Photos: Matt Risinger

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But there are solutions. Building science has shown us what to do with water that leaks behind wall claddings. Proper installation of a housewrap—also known as a water-resistive barrier (WRB)—preferably with a rainscreen behind the wall cladding, enables us to build resilient homes that will last for generations. In this article, I will tell you what I've learned as a builder about keeping water away from sheathing and framing and discuss some of the good, better, and best systems currently available.

ALL THAT WATER AND NO PLACE TO GO

The main reason that rot and mold didn't substantially affect older homes is because the water that got past the leaky siding had a chance to dry. Before the days of plywood sheathing and drywall, not to mention insulation, caulking, and other airtightness measures, air flowed more freely through the building and any water that got in dried out.

Wood doesn't rot and mold doesn't grow when wood gets wet; it happens when the wood stays wet and can't dry. And engineered-wood products (OSB in particular) don't stand up to constant wetting as well as solid-wood framing and sheathing products do.

DESIGN CONSIDERATIONS

Dr. Joseph Lstiburek, the founding principal of Building Science Corporation (buildingscience.com), has said, "Rain is the single most important factor to control in order to construct a durable building." And the architectural design of a home can influence how much rainwater lands on the walls of a building.

Roof overhangs. The absence of roof overhangs in many new houses allows more water to hit the walls. Here's an analogy: Roof overhangs are like an umbrella in a rainstorm. If you don't have an umbrella, you better make sure you're wearing a high-quality raincoat, or you're going to get wet. Think of a good WRB system as being like a raincoat for the house.

Roof pitch. Shallow-pitch or flat roofs also contribute to the amount of water hitting a wall during rainy, windy conditions. A steeper roof, on the other hand, can act like an airfoil, pulling rain up over the roof and pushing it away from the walls.

Wall height. The system that should be used is dependent on the location and design of the house you're building. It's a matter of the walls' exposure to water infiltration—more exposure will require a higher level of protection. For instance, a single-story house

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How Much Protection Do You Need?

	DEGREE OF PROTECTION		
DESIGN/ENVIRONMENT	GOOD	BETTER	BEST
Annual rainfall less than 30"	X		
Single-story house, 2-foot overhangs	X		
Two-story house, 1-foot overhangs		X	
Two-story house, annual rainfall more than 30"		X	
Coastal, or annual rainfall more than 40"			X
No overhangs			X

The degree of protection from water that house walls need depends on a house's design and the climate it's exposed to. That protection can be provided by good, better, or best ways to keep water away from the sheathing. Wet sheathing that can't dry will eventually rot, encourage mold growth, and lead to callbacks.

with a pitched roof and broad overhangs located in an inland location that doesn't receive much annual rainfall won't need nearly as much protection as a two-story building (which will have higher, more exposed walls) with a flat roof located on a windy, rainy seacoast (see chart, above).

MANUFACTURER SPECS

Don't get too hung up on a housewrap's perm rating—the amount of water vapor that a housewrap will allow to pass through it. For cold-climate houses, a perm rating of 5 to 30 is sufficient, and in a warm climate where the vapor drive is primarily from outside to inside and the air conditioning removes the majority of water vapor, a zero perm rating is fine. In a hot, humid climate like I have, where the walls should be allowed to dry to the inside, no interior vapor barrier, such as vinyl wallpaper, should ever be used.

Capped fasteners. Some housewrap manufacturers recommend, or require, the use of a cap stapler to install their products, for the extra water resistance and holding power staples provide. We use a Stinger CH38 hand cap stapler (stingerworld.com) **(1)**.

WHAT NOT TO USE

Don't skimp on the WRB—either the product you use or the care you take to install it. Any WRB system you use will never be seen again once the cladding is on the house—unless it fails and someone needs to come in and remove the siding and repair any water-related damage **(2)**.

Although tar paper is still considered a code-compliant WRB material and is still used behind stucco and brick by many builders, my advice is to stay away from it—for two reasons. First of all, it won't stand up to constantly moist conditions. Second, it tears easily. Anyone who has ever stood a ladder against a tar-paper-covered wall knows this.

In general, avoid any housewrap that's not durable. My crews are diligent and careful, but some wraps can't stand up to much, if any, abuse. If a product tears easily, steer clear of it **(3)**.

I also avoid perforated, pin-pricked plastic housewraps sold by the big box stores. If you can see though a sheet of housewrap when you hold it up to the light, it's a good indication that it isn't going to keep out water. To see the fallibility of the pin-pricked wraps, you can easily duplicate a quick demonstration that I show

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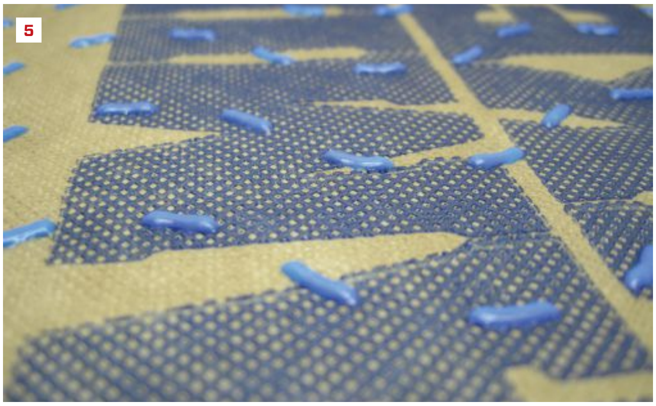

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on my YouTube channel (youtube.com/MattRisinger). Place a 12x12-inch square of one of the good housewraps mentioned below and a similar-size square of pin-pricked housewrap on top of a paper towel. Pour a few tablespoons of water on each housewrap square, then set a coffee mug on each water puddle. Wait five minutes, then lift up the mug and the housewrap and see which paper towel is soaking wet.

You might want to try this simple test using any housewrap you're considering. Then decide which product you want on the next house you build.

GOOD CHOICES

As building scientist David Nicastro, P.E., of Building Diagnostics (buildingdx.com), says, "It's not about keeping water out, it's about letting water out."

I like to use a housewrap that has a textured surface as the first defense for draining out moisture that infiltrates behind wall claddings. The small gap it creates between the back surface of the cladding and the sheathing allows water to drain away to the ground. Manufacturers use a variety of patterns and technologies to hold the siding away from the sheathing when it's installed.

Dupont (dupont.com), the parent company of Tyvek, manufactures a family of small-gap housewraps. Two that I use are Tyvek Drainwrap and Commercial Wrap D **(4)**. The main differences between them are that Commercial Wrap D is slightly tougher, and it has a longer UV-exposure time, so it will last longer if it's going to be a while before you install siding. Both have a slight, almost crinkled corrugation, which when installed properly creates vertical channels for water to run out. Regardless of how tightly the siding is attached to the sheathing, Drainwrap and Commercial Wrap D create enough of a space between the back of the siding and the wall for water to drain away.

Benjamin Obdyke's Hydrogap housewrap (hydrogap.com) has 1-mm-thick blue plastic oblong dots bonded to its surface. The thickness of the dots holds cladding away from the wall and creates a space for water to drain away **(5)**. One of the things I like about Hydrogap is that it can be installed in any direction, even rolled out vertically, without its draining abilities being affected.

All the housewrap manufacturers sell proprietary tapes and flashing materials to use with their products. I stick with the man-

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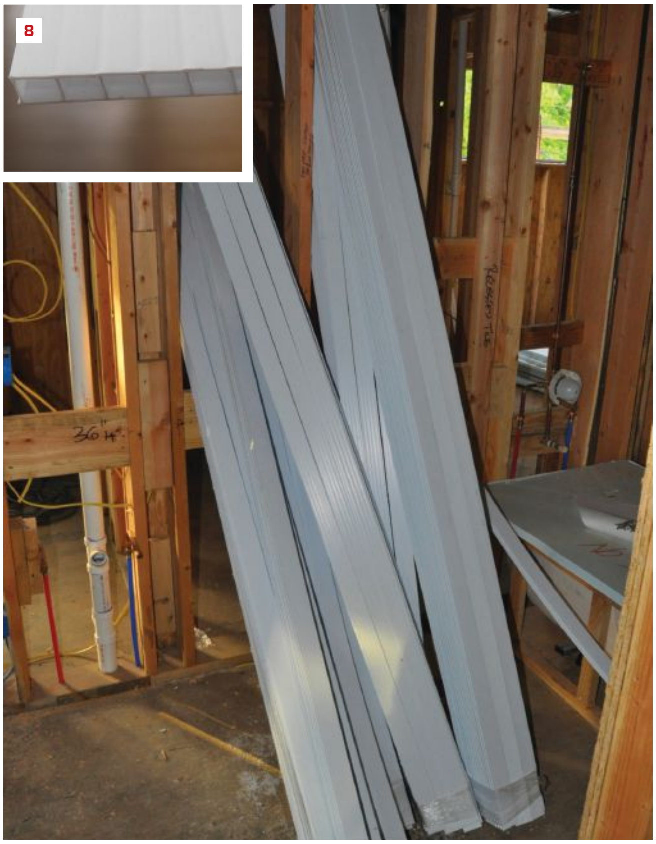

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ufacturers' branded tapes that go with their housewraps and prefer ones with butyl adhesives. Tyvek's StraightFlash and FlexWrap are among the best in the market.

Not all brands of housewrap are available everywhere in the U.S. If you can't find one of the brands I prefer, look for a wrap with some kind of built-in air gap. Once you find one, give it the tear test, and if you can get a sample, try the water test, too. Some housewraps can even be bought online. Benjamin Obdyke, for instance, will sell direct from its store website, and it offers free shipping (buyobdyke.com).

BETTER CHOICES

While the textured housewraps listed above do a good job of keeping water off the sheathing and from entering the house, if you want more protection, install a rainscreen under the wall cladding. Rainscreens are typically installed as vertical strips that are fastened to the wall to which the siding is fastened. The thickness of the strips holds the siding away from the housewrap and the sheathing underneath.

When you install a separate rainscreen, you can first cover the sheathing with any housewrap that passes your water and tear tests; it's not necessary to use one of the textured wraps discussed above. I've also used taped Zip Wall sheathing (huberwood.com) with a rainscreen **(6)**.

There are lots of different materials you can use to form a rainscreen, including 1x3 solid wood strapping, or ripped strips of HardiePlank (jameshardie.com) for walls covered with that product **(7)**.

My favorite rainscreen material is Coroplast (coroplast.com), a two-layer recycled-plastic sheet product that's sold in 4x8-foot sheets and used mainly by sign makers and print shops. The outer layers of the product are held apart by parallel flutes that give the material thickness and rigidity **(8)**. The flutes are continuous along the product's 8-foot length. Coroplast is available in various thicknesses; for rainscreens, I use ⅜-inch-thick Coroplast.

The material is easy to rip into strips on a table saw, though I buy it from my sign supplier already cut into 2-inch strips .

For the top and bottom of a wall, we use other, 3-inch-wide strips with the flutes running vertically, which allows convective ventilation behind the siding at the top of the wall and water drainage at the bottom of the wall. Before installing the top and bottom strips,

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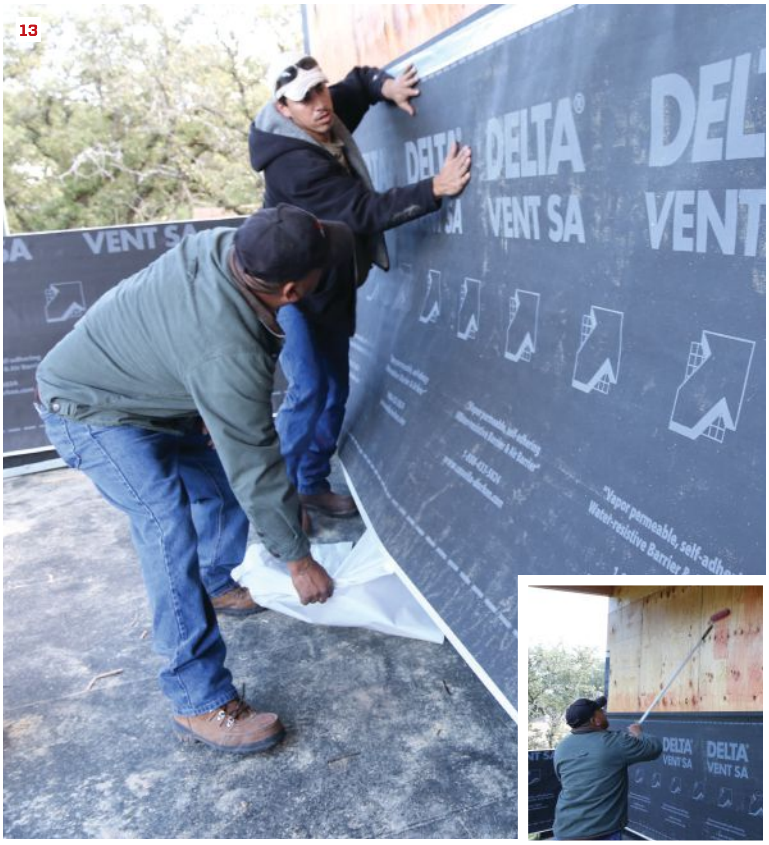

we staple on an 8-inch-wide strip of insect screening, then fold it back over the Coroplast to keep out bugs **(9)**.

You can also use Coroplast as a rainscreen for vertical siding by attaching the strips horizontally. You'll need to rip the Coroplast sheets across their 4-foot width and attach them so the flutes run vertically to allow water to drain through them **(10, 11)**.

For houses with a reservoir cladding—that is, stucco, stone, brick, or any cementitious product that is going to soak up lots of water—I use a zero-perm product, Delta-Dry Stucco & Stone (cosella-dorken.com). It's a ⅜-inch-thick dimpled plastic mat that's stapled to the housewrap **(12)**. The exterior side of the product has a built-in mortar screen that prevents scratch coats from filling the dimples. The beauty of Delta-Dry is that it provides an air gap on both sides—between it and the stucco and between it and the sheathing.

BEST CHOICES

For the ultimate protection on walls, there is another category of WRB systems that includes fluid-applied membranes and peel-and-stick membranes. Unlike some other WRBs, these products have the added benefit of air-sealing a wall, as well as protecting it from moisture. Both should be used in conjunction with an installed rainscreen.

I've been very impressed with a German peel-and-stick product, Delta-Vent SA (cosella-dorken.com) that we recently used on a house. There is a fair amount of labor involved in the installation: The sheathing is first covered with a paint-on primer. Then the 3-foot-wide material is unrolled on the wall; once it's in position, you pull off the backing paper and smooth it into place **(13)**. A double-stick layer at the edges creates an airtight seal at all the overlapping seams. There are also proprietary tapes for flashing windows and wall openings.

Another peel-and-stick WRB product we've used is Aluma Flash (polyguardproducts.com)—a laminated rubberized-asphalt product. The rubberized-asphalt layer is 40 mils thick and laminated to two layers of polyethylene film, with a top protective layer of aluminum. The aluminum outer layer helps this product withstand UV rays almost indefinitely **(14)**. It's applied similarly to Delta-Vent SA.

We have also used fluid-applied flashing and seam-sealing

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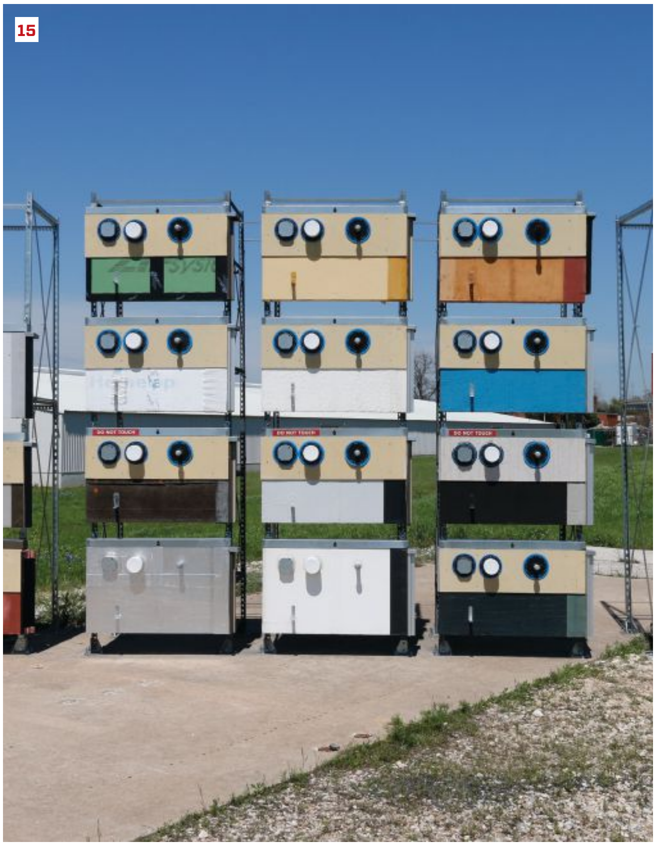

products from Tyvek. They work extremely well for tricky inset window installations. You squirt them on from a caulking gun, then use a trowel or brush to spread the materials, which have the consistency of thick paint. Once cured, they form a rubbery, airtight and watertight bond.

We have not yet used any fluid-applied products to completely cover the walls of a house, but some of the products that look promising are Tremco's ExoAir 230 (tremcosealants.com), Tyvek Fluid Applied WB (dupont.com), and Grace's Perm-A-Barrier Liquid (grace.com).

Fluid-applied WRBs are elastomeric products that can be sprayed, rolled, and even brushed on a wall. Depending on the product, some joint and seam filling or priming may be needed first. The cured products form an elastic, airtight, vapor-permeable, and waterproof covering that will stretch and contract a bit as a building moves.

Residential-grade fluid-applied products are thinner, however, than commercial-grade products, which range in thickness from 30 to 75 mils. At that thickness, the material is almost squishy when cured and provides something of a gasketing effect around fasteners for brick ties and the like. My current preference at this point would be to specify one of the commercial products.

DURABILITY TESTING

I recently visited the University of Texas at Austin Construction Durability Lab to see its ongoing testing of WRBs. Mocked-up wall panels were covered in a variety of WRBs, as per manufacturers' specifications, then left out in the weather, where they've been for almost two years now **(15)**.

As would be expected, the tar-paper-covered panel has not fared well, whereas the thicker, commercial-grade fluid-applied WRBs have performed the best. The thinner, residential-grade fluid-applied WRBs are no better than elastomeric paint, and do not perform very well. I've written about the tests on my blog at mattrisinger.com, and I'll continue to post about them as more test results come in.

Matt Risinger is the owner of Risinger Homes (risingerhomes.com) in Austin, Texas. He is a frequent contributor to JLConline.com, where we post selections from his blog and his YouTube channel.

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Photo: Sue Burnet

Installing Engineered Horizontal Siding
Working efficiently ensures durability and profitability

BY GREG BURNET

Horizontal lap siding, or clapboard as it's known in some areas, has been widely used as an exterior cladding on American houses for centuries. And while it's relatively simple to install, new generations of materials require installers to pay closer attention to details to ensure durable, trouble-free installations.

As the quality of lumber has diminished over the years, manufacturers have developed siding that is composed of synthetic, composite, or engineered materials. These materials are durable but less tolerant of installation errors, and each has a unique set of installation guidelines that must be followed to avoid failure. It would be impractical to cover the nuances of all engineered siding products in one article—and most manufacturers provide clear instructions for installing their products, and many offer online courses or other programs—so I'll focus instead on general techniques and best practices learned over the 30-plus years that I've been installing siding.

EFFICIENT JOBSITE SETUP

One of the keys to a successful siding project is setting up the jobsite to minimize wasted steps as well as the number of times the material is handled. This involves staging the material, setting up a cut station, and erecting scaffolding as required. Thinking

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through this part of the operation carefully can make or break your profitability.

Our supplier typically delivers siding orders with either a roll-back- or forklift-equipped truck. If possible, we unload and store material close to where the cutting station will be—which ideally should be centrally located on the property to allow easy access to all sides of the building. On larger jobs we may load material for multiple cutting stations, or stack the material at multiple locations and move the cutting station as we work around the building.

Our cutting station consists of a simple cutting table—usually a 2x4 frame **(1)** with a fence **(2)**—with enough space directly behind the cutting area to put a sizable stack of siding, which we usually reload several times a day. We do most of our crosscutting with 7¼-inch circular saws fitted with 40-tooth carbide blades **(3)**, and the engineered wood we typically use (LP SmartSide) is strong and light enough that we can gang-cut multiple pieces to the same length **(4)**.

FASTENERS AND NAILERS

Fasteners are critical to the longevity of any siding job. Cheap nails often rust prematurely, leaving unsightly streaks on the siding. In extreme cases, nails rust away completely, and the siding falls off. So at the very least we use double-hot-dipped galvanized ring-shank nails where siding gets blind-nailed. Any trim or siding with exposed fasteners gets stainless-steel ring-shank fasteners.

While nails can be hand-driven into some engineered siding, a coil siding nailer is a must for fastening denser siding or trim products **(5)**. Most of these nailers can shoot nails in lengths from 1¼ inches to 2½ inches (5d to 8d), and a few can fire 3-inch (10d) nails. The nails come in either wire or plastic collation, with each coil holding up to 250 fasteners—meaning less frequent reloading than with a stick nailer. A must-have feature is an adjustable depth of drive; many nailers have a thumb wheel for this purpose. This practically eliminates the need to leave the work area to adjust your compressor's regulator. I also like no-mar rubber or plastic nosepieces, which greatly reduce the risk of damaging prefinished material.

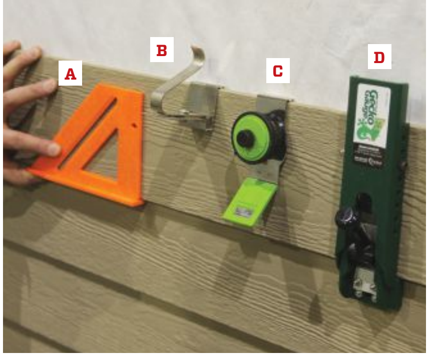
GENERAL LAYOUT

Before we start laying out the siding, we inspect the weather-resistive barrier (WRB), making sure all the seams are taped and repairing any damaged areas. Most engineered siding needs to be

Photos: Roe Osborn

GAUGES FOR INSTALLING SIDING

There are dozens of different gauges; four are shown in the photo below. Gauges can be as simple as a plastic framing square cut to the size of the siding reveal **(A)**. (We label ours with their size and store them in a bucket for future projects.) The second gauge **(B)** is preset to the size of the overlap and slips over the top of a siding course to hold the board above in place, allowing one person to install long lengths. The third one **(C)** also slips over the top and lets you dial in the size of the reveal. The fourth gauge **(D)** clamps to the bottom of the course below. It adjusts to the size of the reveal and locks in place with a lever.



fastened to the framing, so we mark the location of every framing member on the WRB using a permanent marker **(6)**. This way, we don't need to search for studs during the installation, which saves us time.

When possible, we pre-assemble components such as window trim and corner boards. Building them in the shop is faster and easier than on the jobsite. On some smaller jobs we've even pre-fabricated the entire soffit assembly. We install these components directly over the WRB.

The crew uses a laser level to shoot a horizontal control line around the entire building prior to installation. This line gives us a benchmark and allows us to level our starter strip. It also helps to alert us to potential challenges so we can formulate strategies to deal with them. As an example, a soffit that's out of level an inch over 24 feet is easily masked by adjusting multiple courses across the entire surface of the wall. But it's not as easy to hide if you suddenly notice the discrepancy while you're installing the last two courses of siding just below the soffit.

Depending on the type of siding we're installing, we plan some of our cuts and leftover pieces, especially for the front of a building. Engineered wood siding comes in 16-foot lengths, so we use as many full or close-to-full pieces as possible. Because front elevations are often interrupted by doors, windows, and other details, it's often possible to span between these elements with continuous lengths of siding, therefore creating fewer butt joints where they would be most visible.

FIXED VS. VARIABLE SIDING REVEALS

This debate is as likely to start an argument as the one about wormdrive saws vs. sidewinders. Fixed-reveal proponents claim that their method is faster and uses less material because siding can be installed to the maximum reveal stated by the manufacturer. Those who favor the variable-reveal approach point to historic design, where the horizontal edges of the siding align with other horizontal wall elements such as window and door heads and sills, arguing that anything else is just plain ugly.

Despite the passion that both sides feel, either method is acceptable, and I have used both approaches successfully on different projects. Beyond personal preference, your choice may also largely depend on what part of the country you live in, what your

Photos: 5&6, Sue Burnet; sidebar, Roe Osborn

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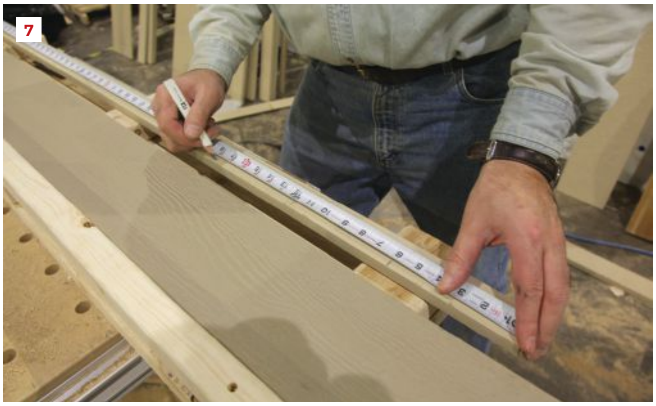

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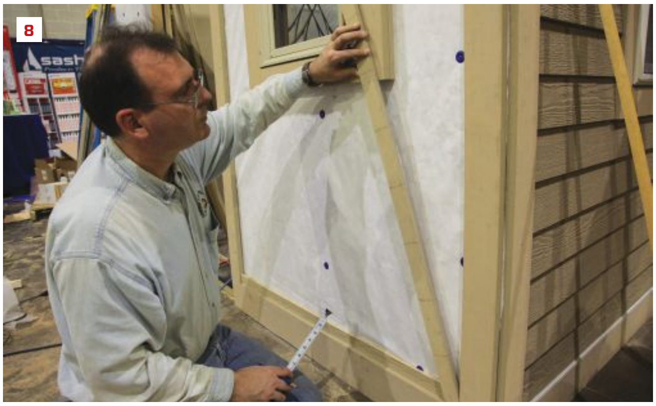

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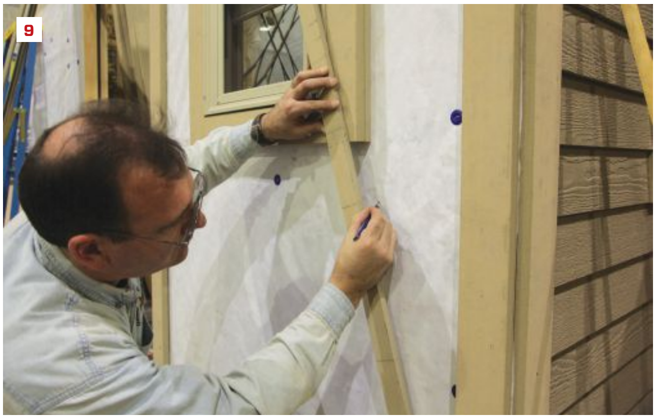

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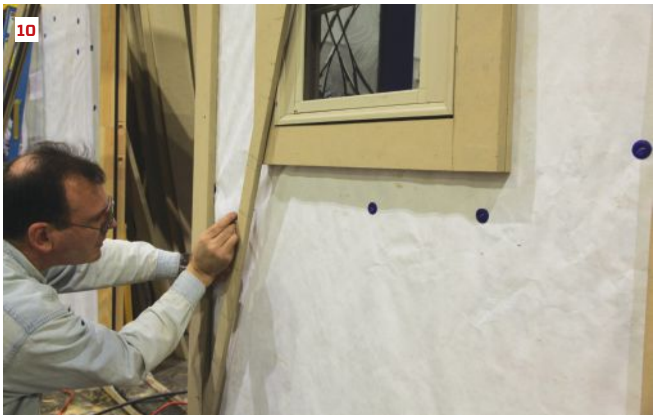

customer's expectations are, and whether you're being asked to match existing conditions or other buildings on the property.

If we go with fixed reveals, we usually install the siding using gauges to set the width of the siding courses (see Gauges for Installing Siding, page 47). Gauges are always used in pairs, to support the ends of the siding planks at the proper reveal while they are being nailed in place. There are many different gauges, props, holders, and other accessories for installing different kinds of siding, and a lot of them are designed to let you work solo. I've also seen some ingenious homemade gauges. Many gauges are specific to one particular type or thickness of siding, so be sure the gauge you buy works for the siding you're installing.

Variable reveals, on the other hand, are usually laid out with a story pole. I used to make a story pole for each facade of a building, carefully noting all the window and door heads and sills on it. I'd then calculate each measurement, dividing it by the target exposure of the siding and marking each course on the pole. This method works well but often requires a bit of trial and error, not to mention a fractional calculator. More recently I've stopped trying to calculate each course, after realizing that variations of up to ½ inch between courses with a 6-inch exposure (or more) are barely perceptible.

Instead, I lay out individual areas of the wall, such as from the starter strip to the window sill or from the window sill to the window head, and I make a story pole out of strapping or some other material that's longer than the height of each location. At the bottom of the story pole I taper the sides to a point like the top of a fence picket. Then I lay out the ideal (target) exposure for the courses along the stick **(7)**, squaring the lines across the face and onto the edges.

On the building, I mark the locations of each horizontal element across the WRB, bringing a line out to the edges of corner boards. Then I bring the story pole to one side of an area that I need to divide, and place the bottom of the pole at the level of an element that has already been installed (such as a window sill) or on one of our lower reference lines. I rotate the pole diagonally (the point on the bottom allows the stick to pivot without it lifting off the work) until one of the story-pole lines intersects with an upper element, such as the window trim **(8)** or an upper reference line.

Holding the diagonal story pole in place, I transfer the marks for each course from the pole onto the WRB **(9)**. I repeat the process for the other side of the area **(10)**, then connect the marks on the WRB

Photos: Roe Osborn

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with a chalk line or a straightedge. These marks represent the *bottom* edge of each course and will be impossible to see as the siding is installed. So after the reference lines are drawn or snapped, I transfer them onto the edge of the trim where they can be read as the siding is installed.

THE STARTER STRIP

Once all the trim that the siding butts into is in place, installation of the siding can begin. Because the first course must be installed at the same angle to the wall as the rest of the siding, we install a starter strip **(11)**. Unlike taper-sawn wood clapboards, most engineered siding is the same thickness across the width of each board. So for the starter strips, we rip a length of whatever material we're installing into 1½-inch widths. We often use leftover pieces of the same material from previous jobs, because the color doesn't show. When we don't have scraps to make the starter, we order extra siding material for this purpose. For 8-inch-wide siding, for instance, we order one extra lineal foot of product for every 4 lineal feet of starter that we need.

The starter strip is treated like any other piece of siding: Any cuts, including ripped edges and crosscuts, are sealed with paint or primer prior to installation, and the strip is fastened directly to each stud with 8d double-hot-dipped galvanized (or stainless steel) ring-shank nails. If we didn't install the starter strip with the same care as the surrounding siding—for example, if we used fewer nails—the strip could bow off the wall, bulging the first course of siding. The only way to correct this problem would then be to face-nail the lower edge of the first course in an attempt to draw both layers back tight to the wall.

We're careful to install the starter parallel to the level control line we established earlier. This way the first course of siding should be level as long as its bottom edge is flush with that of the starter strip. We also set the starter strip at the correct elevation above grade. By code, siding materials should be held at least 6 inches above finished grade. For siding above an intersecting roof or hard surface, such as a patio or porch, most manufacturers call for a one-inch minimum for vertical clearance. In these cases, we install a flashing and counterflashing on the wall before installing the siding or trim. We usually form the flashing out of black aluminum, which creates a nice shadow line once the siding is on.

Photos: Sue Burnet

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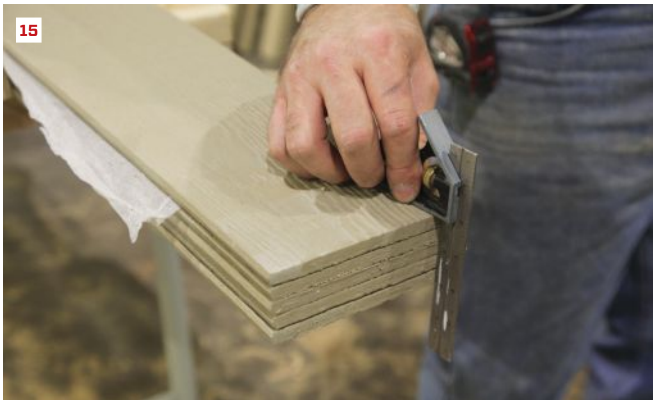

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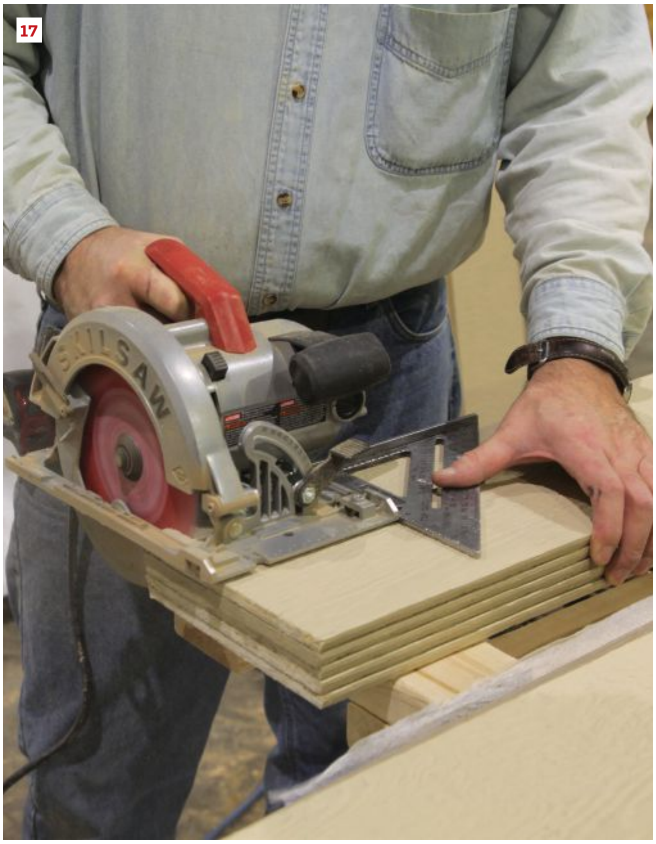

CUTTING AND INSTALLING THE SIDING

For the actual installation, a two-person team works best: one installing and one cutting. An experienced cutter, though, can sometimes keep multiple installers going at the same time. After getting a measurement for the first piece, the cutter cuts the siding to length and seals any cuts.

If the installers are using gauges, the cutter also scribes a line along the siding's face at the proper reveal to help the installers align the second course without having to measure and mark the reveal in an awkward position. The installer then blind-nails the siding through the top edge and into the studs, placing the nails the distance from the top edge that's prescribed by the siding manufacturer. Most engineered siding can be blind-nailed, which looks better and helps to protect the fasteners from corrosion.

Working from left to right, additional courses install in a stair-step fashion **(12)**. We stagger each butt joint at least a stud or two from the one below, and we make sure to break the end of each course on a stud as we work our way up a wall, minimizing any chance for the end of a board to work loose.

The butt joints in each course are flashed using aluminum coil-stock that we form ahead of time into pans or cards. Each card starts out about 4 inches wide and is as long as the nominal width of the siding that we're installing. We then form a 90-degree leg at the top that is as long as the thickness of the siding **(13)**. The bend lets us place each card at the end of a siding course without nailing it in place **(14)**. Because the card moves with the board, we can adjust a row of siding if necessary to compensate for a slightly bowed piece.

I've remodeled old houses and found tar-paper splines at butt joints of siding. While this method is okay, I prefer to make our flashings out of rigid material that isn't adversely affected by UV rays, moisture, or other environmental conditions. I want the supporting materials we use to last as long as the siding.

To gang-cut siding, the cutter takes material from the pile and stacks it against the cutting-table fence. When working with finished siding, we prefer to make our cuts with the finished side facing down—to minimize chipout—but manufacturers usually alternate the finished and unfinished sides for shipping, so it's not always practical to have the unfinished side facing up.

After squaring the ends of the boards **(15)**, the cutter pulls the measurement **(16)** and cuts through the entire stack at once **(17)**. A

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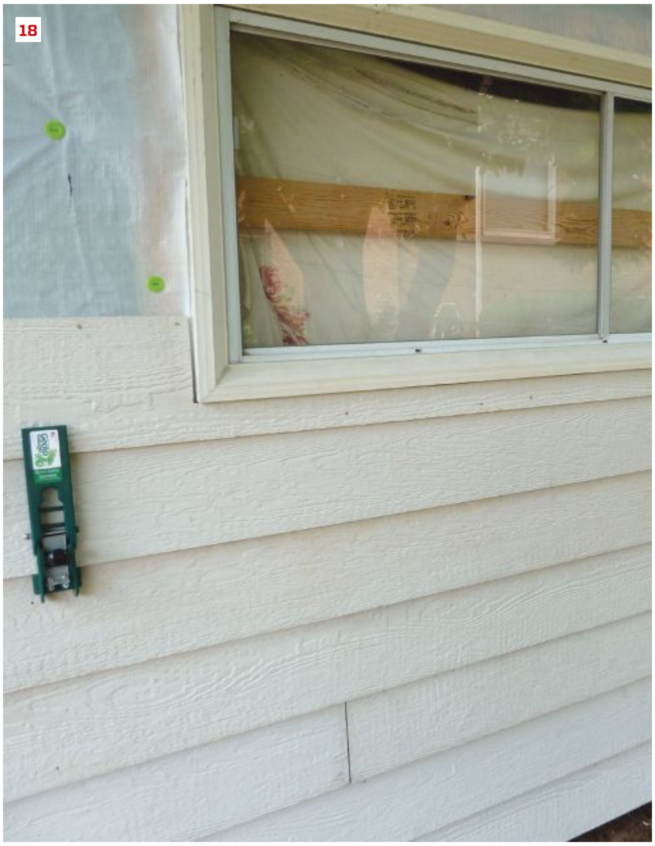

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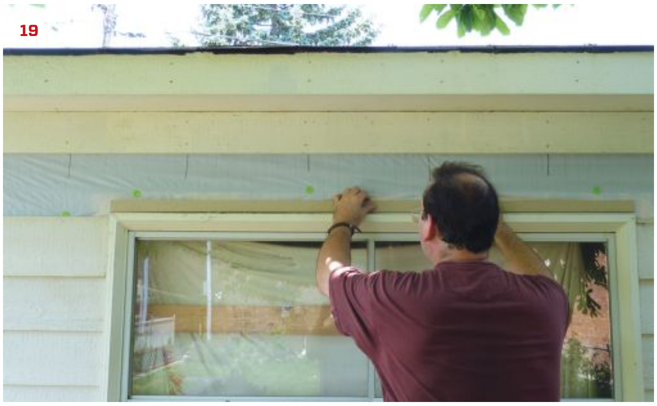

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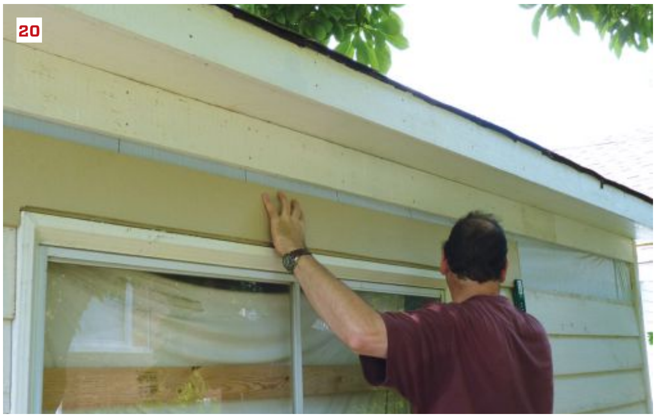


7¼-inch circular saw can usually cut four or five boards at a time.

Successive courses of siding are installed as described above. The only difference is when a piece needs to be notched, such as around a window **(18)**. Engineered-wood siding is usually notched by the cutter on the ground, but fiber-cement siding is usually notched by the installer to minimize breakage during handling. The exposed edges of the siding are sealed immediately after cutting, before the modified piece is installed. Install a starter strip to support the siding above the window **(19)**.

The vertical edges of the notched pieces typically abut a projection such as window trim, so we add a thin bead of caulk to the backs of these areas before installing the siding. For the pieces above a projection, we hold the siding up ⅜ inch above the flashing to keep the siding from wicking moisture and to allow water to drain away freely **(20)**. We generally don't caulk horizontal areas, to avoid trapping moisture behind the siding.

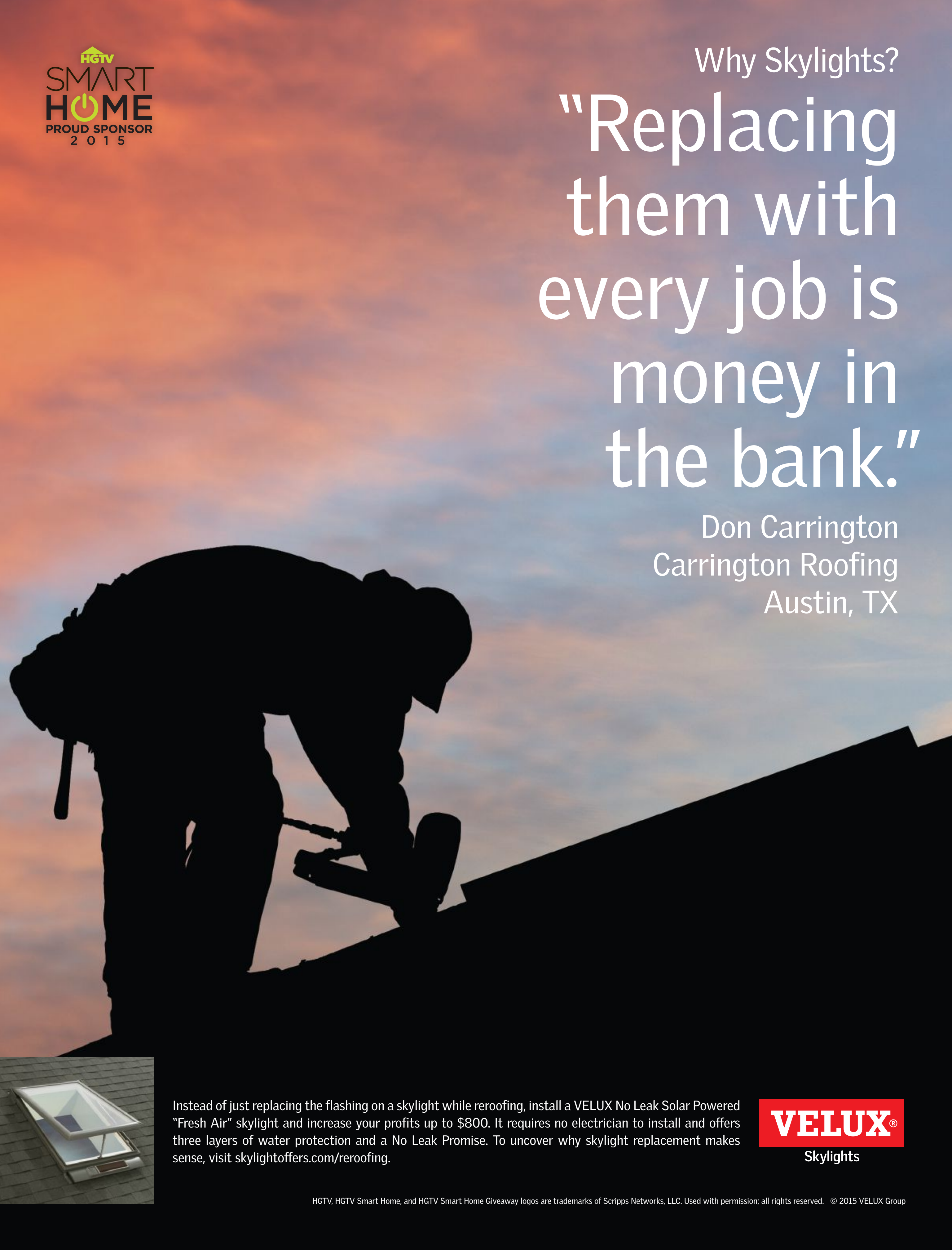
FLASH EVERY PROJECTION

As we work our way up a wall, we inevitably need to deal with window and door heads, light-fixture blocks, hose bibs, and other elements that project horizontally beyond the plane of the siding. No matter the component, we flash it the same way: We install a piece of rigid material over the top of each projecting element, integrate the top of the flashing into the WRB, seal it tight to the weather, and then seal around it with caulk **(21)**.

Because the window, door, and deck-ledger flashings at home centers and lumberyards rarely meet the dimensional requirements of our projects, we usually make our own on a portable sheet-metal brake. The flashing is usually formed out of painted aluminum coil stock in a color that matches the siding or trim **(22)**. (We have also used copper or PVC on occasion).

We add up the total width of the various legs and horizontals and shear a strip that size from the coil. We typically make the downward leg around ½ inch and make the horizontal projection slightly wider than the thickness of whatever we're flashing. We then make the upturned (vertical) leg of the flashing at least 4 inches tall, which is a code minimum in many areas. Rather than bending each portion of the flashing at right angles, we add a 10 to 15 degree bevel on the horizontal portion of the flashing to prevent water from pooling on top.

Photos: Sue Burnet



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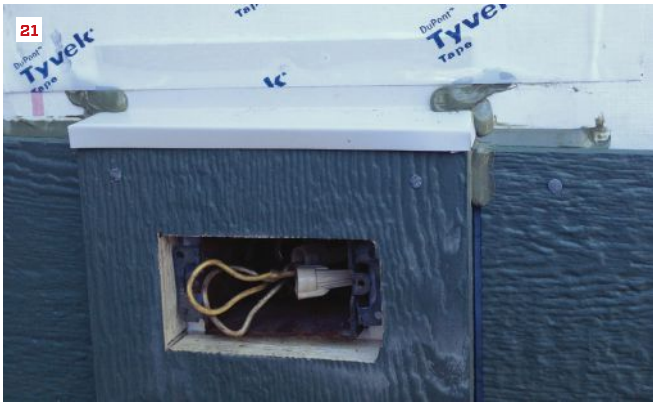
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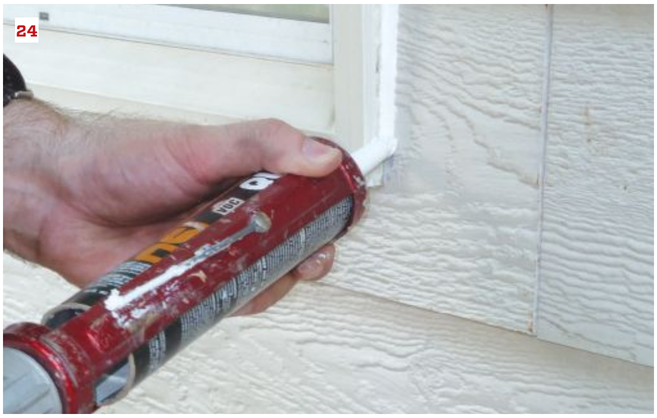
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To install the flashing, we make a horizontal slit in the WRB directly above the trim that's being flashed. The resulting flap of material is lifted and tacked out of the way. The flashing then slides into place and attaches to the building with the same type of nails as the flashing material—aluminum nails for aluminum flashing, copper for copper, and so on—to prevent galvanic corrosion from dissimilar metals being in contact. The upturned leg of the flashing is taped to the sheathing with a strip of peel-and-stick flashing tape, and the flap of WRB is brought down over the flashing and sealed to it with tape approved by the WRB manufacturer to preserve the integrity of the air barrier.

FINISHING UP

When we've completely sided a wall, we finish it off as we travel down on the pump jacks. If the siding is prefinished, we touch up exposed nail heads or minor scratches that may be visible on the siding or trim, starting at the top of the wall and working down. We do paint touch-ups with a cotton swab to minimize "flashing," where touch-up spots have a noticeably different sheen than surrounding areas. Flashing usually occurs when too much finish is applied; as the mil thickness of the finish increases, that area wears differently than the surrounding areas.

This is also the time we apply sealant to all areas that require it, such as where the siding abuts vertical surfaces **(23)**, doors, and windows and at the soffit or frieze juncture. Using a good-quality caulking gun, we apply the sealant, aiming for a bead that has a slightly concave shape when viewed in cross-section **(24)**. For joints that are wider than ¼ inch, such as where the siding or trim abuts a window or door, we insert foam backer rod into the joint before applying sealant. The backer rod prevents the sealant from filling the area, where it could form a three-sided bond and fail prematurely.

If we've installed primed siding, we sometimes leave the scaffolding in place for the painter, or we may simply paint the job ourselves. We've found most engineered material to be very easy to paint, and we're not shy about wielding paintbrushes if it's a profitable use of our time.

Greg Burnet is a Chicago-based window and siding contractor, and a presenter at JLC Live, where some of the photos for this article were taken.

Photos: Sue Burnet

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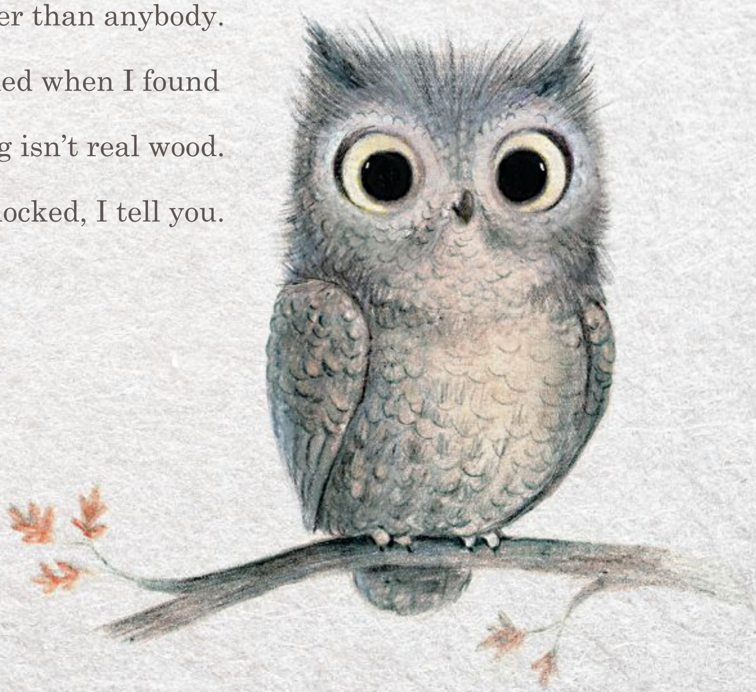

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Deck Footings That Work

Best practices for forming and pouring concrete piers and footings

BY MIKE GUERTIN

Photos: Mike Guertin

Holes for poured concrete piers and footings can be a pain to dig. After a couple of hours of blister-raising, back-breaking work have already been spent trying to dig down to frost depth through hard-packed and dense soils, rocks, tree roots, and groundwater, is it any wonder when successive footing holes become shallower and narrower, and start to worm around obstructions? You probably have wondered if a deck will really fail if the footings aren't quite up to par, especially if you're the one doing the digging. But do you want to risk your company's reputation on a faulty footing installation?

If you're looking for guidance, you won't find much in the IRC, which addresses only frost depth, soil suitability and bearing capacity, and concrete standards. By code, the bottom of a footing must be at least 12 inches deep and below the local frostline, whichever is deeper, and must bear on stable, undisturbed soil that is free of organic matter. The code also requires a minimum compressive strength of 2,500 psi for the concrete. But the code doesn't address many of the finer points that can impact how well a footing provides stable support for the deck. Footing design factors, including the size and number of footings needed to support a deck of a given size and soil bearing capacity, must also be taken into account. These design issues I address in a companion article in *JLC*'s sister publication, *Professional*

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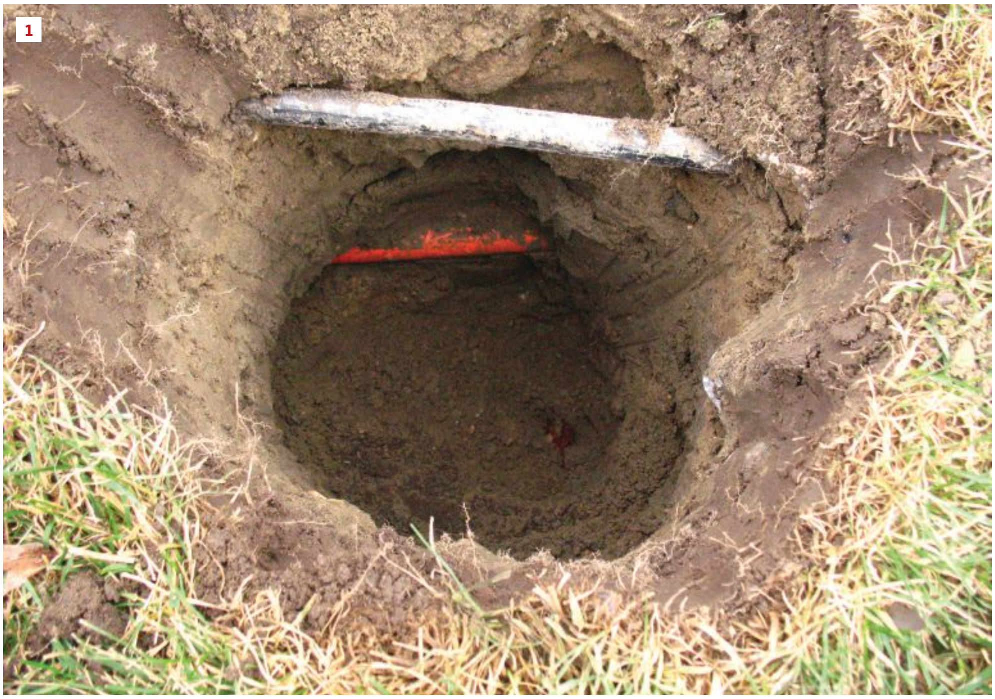

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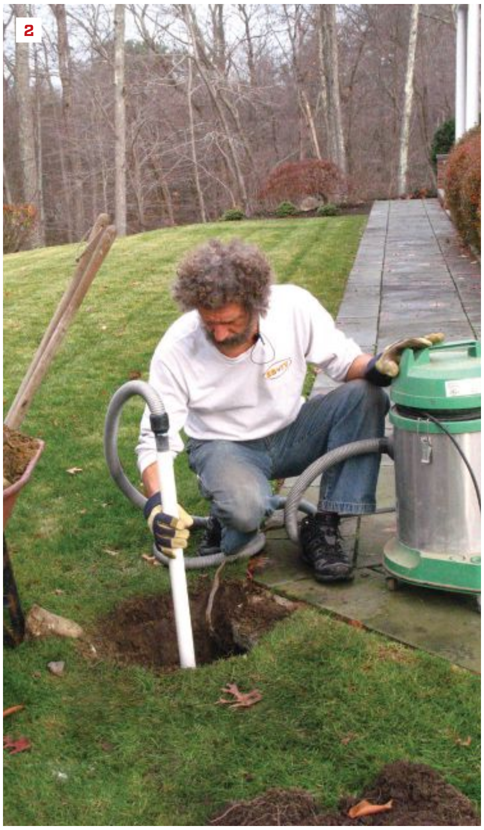

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1. Before digging footing holes, call 811 to reach your local utility locator. It will find and mark utility lines, but dig carefully; this service doesn't typically locate sprinkler lines, and here it missed a telecom cable conduit, too.

2. You're always disturbing the soil at the bottom of the hole as you dig and it's hard to scrape it out, especially from deep holes. One trick for removing the loosened soil is to vacuum it out.

3. Alternatively, loose soil can be compacted with a tamper, a framing offcut, or a section of a 4x4 or 6x6 post.

Deck Builder ("Better Deck Piers," deckmagazine.com). In this article, I'll confine the discussion to installation best practices.

EXCAVATION

In most states, law requires a call to a utility-funded service locator to identify buried gas, sewer, water, power, and telecom lines. The national campaign sponsored by the Common Ground Alliance is called "Call Before You Dig" (call811.com); you can reach your locally administered utility locating service by calling 811.

Use caution if the service locator identifies any utilities near the excavation area. The locations may not be exact. When utilities are found anywhere close, I dig carefully by hand. In the example shown here **(1)** the nearest utility my area service locator had identified was 4 feet away. If the service locator verifies that no utilities are anywhere close to the new deck area, I use either a backhoe or a post-hole auger, depending on soil conditions and the quantity and size of the footings. Mechanized equipment is fast but unforgiving—a utility strike due to one too-deep scoop or auger spin can result in a safety problem, lost time, additional costs, and an upset client.

Sometimes it's necessary to dig deeper than frost depth to reach stable, undisturbed earth. Where organic and highly compressible soil extends beyond the frost depth, it must be removed. Footings within 5 feet of a house foundation should be at least as deep as the foundation itself, since the soil was likely disturbed by excavation and filling operations when the house was built.

I always make sure that the bottom of the hole is flat—rounded or pointed bottoms won't support as much weight. And because loose soil can compress over time and lead to settling, I tamp it or physically remove loose soil from the bottom of the hole **(2, 3)**.

When I'm pouring concrete piers without using forms, I make sure that the hole sides are parallel and not tapering inward toward the bottom (tapering outward is OK). Otherwise, frost can grab the sides of the pier and heave it out of the ground. The holes should also be plumb, not angled, since slanted footings don't transfer gravity loads to the bottom. Offset loads can cause one side of the footing to sink, while frost can heave the sloped edge. Anything—rocks, roots, utility conduits—that impinges on the sides of the hole should also be removed. While it would be easier to dig around obstructions and then just pour around them, impingements weaken the concrete and create ledges that frost can grab onto, heaving the pier.

FOOTING FORMS

Whether cardboard, steel, plastic, or site-built out of wood, footing forms prevent some of the problems associated with piers poured directly into holes. First, the form isolates the surrounding earth from the concrete as it's poured, so there's less chance of contamination. The form keeps the sides parallel and smooth, so frost won't have a ledge to grab hold of; and it contains the above-grade portion of the footing, preventing mushrooming.

Rather than cutting footing forms to height before dropping them into the holes, I let them run high and then set the height for the pour. When the existing grade is fairly level, I use a laser level and mark the footing forms at a uniform height. When the grade is

BIG FORM, SMALL HOLE

Wide-base forms work great, but require jumbo-sized holes. One trick to reduce the amount of digging for a wide-base form is to dig a narrower shaft and just widen out the bottom of the hole. Before placing the form in the hole, make a cut in the side of the form **(A)** and fold it onto itself **(B)**. Then tape the folded form to hold the narrower dimension and drop it in the hole. When the tape is cut, the form will spring open to its full diameter **(C)**. When a form has been cut like this, however, you won't be able to pack the backfill in the hole before the form has been filled with concrete, or it may crush at the joint. So just lightly backfill and wait until the concrete has set up before backfilling the hole completely and compacting.

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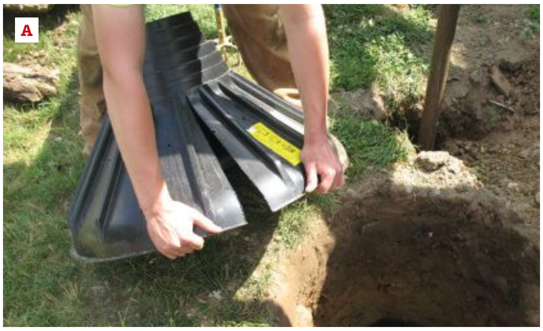

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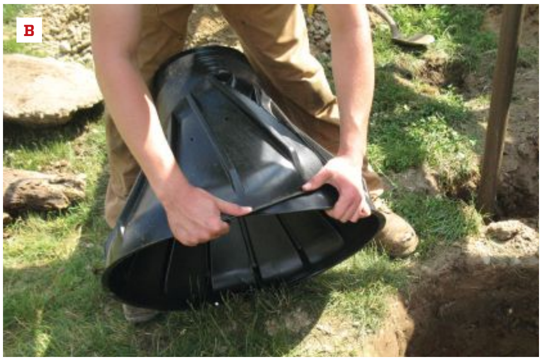

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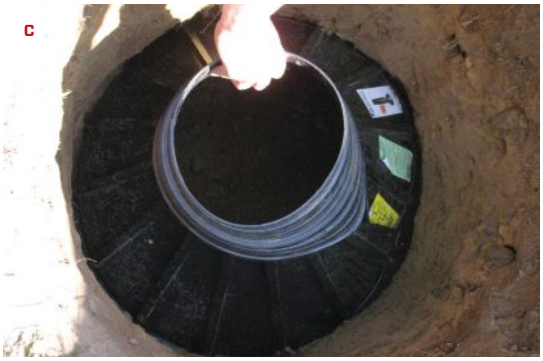

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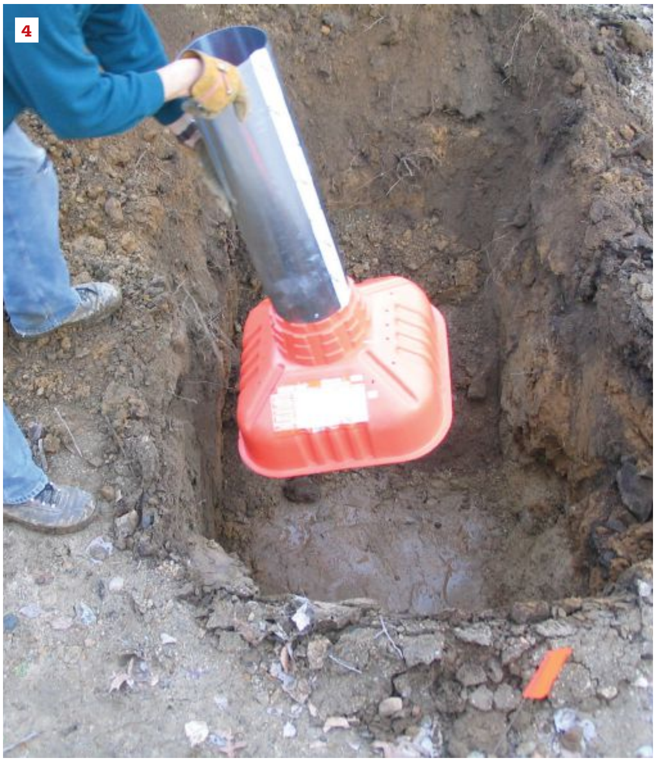

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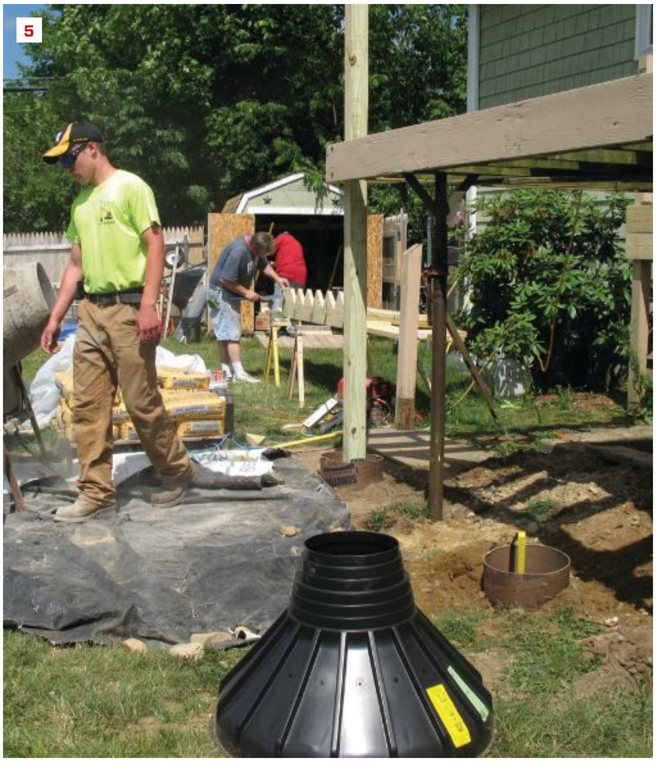

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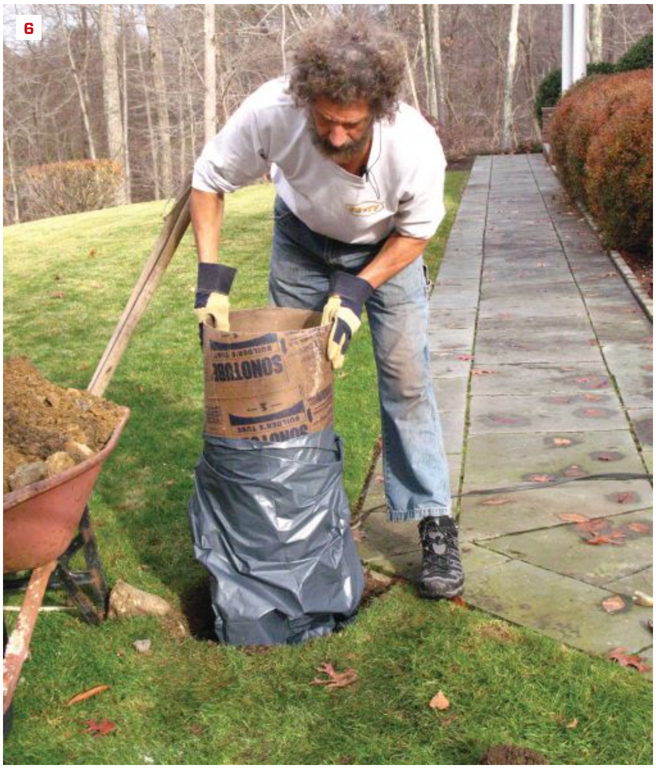

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4. You can form piers using metal duct, which costs 30% to 40% more (about $4 more per footing) than cardboard tubes, but is more durable in wet conditions. To reduce costs, the author recycles his HVAC sub's offcuts, as well as old ductwork removed from remodeling jobs.

5. To increase a pier's bearing area without adding a lot to the total volume—and weight—of concrete needed to build it, many deck builders add a wide-base form to their standard cardboard-tube footing forms.

6. Garbage-bag footing bases are useful in wet conditions, as well as when your footings will be wider than concrete tubes but smaller than prefabricated wide-base forms. The author digs a 12-inch-diameter footing hole about two-thirds of the footing depth, then widens the last third of the hole to the calculated size. After duct-taping a heavy-duty garbage bag to a footing tube cut 6 inches longer than two-thirds of the depth, he pokes rebar horizontally through the form 6 inches from the top to suspend the form in the hole. Finally, he pours concrete in the bottom third—the bag—then backfills the space between the hole and the form before filling the form to the top with concrete.

7. A pier should extend a few inches above grade so that the hardware used to connect the PT post to the pier won't get covered with soil.

sloped I mark the pour height 4 to 6 inches off the grade level at each footing. The easiest way to level off the concrete at the top is to trim the form off level at the desired height before placing the concrete. A visible laser strikes a line halfway around a cylindrical form, making for easy marking and precise cuts.

Cardboard tubes are standard for most deck builders, but when the soil is wet or rain is expected there's a risk of even the good coated forms dampening and collapsing under the weight of the backfilled soil before the pour. When the weather forecast is iffy, I use round light-gauge sheet-metal duct in place of cardboard forms **(4)**. Removing the above-grade metal takes a bit longer than peeling off a cardboard spiral—about 10 minutes to score the metal with a 4-inch angle grinder at ground level and pop the piece.

A round tube form can be used without a widened footing base, but the footing diameter is then limited to the tube diameter. The easiest way to form footings with larger bases that can bear greater loads is to use a wide-base footing form **(5)**. Forms are made in many styles from cardboard or plastic. They can have either round or square bottoms, with tapering tops that mate up to cardboard form tubes, which bridge the distance between the top of the wide-base form and grade (see Big Form, Small Hole, page 59).

Most deck builders don't place steel reinforcing rebar in footings, but in areas with expansive or other unstable soils rebar is usually required. Otherwise, the only time I use rebar is when the concrete pier needs to be poured more than 12 inches above grade and when I'm building on severe slopes that may be subject to erosion.

POURING CONCRETE

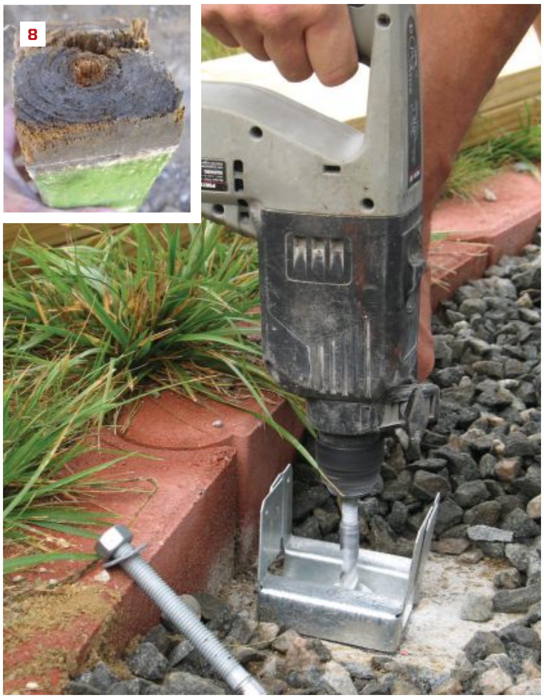
The "just right" Goldilocks concrete mix—not too dry, not too wet—is wet, but stiff. A squeezed fistful should hold its shape and neither crumble (too dry) nor squeeze through your fingers (too wet). When the mix is too dry, the cement in concrete won't hydrate properly and bind the aggregate, resulting in a footing that cracks and crumbles. A wet mix reduces the compressive strength of the concrete. If you're unsure, check the packaging of your bagged concrete mix for the proper water-to-mix ratio.

Don't add aggregate to the mix. If you're working in bony soil, the temptation may be to toss those extra rocks that you've dug out of the hole back into the footing as the concrete is poured. But concrete may not bond to rocks that have even a small amount of residual dirt, which will weaken the footing. Rocks can also create air pockets in the footing.

To avoid cold joints, make a continuous pour. Cold joints—or seams between layers of concrete—can occur with a mix that's too dry, or when there's a delay between the pouring of successive batches of concrete into a form. I always rod or vibrate the concrete in successive batches to make sure they mix well where they meet.

Also, keep the pour clean. This can be tricky when footings are poured directly into holes without a form, since dirt from the sides can fall into the concrete. The contamination will reduce the concrete strength and can leave a fracture line, much like a cold joint.

It's possible you'll hit the water table when digging a hole, or rainwater may fill the bottom if the weather turns inclement. But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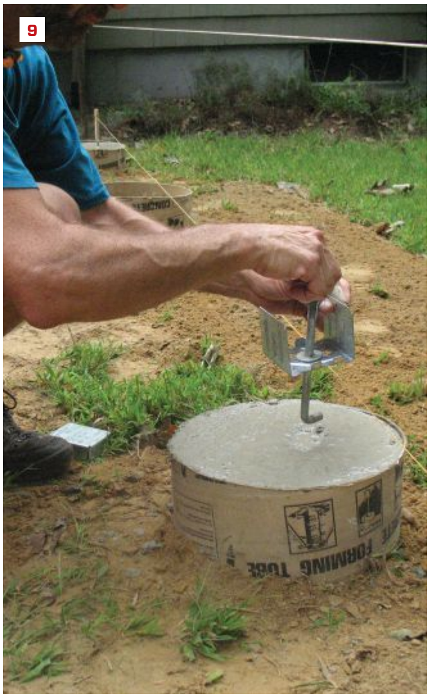
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8. Most post bases have an elevated plate that prevents the bottom of the 4x4 or 6x6 post from coming in direct contact with the concrete. Even though PT posts are treated for ground-contact, end grain will wick up moisture and is particularly vulnerable to rot (inset).

9. After the author pours concrete into the form, he makes sure the top of the pier is flat, rather than angled or crowned. Sloped tops make it hard to set a post base properly.

don't pour concrete into a wet hole, because standing water will mix with the concrete and weaken it. Instead, pump the water out, or isolate the concrete from groundwater until it cures, to prevent contamination. One technique I use with a partially water-filled hole is to place a garbage bag in the hole or—if I'm using a footing form—around the base of the form before setting it in place. As the bag fills with concrete, the water will be displaced **(6)**.

Piers should extend 4 inches or more above grade, because footings that are recessed below grade put the post-base connector at risk of being covered by backfill **(7)**, and deck hardware is generally not rated for below-grade use. But unless you're using a form, it's difficult to prevent concrete from spreading out at grade and forming a mushroom cap, which frost can seize and heave up. In general, the portion of the pier that is above grade should be the same size as the footing below grade.

ANCHORING POSTS TO PIERS

A post base is needed to anchor the bottom of a bearing post to its supporting pier. A properly installed post base resists uplift forces while acting as a capillary break to reduce the amount of water wicked into the post's end grain (even lumber treated for ground contact can decay over time) **(8)**.

The trick to installing post bases is locating them precisely on the piers so they're directly beneath the beam. In one approach, I locate and install the anchor bolts for the post bases at the time the concrete is poured; in the other, I locate and install them after the concrete has cured. In either case, I use a string line to orient the post bases. The string aligns to the edge of the post position.

Wet installation. Galvanized ½-inch-diameter J-bolts can be set right after the footings have been poured, but before the concrete firms too much. I use a minimum 8-inch-tall bolt and embed it 7 inches into the concrete.

I use a post base as a guide to position the anchor bolt, aligning it with my string line and then lowering the bolt into the concrete **(9)**. Jiggling the bolt helps displace the concrete aggregate so it will settle into the footing. Once the bolt is embedded into the concrete, I turn it 180 degrees; this ensures that the bottom of the "J" hooks under aggregate. If the bolt isn't turned, then the "J" portion only has sand and cement over it.

Dry installation. To secure post bases to the piers after the concrete is cured, I use ½-inch-diameter galvanized wedge anchors. I wait a minimum of seven days for the concrete to cure before drilling and installing anchors; any less and the concrete may strip out or crack as the wedge anchor is tightened. I place the post base in position on the footing and hammer-drill a hole into the concrete. A quick blast of air from a compressor before bolting the post base to the pier clears out the dust on the sides of the hole that could reduce the wedge friction.

Mike Guertin is a custom home builder and remodeler in East Greenwich, R.I., and a regular presenter at DeckExpo and JLC Live. This article first appeared in Professional Deck Builder *(deckmagazine.com).*

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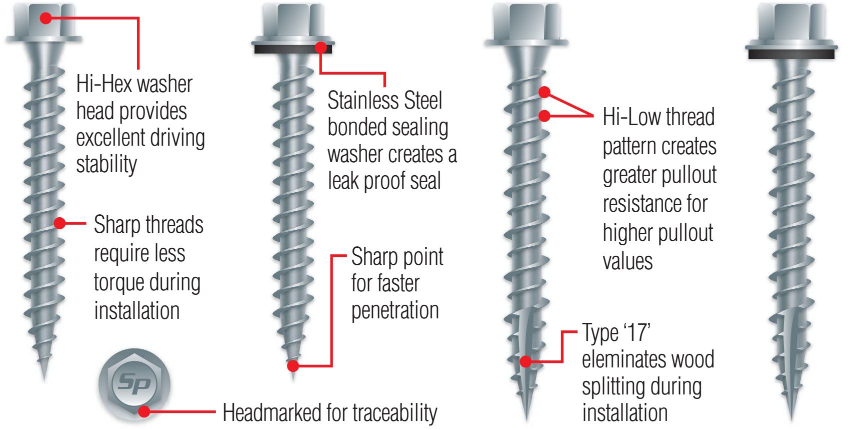
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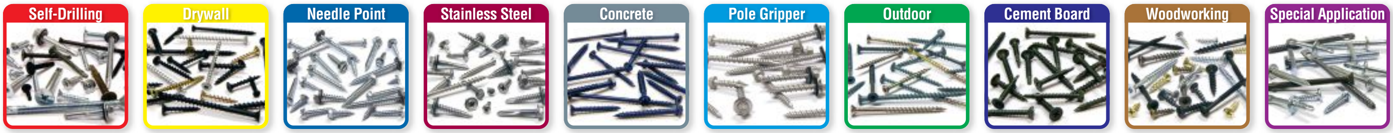
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BY CLAYTON DEKORNE

Working With Thick Layers of Exterior Foam

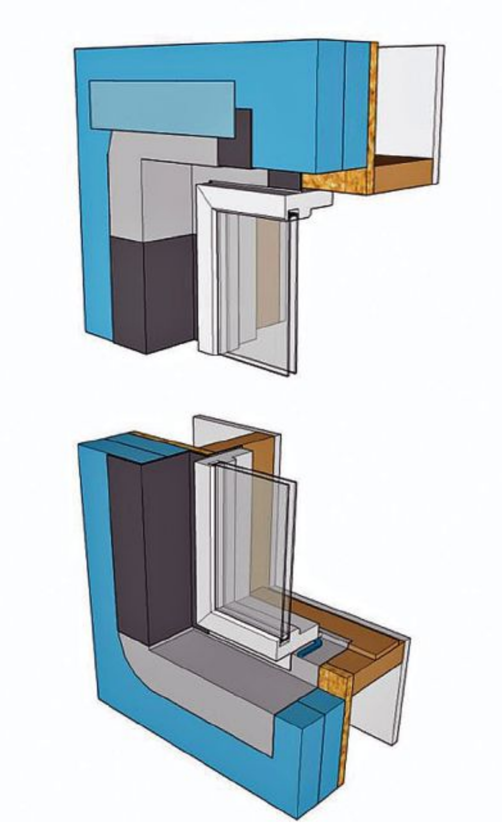
New guidelines from the U.S. Department of Energy's (DOE's) Building America program cover the design and construction of wall assemblies that use more than 1 ½ inches of rigid exterior insulation. Written by Joe Lstiburek and Peter Baker of Building Science Corporation (BSC), the 115-page "Measure Guideline: Incorporating Thick Layers of Exterior Rigid Insulation on Walls" offers clear guidance on some of the tricky details required to maintain a consistent "water-control layer" when you have fat layers of exterior foam.

Control layers. Those familiar with Lstiburek's thinking about building envelopes will recognize the terminology. For Lstiburek, it's all about "control layers"—the various systems that control the flow of moisture vapor, air, bulk water, and heat through a wall assembly. His is a conceptual way of keeping track of what a wall needs to do. You can substitute the terms vapor retarder, air barrier, weather barrier, and insulation for each of the control layers. But thinking in terms of layers moves us away from focusing on single materials and toward a systems approach that integrates several components to form a continuous layer. For example, a complete weather barrier is not just housewrap that we need to roll out onto a wall; it must also include the flashings, tapes, and sealants that complete a "water-control layer" to keep rainwater and wind-driven snow out of the wall.

The confusing part is that the materials that make up one layer often do double- or even triple-duty. The materials in the water-control layer might also be integral to the air barrier, for instance, as when you tape seams in overlapping pieces of housewrap. And when you tape the seams in the exterior foam to help seal out air *and* water, you are making use of the thermal-control layer (foam insulation) to control air and water flow, as well.

Thinking in terms of layers helps us evaluate each of the elements we are trying to control. So, for example, if we're using a taped weather barrier as an air barrier, pausing to identify the continuity of the air-control layer might help us remember to apply a foam sealant around penetrations to stop air flow. This is an added step, if you will, to the steps needed for controlling bulk water—the shingled flashings that stop water leakage around those same penetrations. "Control layers" is a little academic, but I think it's a helpful way to stay mindful of the purposes for all the different envelope materials. And when we add thick foam to the exterior, keeping track of all these different flows can get tricky. That's where this Building America document shines especially bright.

"Innie" Window Details



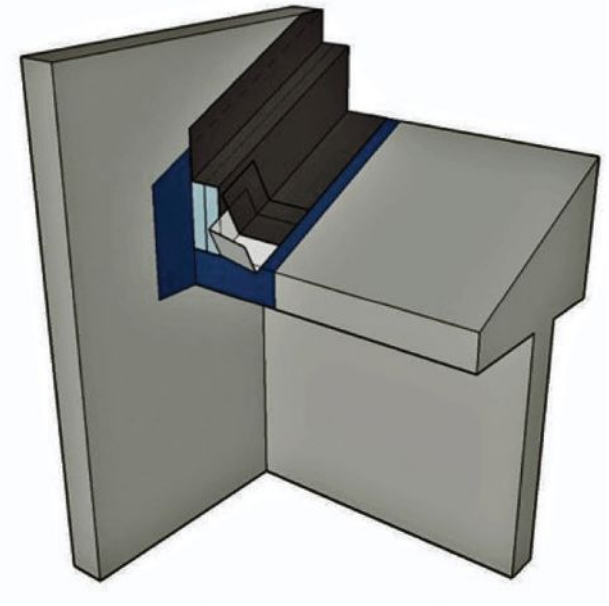
With extra thick layers of exterior foam, keeping a consistent "water control layer" can be complex. Building America's latest "measure guideline" provides step-by-step guidance for solving these water-sealing details around all types of wall penetrations, including windows. In the examples shown, the water-control layer is applied over the foam. Details for applying it under the foam for both "innie" and "outie" windows are also provided.

Illustrations: U.S. Department of Energy Building America

REASONS FOR EXTERIOR FOAM

There are good reasons to use exterior foam. The opportunity to extract triple-duty performance from the foam, as mentioned, is one. Creating an effective thermal-control layer by shutting down most of the thermal bridges, of course, is another. This is probably the main reason energy codes have pushed builders toward continuous insulation, and why the Building America program is working hard to create practical building details for this approach. But there's a third reason that jumped

Fat Foam Meets Side-Wall Flashing



The details for using thick layers of foam on a wall include how to detail side-wall flashing. This detail depends on the ingenious use of foam blocking behind the flashing.

Minimum R-Values of Exterior Foam

Climate Zone	Framing	Minimum R-Value (Rigid Installation)
4C	2x4	2.5
	2x6	.75
5	2x4	5
	2x6	7.5
6	2x4	7.5
	2x6	11.25
7/8	2x4	10
	2x6	15

The table above is adapted from Table R601.3.1 "Class III Vapor Retarders" from the 2009 IRC and Table R702.7.1 "Class III Vapor Retarders" from the 2012 IRC. It provides guidance for the minimum R-value needed on exterior walls to control wall-cavity condensation for climate zones 5 to 8 and Marine 4.

out at me from these guidelines, not least because it bumps up against an issue covered last month in this column ("Lessons in Building Science," Apr/15): With enough exterior foam on the wall, you don't have to worry as much about wall-cavity condensation. Exterior foam becomes your primary "vapor-control strategy," and it works regardless of the climate zone. It's especially good for reducing the condensation risk in *any* climate zone where air conditioning is included. (Even in cold climates, we all know, AC is frequently installed). This does mean that *no warm-side vapor retarder* should be used, and no vapor-closed interior paints or vinyl wallpaper should be applied to interior walls. If the walls are allowed to dry to the inside, leaning on the right amount of exterior foam is, in the words of the guide, "arguably the most effective means of condensation control from both air transported vapor (air leakage) and vapor diffusion."

How much foam is the right amount? The guide provides the answer in clear terms via the 2009 and 2012 IRC (see table, above). If you're building in climate zone 5, for example, you need at least 1 ½ inches when using extruded polystyrene (at R-5 per inch), and in climate zone 8, you need 3 inches (or 2 inches of polyiso at R-8 per inch). Remember, these are only minimum values to keep the inside face of the exterior sheathing above the dew point. More foam, of course, will increase thermal performance.

The prescribed values assume that the 2x4 or 2x6 wall will be filled with cavity insulation. The guidelines are careful to note that if your walls will be fatter than 2x6 (that is, have more cavity-wall insulation and a greater risk that the sheathing will reach the dew point), additional analysis is recommended. The type of analysis the authors are referring to here is the sort done by BSC on the net-zero homes built by R. Carter Scott and company, as described in this column in March (see "Moisture in Fat Walls—A Closer Look," Mar/15).

EXTERIOR DETAILS FOR FAT FOAM

The meat of this document comes in the step-by-step guidelines for integrating the water-control layer with thick layers of foam. Many are based on real-world experience, including some documented in *JLC* by David Joyce, working on projects for BSC's Betsy Petitt (see "Retrofitting Exterior Insulation," Nov/09). But there are a number of important details we have not seen—details that are common on homes. Key examples include integrating fat foam with the step-flashing and kick-out needed for an intersecting roof (see Fat Foam Meets Side-Wall Flashing, above) and

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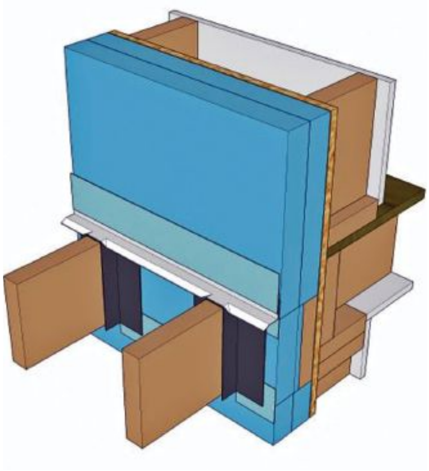
Fat Foam Meets Deck Ledger



This detail for attaching and flashing a deck ledger doesn't completely solve thermal bridging issues. But given the risk of a deck collapsing from a ledger attachment failure it's the safest approach offered in the new guidelines.

attaching a deck ledger (see illustration, left). Detailing for two cases—installing the water-control layer *over* the foam and *under* the foam—are provided.

WHY INSIST ON COST-EFFECTIVENESS?

There are some parts of this guide that are much less insightful, namely the cost analysis. It starts with a "base wall" that's fully sheathed with OSB, but then evaluates the added cost of foam sheathing using walls that are only 25% sheathed. This 25% "is a result of installing OSB only where structurally necessary," which isn't realistic.

You can, in some locations, sheathe only corners. But then you must deal with the discrepancy in thickness between the sheathed framing and the unsheathed framing. Are you really going to use ½- or ⅝-inch foam to flatten out the surface before applying thicker layers of foam? There is no evidence in the guidelines that the cost analysis factors in the extra labor to do this or that the labor cost would offset the added cost of more OSB. It's telling that none of the details show anything but a continuous layer of structural sheathing, and in many locales, you need continuous structural sheathing to meet wind bracing requirements (assuming you want windows).

I'm not blaming BSC. I'm guessing they were encouraged by the DOE to use bare-bones building requirements as a basis for cost-effectiveness. For a bare-bones house, it's probably perfect. But it doesn't accurately reflect the way most houses are built.

The DOE should give up on insisting that every energy upgrade be cost-effective. Can you imagine if the auto and computer industries advanced only technological improvements that were cost-effective? The energy-efficient housing industry shouldn't feel so constrained. Hats off to those, like BSC, who keep pushing the envelope (pun intended), regardless.

Clayton DeKorne is editor of JLC*. Measure Guideline: Incorporating Thick Layers of Exterior Rigid Insulation on Walls is available from www1.eere.energy.gov/library.*

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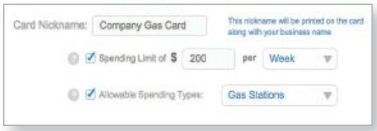

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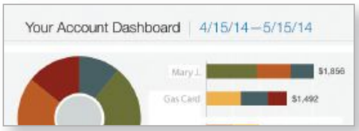

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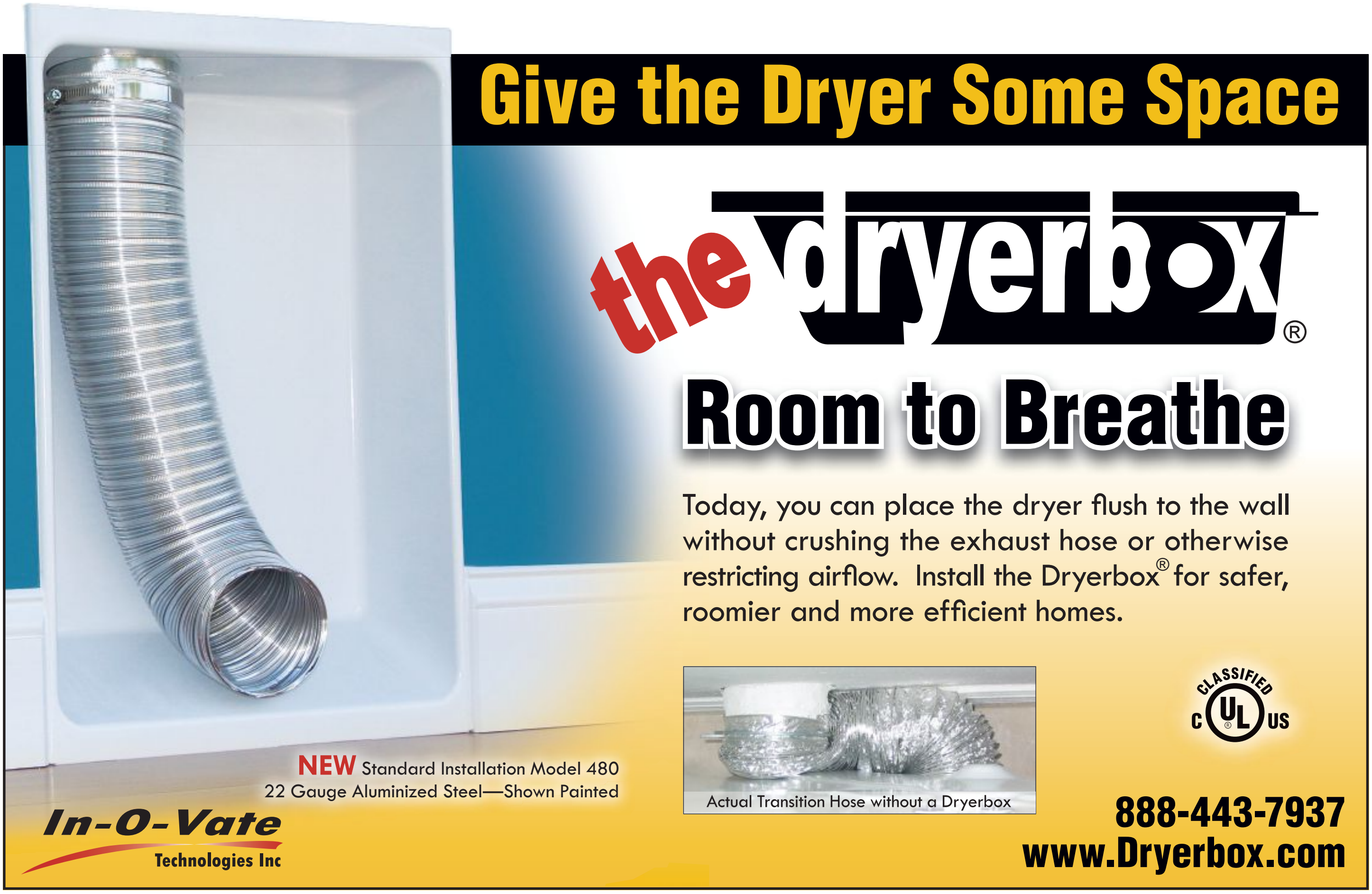

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Products

BY LAUREN HUNTER

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1. One-Piece Design

As one-piece toilets continue to gain interest, Gerber is introducing a new model to its Wicker Park Suite. Model 21-221 reflects contemporary design details from other products in the family, including sinks, faucets, and accessories. The toilet features a concealed trapway, and an elongated, ADA-compliant ErgoHeight seat for increased comfort. The WaterSense-approved design uses 1.28 gallons per flush. Priced at $800. gerberonline.com

2. Shingle Solution

Designed with contractors in mind, Atlas Roofing High Performance (HP) Technology shingles are oversized, saving as many as 240 shingles on a 40-square job, and between 1,440 and 6,240 nails depending on the nailing schedule. Fewer shingles reduces overall installation time, while fewer nail penetrations saves on materials and reduces the number of points where water could infiltrate. Installers will appreciate the 1 1/4-inch-wide nailing area and the Fastac double sealant lines for a long-lasting seal. atlasroofing.com

3. Dumbwaiter, Smart Solution

Aging-in-place homeowners are on your client list? Consider a Butler Mobility dumbwaiter to make it easier to move laundry, groceries, and other items floor-to-floor. This unit can be customized to any size requirements, with load capacities from 100 to 450 pounds. Installations can accommodate up to seven stories. Two customizable electric models are available, starting at 12 to 15 inches by 12 inches for $3,355. Custom dumbwaiters come with a complete set of drawings and a step-by-step installation manual. butlermobility.com

4. Steel Yourself

Franke's Kitchen Systems Steel Series kitchen faucets combine 100% stainless steel construction with contemporary design and flow rates as low as 1.75 gallons per minute. The collection includes bar, prep, and kitchen faucets—all three with pull-down heads, 21-inch hoses, and both full- and needle-spray patterns. Two additional specialty faucets round out the collection: a 9-inch kitchen faucet that accommodates lower cabinet clearances, and a pot-filler with 180-degree rotation. Prices range from $400 to $600. franke.com

5. Iron Made Easy

LJ Smith's IronPro system makes it easy to swap out wood balusters for iron designs in existing stairways, and to incorporate iron designs into new construction. Two kits, both in satin black, are available for open-tread or knee-wall stairs up to a 45-degree angle of ascent. The hardware features ball adapters that allow each baluster to swing into place for installation without removal of the handrail. The hardware covers any necessary cuts and the set screws. Each kit for one ½-inch iron baluster costs about $6. ljsmith.com

6. Handy Work

StoneBreaker's MasterSmith gloves are part of the maker's Trades line. Incorporating "Fit to Work" construction, the gloves are designed to improve dexterity and hold their shape, and they reportedly don't require a break-in period. The shell comprises 22 separate pieces so the leather conforms to the hand without bunching in the palm area, and double-stitched seams protect against rips and tears. Altogether, the construction yields gloves that the manufacturer claims will hold up better to day-to-day wear. Price online: about $33. stone-breaker.com

7. Whatever the Weather

The Simpson Door Company offers its WaterBarrier technology on almost all of its door designs now, including those with raised or flat panels, ovolo or Shaker profiles, and divided lites. WaterBarrier combines a moisture-resistant medium-density overlay with a thermoset acrylic latex primer topcoat and PVC glazing beads on the door's exterior. The result is a smooth and durable exterior that resists moisture absorption and is ready to paint. The exterior treatment adds $100 to $250 to the price of the door, depending on the complexity of the installation. simpsondoor.com

8. Revealing Functionality

The new Reveal collection of storage accessories from Organized Living brings more functionality to the brand's freedomRail system. Components include slide-out hampers, shoe racks, baskets, and pant racks, all of which can be used to maximize space in closets, pantries, laundry rooms, and elsewhere. The accessories snap right onto freedomRail uprights, and reportedly contain as much as 30% more steel than elements of other organization systems. List prices range from $65 to $100. organizedliving.com

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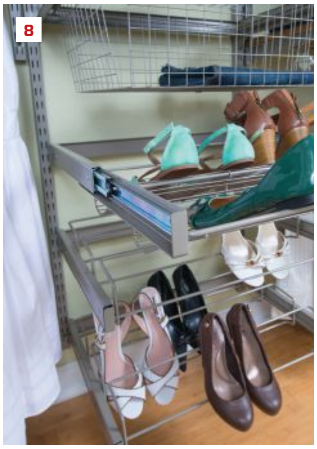

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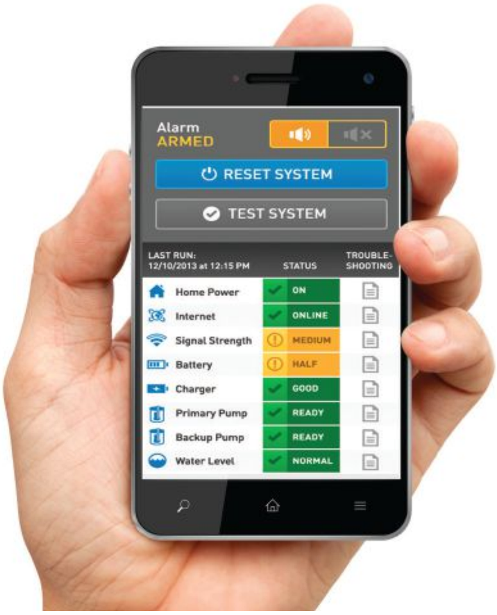

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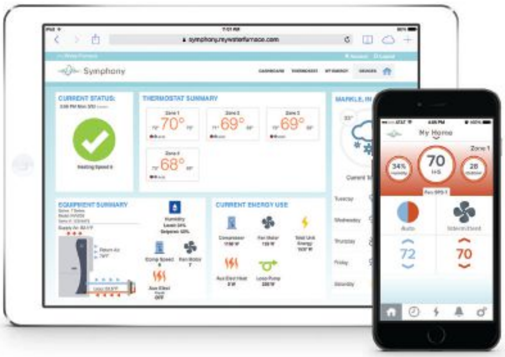

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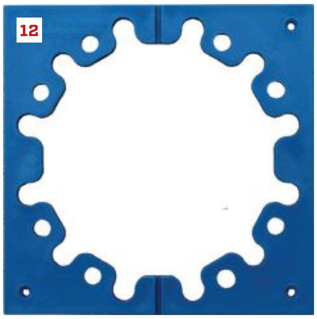

9. Leak Alert

For a $20 annual subscription, Pentair's cloud-based Virtual Water Assistant continuously monitors its battery-backup sump pump and sends text or email alerts to mobile or desktop devices. Alerts are sent when problems are detected, when the backup pump is activated during an emergency, when home power is lost, or when battery charge is low. The alert provides a status report and offers troubleshooting options. Battery backup technology also allows users to remotely run a diagnostics test cycle to confirm the system is working correctly. virtualwaterassistant.com

10. Comfort and Control

Designed for WaterFurnace's 3-, 5-, and 7-Series geothermal heat pumps, Symphony is a cloud-based app that gives remote access to system settings, status, and history; energy usage data; zone temperatures; and even local weather. A web-enabled thermostat allows homeowners to change temperatures, set schedules, and monitor modes. The app can also provide equipment alerts and service reminders to service dealers via email and text message. waterfurnace.com

11. Groovier Grout

Laticrete's Plasma grout is crack- and stain-resistant and doesn't require sealing, thanks to its resistance to mold and mildew. Its non-yellowing, UV-stable formula also yields a uniform color with no blotches, and grout lines that return to their original color after cleaning. Suited for most 1/16- to 1/2-inch grouting applications for ceramic, glass, and stone, in interior and exterior applications, it's available in 1-gallon pails in 20 popular Laticrete grout colors, as well as in a translucent formulation that allows light to pass through the grout. Check with suppliers for pricing. laticrete.com

12. Square of Support

The Tile Buddy works for both new toilet installations and retrofits. The 1/4-inch-thick polypropylene shims slip over the toilet waste pipe, providing support for the flange bolts. Multiple shims can be stacked, allowing the flange to sit on top at a height even with the floor. The square design eliminates the need to cut or nip around a rounded flange, and accommodates surrounding backerboard, tile, or other flooring materials. Scored lines allow installers to snap the shim in half and slide each half under an existing flange to bring it level with new flooring. Cost: $7.59 each. tilebuddy.com

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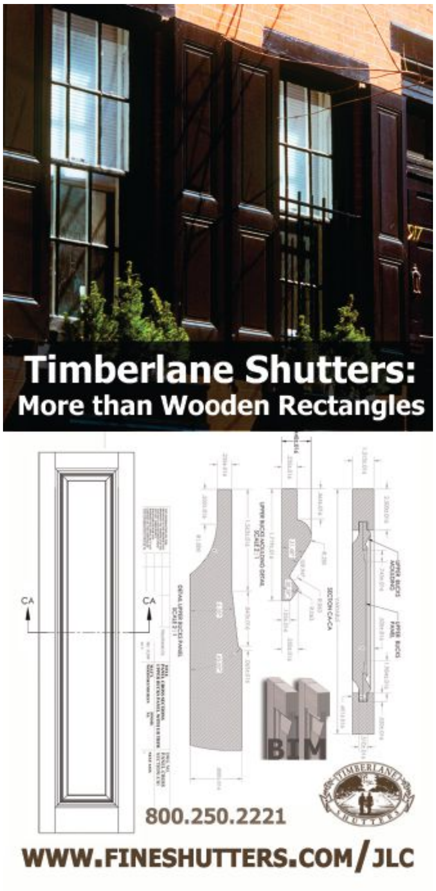

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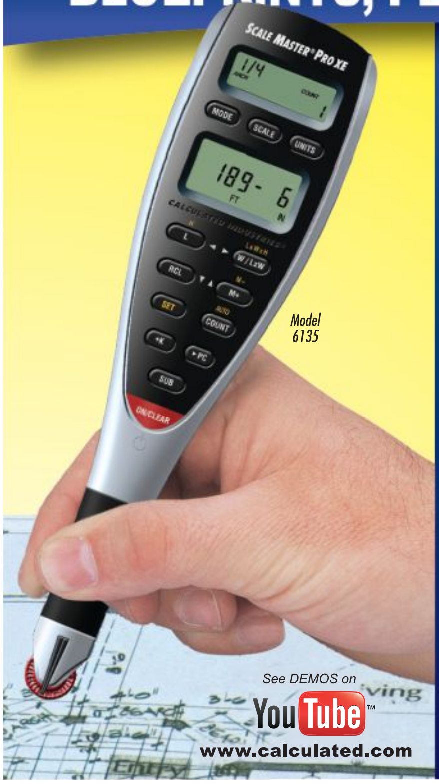

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Toolbox

EDITED BY BRUCE GREENLAW

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Brushless 18-Volt Angle Grinder

BY PAUL JOHNSON

A couple of years ago, I bought a Makita 18-volt model XAG01 4 ½-inch angle grinder as a bare tool to add to my Makita 18V LXT cordless platform. The tool has been on the market since 2006, and I thought it might be an ideal companion to my corded model, which is a Metabo W8-115.

Given its limited power and runtime, I've used the cordless tool mainly for cutting metal closet rod, the occasional rebar, and the like, reserving more demanding jobs for the Metabo.

When *JLC* asked if I would like to try Makita's new brushless 18-volt, 4 ½-inch model XAG03, I was eager to see if it could truly replace corded grinders on the jobsite, as Makita claims. Makita sent me the bare tool (XAG03Z) along with two of its new 4-amp-hour batteries and a charger, but a full kit (XAG03M) with a plastic case is also available.

FEATURES AND PERFORMANCE

The new model is almost 2 inches longer than its predecessor, but has a narrower body that I found to be more comfortable to hold for long periods of time. Given the old model's shorter length, however, it does fit into tighter spaces and feels a little better balanced, at least in my hands.

Internally, the new grinder really shines. In addition to an efficient brushless motor that improves battery runtime, the soft-start tool uses Makita's "Automatic Speed Change" technology. This adjusts the speed and torque on the fly for optimal performance. Also, Makita's "Star Protection Computer Controls" monitor the tool and the batteries help prevent overloading, overdischarging, and overheating.

To compare the cordless angle grinders side by side, I tested their runtime and speed under constant heavy load by making multiple crosscuts through scraps of ⅜-inch by 1-inch flat-stock steel. Powered by the 3-amp-hour batteries that I normally use, the older model averaged eight cuts in roughly six minutes of continuous cutting before the battery drained. Using the same batteries, the new model made the same number of cuts in only three minutes and averaged a total of 16 cuts in six minutes of continuous cutting per charge, delivering steady, constant power no matter how hard I pushed it.

When I switched to the new 4-amp-hour batteries, the new grinder averaged 22 cuts in almost 7½ minutes of continuous cutting per charge. As a point of reference, I averaged the exact same number of cuts per minute with my corded grinder.

On the jobsite, I've used the new grinder with the 4-amp-hour batteries to cut plenty of rebar, smooth irregularities on sheet steel, ground down some humps in a concrete floor, and cut a few dozen ½-inch-thick porcelain tiles. I've only drained one or two batteries per month, so the runtime is certainly adequate for these routine intermittent tasks.

I do have a couple of gripes about the tool. I usually need to shift my grip or use both hands to lock on the slide switch for continuous operation, which is a hassle. And although I'm glad that the "Computer Controls" help prevent damage to the tool and the batteries, they can repeatedly shut down the tool when I push it really hard, which nullifies some of the convenience of going cordless.

As for power, this angle grinder is a brute. For those using a grinder for long periods at a time under serious load, though, it still won't replace a corded model. But for remodeling contractors like me, it's a dream come true. A paddle-switch version will soon be available.

XAG03 Specs

Weight with grinding wheel and battery: 5.5 pounds
RPM: 8,500
Price: $160 for XAG03Z bare tool, $390 for XAG03M kit
Warranty: 3 years tool, 1 year battery

Paul Johnson is a remodeling contractor in Portland, Ore.

SENCO
21 GA.
SLIGHT-HEAD PINS
CAPACITY: 200
FinishPro 21LXP

Senco 21-Gauge Pinner

BY GARY STRIEGLER

When we started using 23-gauge pinners about 15 years ago, they replaced our 18-gauge brad nailers for many delicate wood-to-wood applications, such as attaching trim inside face frames, installing base shoe, and tacking small, freshly glued miters. The headless pins almost never split even the smallest pieces, and my painters love them because the tiny entry holes are easy to fill. We still use brad nailers and 15-gauge finish nailers, however, for securing baseboard, crown, and casings because the fasteners have significantly more holding power.

JLC asked if I'd like to try the new Senco FinishPro 21LXP 21-gauge pinner. It fires slight-head pins from ⅝ inch to 2 inches long and has several deluxe features, including a lock-out mechanism to prevent dry-firing and a reversible belt hook. I had never used a 21-gauge pinner, and wanted to see if it would be a step up from our other pinners and nailers for some applications.

PERFORMANCE

I first used the tool on a trim job for fastening small returns, pinning outside corners, and shooting through splices. After that, I used it to fasten moldings to the frames and panels of a mantel. The pinner worked great for these jobs, but didn't offer any advantages over my 23-gauge pinners, and it left slightly larger holes to deal with.

Next, I used the tool to case some doors with finger-jointed pine trim and an arched jamb with MDF trim. Normally I would use 18-gauge brads to fasten these casings to the jambs. The pins worked fine and left smaller holes to fill, but I had to use more fasteners to pull the casings tight against the jambs.

Pushing the tool to the limit, I drove 2-inch-long pins with it to assemble a built-up pine door casing. About 25% of the pins curled out of the wood. Curious, I used my 23-gauge pinner to shoot a bunch of 2-inch pins as close as possible to the 21-gauge Senco pins to see if they did the same thing. Surprisingly, none of the 23-gauge pins curled out. When I used the long 21-gauge pins to fasten thick casings to a door jamb, though, they worked perfectly.

A lot of our jobs have an exceptionally high level of finish, and filling the fastener holes is a critical step. To see if the slightly larger entry holes left by the 21-gauge pins would be harder to fill than 23-gauge holes, I shot several 21- and 23-gauge pins into a piece of trim and had our painter fill the holes and paint the trim. When he was done, I had to look really hard to spot any of the pin holes of either size. On stain-grade work, though, I would probably see the difference. Sometimes we don't fill 23-gauge holes in stained base shoe, but I couldn't do that with the slight-head 21-gauge pins. Some contractors never fill 23-gauge holes. I'm guessing that you couldn't get away with that when using these 21-gauge pins.

THE BOTTOM LINE

Overall, I think the Senco FinishPro 21LXP is a high-quality tool. I didn't have a single jam during my field tests, and the two-trigger safety worked flawlessly. I do wonder why Senco's 2-inch-long pins curled out of the woodwork during one field test while my smaller-diameter 2-inch, 23-gauge pins didn't, but that was the only time I encountered that problem. This tool is a useful addition to the ones we already use, but will not become my number one option.

FinishPro 21LXP Specs

Weight: 2.7 pounds
Pin length: 5/8 inch to 2 inches
Pin capacity: 200
Price: $250
Warranty: 5 years

Gary Striegler is a trim carpenter in Fayetteville, Ark.

Photo, top right: Charlie Carte

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BOSCH
DH1020VC

Versatile Inline Demo Hammer

BY JOSH DUNLAP

We've been great fans of inline electric demolition hammers in the 25-pound weight class since we bought two model D25900K DeWalts in 2003. The well-balanced tools are tall enough to use upright, yet light enough to hold diagonally for floor scraping or horizontally for vertical surface work. Skip forward to 2014, though, and we couldn't buy replacement parts to keep our DeWalts alive. After researching the field, we decided to replace them with Bosch's SDS-Max model DH1020VC, which hit the market in 2013. After using it for almost nine months, we have no regrets.

QUICK TOUR

The Bosch DH1020VC delivers soft starts and a constant speed under varying loads, has a variable-speed dial to adjust the speed and impact force for maximum control, and has a "Service Minder" light indicating that the carbon brushes must be replaced within eight hours or the tool will automatically shut down. Bits can rotate and lock into 12 different positions, and the side handle adjusts for an optimal grip.

Similar to other demo hammers, this one uses a piston to launch a free-floating striker through a hammer tube, which in turn whacks an impact bolt against the bit. An air space between the piston and the striker compresses and drives the striker forward as the piston advances, then sucks it back as the piston withdraws. The air space also acts as a shock absorber. According to Bosch, however, the DH1020VC has a longer hammer tube, air space, and impact bolt than its predecessor to deliver more power to the bit while more effectively dampening vibration. A decoupled rear handle further reduces vibration.

ON THE JOB

When we first unboxed the Bosch, we saw that the case is smaller than our DeWalt ones, with less room for accessories. That's a good thing, because we were no longer tempted to lug around an extra 20 pounds of steel along with the tool.

The first time we used the Bosch, it demolished all of our doubts about buying it. It broke up exposed-aggregate concrete with a high quartz content as if it were asphalt. We often install new columns in existing basements, and we've been using the Bosch to break up patches of the old concrete slabs and to excavate underneath to accommodate new footings. The tool has excelled at both tasks.

In fact, we often use a demo hammer equipped with a clay spade to break up compacted clay-laden soil for foundation pads and the like. Our old DeWalts could handle this job, but the Bosch cuts through the hard ground like a hot knife through butter. Granted, the Bosch is at least one generation above our DeWalts, but the difference between the tools is astonishing. We also used the Bosch horizontally for deconstructing a CMU wall and for opening up an old stone foundation. Superb.

As for vibration control, our hands typically begin to ache after using the Bosch continuously for about an hour. With our old DeWalts, that took only about 10 minutes.

THE BOTTOM LINE

If we had to demolish a whole basement slab, we would rent a heavyweight breaker like the electric 63-pound Bosch Brute or a 90-pound pneumatic. But the muscular 25-pound Bosch DH1020VC can handle most of our demolition tasks, and it's light enough to use for horizontal or vertical work. As for comfort and power, it's light-years ahead of our 12-year-old, 22-pound DeWalt models that it has replaced.

DH1020VC Specs

Weight: 25.4 pounds
Length: 27.5 inches
Impact energy: 17 foot-pounds
Blows per minute: 900 to 1,700
Price: $900
Included with tool: tube of grease, side handle, plastic case

Josh Dunlap is a production manager of Aleto Construction Group, a residential design/build remodeling contractor in St. Louis.

The tool's inline design and 25-pound weight are ideal for a variety of vertical and horizontal applications.

Photo, bottom right: Josh Dunlap

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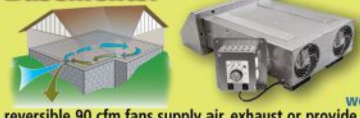

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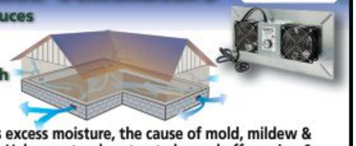

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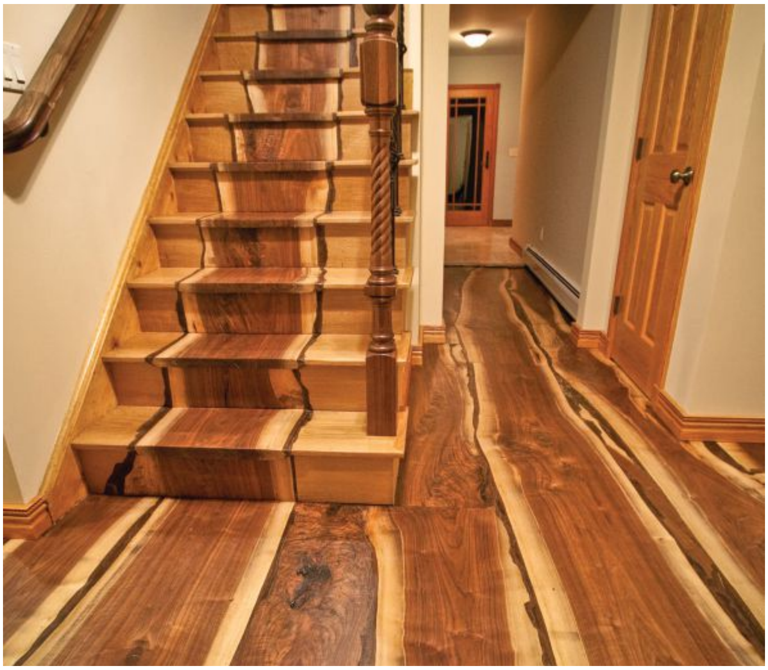
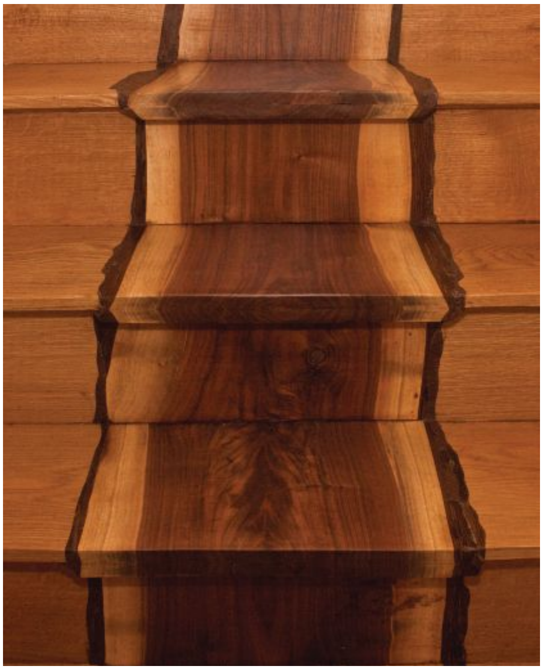
BY JEFFERSON KOLLE





Photos: Gary Horvath

Lively Live-Edge Floor

Gary Horvath began installing floors in the 1980s. About five years ago, he and his wife, Lisa, started Real Antique Wood (realantiquewood.com) in an industrial property in Irvington, N.J., once owned by a flooring mill he used to purchase from. Real Antique Wood sells vintage lumber and building parts from structures he's taken down as far away as Ohio.

When Hurricane Irene felled a massive black walnut tree in 2011, Horvath milled it into planks and stickered them for air drying. For several years, the lumber lay stacked behind the couch in the Horvaths' living room. "We knew the wood was knock-out beautiful, but we didn't know what to do with it," Horvath says, "until a friend of ours saw it and wanted it for the floor and stairs in his house."

For the flooring installation, Horvath and crew glued the live-edge boards to the subfloor with full-coverage Sikabond T55 adhesive (usa.sika.com). Adjacent boards were scribed to fit and the occasional gaps were filled with ground walnut bark, wood-flour cement (glitsa.com), and pulverized coffee grounds.

The staircase was more complex, mainly because the customer wanted the appearance of a single board running up to the second floor. "Like a carpet runner," Horvath says. To make the nosing for the treads and maintain the look of continuous grain, the boards were run long, then cut to the correct overhang dimension. The cutoff was "folded under," then glued and clamped to the tread above. To fill in on each side of the walnut runner, Horvath and crew scribed and fastened pieces of white oak. After lots of filling, edging, and orbital sanding, the staircase and flooring were finished with Bona Traffic water-based polyurethane (bona.com).

Horvath figures the whole job took about 300 man-hours. "But you can add another 100," he says, "if you figure in the time to mill the tree, stack it in our warehouse, then take it to my house, then to the final jobsite where it acclimatized for two weeks before installation. Since photos of the floor were posted on Horvath's company's Facebook page, it's gotten more than 1.95 million hits.

Jefferson Kolle is a senior editor at JLC.

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