

# Clipped-Head vs. Full-Head Nails

**Q.** *What are the pros and cons of clipped-head versus full-head nails? Are there any framing nailers that drive both kinds?*

**A.** *Eric Borden, owner of ESB Contracting in Forked River, N.J., responds:* Clipped-head nails are collated at a steeper angle than round-head nails. The steeper collation angle provides two main advantages: There are more nails in a stick, and the working clearance (the angle between the gun and the work) is greatly improved.

The model building codes do not require the use of round-head nails. The codes specify nails by length and by shank diameter, not by the type of nail head. Lateral load capacity depends on a nail shaft's shear strength, and withdrawal resistance depends on shank type. An increase in withdrawal resistance can be achieved by using a screw-shank or ring-shank nail.

The industry reference for evaluating pneumatic nails is the *National Evaluation Report (NER-272)*, which is posted at the Senco Web site ([www.senco.com/pdf/facts/ner272.pdf](http://www.senco.com/pdf/facts/ner272.pdf)). This report lists the nailing schedules for pneumatic fasteners for all of the model building codes (BOCA, CABO, SBCCI, and ICBO).

A panel's shear strength depends more on the depth to which fasteners are driven than on the shape of the nail head. Nail heads should be set flush with the surface of the sheathing, not countersunk. When fasteners are driven through the outer ply of plywood or OSB, shear strength decreases significantly. But if the nails are properly driven, there is no difference in performance between the two types of nail heads, because the pull-through values of both nails exceed the performance requirements for the assembly. Of course, regardless of the type used, proper spacing of the nails is essential.

Although there is no evidence that round-head nails provide greater shear strength or withdrawal resistance than clipped-head nails, some building inspectors ignore the facts and require round-head nails on exterior sheathing. These inspectors reason that the larger head area of round-head nails reduces the likelihood of overdrive.

Currently, all manufacturers make separate nailers for the two types of nail heads, and the nails are not interchangeable. Nails with a third type of head, the offset round head, are available from Paslode, Senco, and Hitachi. These nails can be used in clipped-head guns. For more information, see "Choosing Collated Nails," 6/00.

## Leaving Rigid Foam Exposed

**Q.** *I plan to install rigid foam insulation in a crawlspace. As far as I know, most types of rigid foam insulation can't be left exposed but need to be covered with a layer of drywall for fire resistance. Is there a type of rigid foam insulation panel available that can be left exposed?*

**A.** *Corresponding editor Paul Fisetta responds:* Not that I know of. However, most building codes allow the installation of unprotected rigid foam in a crawlspace that has no open connection to a basement, as long as the foam has passed alternative testing procedures. Dow Styrofoam and Owens Corning Foamular are two products that pass the burn test and can be left unprotected in an isolated crawlspace.

Building codes restrict the use of unprotected foam in habitable or accessible spaces. Different code jurisdictions may have particular code sections that deal with this issue. Some codes say that if your crawlspace is connected to a basement, you need to cover the foam with an ignition barrier like 1/4-inch plywood or particleboard. Where

inspectors draw the line often depends on whether there is a mechanical system in the crawlspace. The thinking here is that a fire could be set off by either the equipment or the activity of people in the space. When in doubt, it always pays to talk to your inspector during the design stage.

## Freezing Downspout

**Q.** *A customer has a building with a nearly flat roof surrounded by a parapet. The roof drains to a single scupper, which conducts the water to a downspout. Ice builds up regularly in the downspout, and the water backs up and spills down the wall. What's the best way to keep the downspout free of ice?*

**A.** *Architect and roofing consultant Harrison McCampbell responds:* No roof should depend on a single scupper or drain. In fact, this may be a code violation. Solving this problem probably requires installing an additional scupper or drain, and may involve adjusting the slope of the roof. In addition, the size of the existing drain opening and downspout may need to be increased.

If a roof depends on a single drain, and that drain gets clogged, the result can be catastrophic. Remember, water weighs over 5 pounds per square foot per inch of depth. Even 4 inches of standing water exceeds the live load capacity of most roofs.

## Thin Radiant Slab

**Q.** *I want to install a thin radiant slab over a wood subfloor in a remodel. The flooring will be ceramic tile. What is the thinnest slab I can get away with?*

**A.** *Heating contractor Bill Clinton responds:* If you want a slab as thin as possible and expect to tile over it, I think regular concrete is out of the

question. You're bound to get cracking, which will telegraph through the tile. My choice would be a gypsum-cement product — either Gyp-Crete from Maxxon Industries (800/356-7887; www.maxxon.com) or Gyp-Span from Hacker Industries (800/642-3455; www.hackerindustries.com). Gypsum cement, unlike concrete, doesn't shrink as it cures and usually won't crack. When it comes to preventing cracks, the most important factor is the rigidity of the floor framing and subfloor.

Gypsum cement can, with care, be poured as thin as 1<sup>1</sup>/<sub>4</sub> inches. You can thin-set the tile to a gypsum-cement slab. But before tiling, you need to allow the gypsum underlayment to dry completely, and then seal it. In bathrooms, you will need a waterproof membrane, like NobleSeal (800/678-6625; www.noblecompany.com).

### Indoor Design Temperature

**Q.** *Some hvac contractors in this area of Virginia size cooling systems using an indoor design temperature of 78°F. I'm under the impression that a system should be designed for an indoor temperature of 75°F. Is there a standard interior design temperature for cooling systems?*

**A.** *Martin Weiland, manager of technical services at ASHRAE, responds:* Both the ASHRAE residential load calculation method described in the 1997 *ASHRAE Fundamentals Handbook* and the *ACCA Manual J* are based on an indoor temperature of 75°F. I am not aware of a system-sizing method that uses a 78°F indoor design temperature.

### Metal Lath Ceiling Demo

**Q.** *I need to remove a metal lath and plaster ceiling in a finished basement. The existing partitions were installed after the ceiling, and I want to disturb the finished walls as little as possible. What tools and techniques should I use for this demolition job?*

**A.** *Ron Webber, owner of Prime Plastering in Irvine, Calif., responds:* In the center of the ceiling, where there is no particular need to be fussy, you can beat out the plaster fairly quickly.

When you get to the edges, use a large screwdriver or chisel to chip away the plaster more carefully, so as not to damage the adjacent surfaces. You want to leave a clean edge in the corners, if possible. Where necessary, use metal snips to cut the lath.

### Polyethylene Water Service Pipe

**Q.** *I would like to use black polyethylene water service pipe for plumbing in the crawlspace of a house that has a black poly service line. Are there any code limitations on using polyethylene pipe?*

**A.** *Master plumber Rex Cauldwell responds:* Polyethylene pipe is not approved for in-house cold or hot water lines. According to the *International Building Code*, once the polyethylene service pipe enters the building, you must terminate it within 5 feet. Whether you consider the crawlspace part of the building is up to you and the inspector.

The intent of the code is to prevent the poly pipe from being used for the in-house water lines. If you use polyethylene pipe to go directly to a water pressure tank without any take-offs to fixtures — or, for city water, to go straight to a main valve in the crawlspace — you are probably following the intent of the code, even if you have more than 5 feet of polyethylene pipe in the crawlspace. What you definitely do not want to do is tee off from the polyethylene pipe. No tees should be installed until after the polyethylene hits the main valve and transitions to the in-house piping (for example, to copper or PEX).

### Powered Attic Ventilation

**Q.** *I am trying to plan the best way to ventilate a hipped roof above an attic. Since the ridge is very short, ridge venting is not an option. I was planning to install powered exhaust ventilation. How should I size the fan?*

**A.** *Bill Rose, architect and building researcher at the University of Illinois in Urbana-Champaign, responds:* Although many building codes require attic ventilation, there are more important factors than ventilation when it comes to

designing an attic and roof system that works well. First, be sure the following points have been covered:

- seal any cracks where air can move into the attic or cathedral cavities from below, especially at mechanical chases and the access hatch;
- insulate well above the living space;
- keep mechanical equipment and ductwork out of unconditioned spaces;
- divert rainwater well away from the foundation in order to keep the foundation from contributing excessive humidity to the house; and
- flash the roof correctly.

And ventilation? For hip-roof homes, I've had occasion to recommend soffit plus mushroom vents, soffit only, and no vents at all, depending mostly on the predisposition of the client. Clients concerned about strictness of code enforcement and shingle warranties should have ventilation by the book, and should have simple designs to match the simplicity of the venting requirement. Clients with complex conditions — dormers, cathedral sections, flat-roof sections, shed sections — as well as clients in fire-prone regions, should investigate construction without vents. I suspect that soffit-only venting may give some relief of occasional water without the strong suction of high vents or the possibility of rain or snow entry, and I'd encourage more research and experimentation with this approach.

I've never had occasion to recommend powered venting. It's noisy and expensive to operate, and I haven't seen evidence of a payoff. If you still want to know how to size an attic exhaust fan, my answer is: as small as possible.

### Drying Out a Damp Crawlspace

**Q.** *To dry out damp crawlspaces in Virginia, I have had success closing the crawlspace vents and installing a dehumidifier. Are there any other measures I could be taking? What is an appropriate relative humidity level for a crawlspace?*

**A.** *Bruce Davis, senior building science specialist at Advanced Energy in Raleigh, N.C., responds:* Before beginning work

to dry out a crawlspace, there should be a discussion and agreement (ideally, in writing and signed) between the contractor and the homeowner about the potential for house shrinkage as a result of solving the moisture problem. The next step is to confirm that there is not a liquid moisture problem. Is there a live spring, a plumbing leak, a surface drainage problem, or a hydrostatic source for liquid moisture?

Once those potential moisture sources are removed, you will probably want to seal the crawlspace vents. In the Southeast, outside summer air generally holds more moisture in vapor form than the air in the crawlspace does. When this outside air enters a ventilated crawlspace, it can contact a surface cool enough for condensation to form. Any combustion appliances in a sealed crawlspace should be sealed-combustion units, unless ducted exterior combustion air is provided.

Closing the vents and installing a dehumidifier can control the situation if the moisture flow into the crawlspace is less than the capacity of the dehumidifier to remove it. Dehumidifiers installed in a sealed crawlspace do not use a noticeable amount of energy in the summer and generally do not run during the winter. I advise setting a dehumidifier in the 45% to 50% humidity range. In some sealed crawlspace retrofit jobs, dehumidifiers are used only temporarily, until the excess moisture has been removed.

In addition to sealing the vents, you should consider the following steps:

- installing a ground vapor retarder (6-mil polyethylene), sealed at seams and piers with fiberglass scrim and duct-sealing mastic, and held in place with spikes;
- installing a polyethylene vapor retarder on the masonry walls, sealed under the ground poly, leaving a 3-inch termite view strip at the top of the wall; and
- installing weatherstripping to make the access door reasonably airtight.

## Ventilating a Rain Screen

**Q.** *I plan to install clapboard siding using the rain screen method. The siding will be fastened to 3/4-inch vertical battens, nailed over each stud. At the top, I plan to ventilate the rain screen into the soffit area. What is the best detail to ventilate the bottom of the rain screen, while still excluding insects?*

**A.** *Luis De Miguel, senior researcher at the Canada Mortgage and Housing Corporation, responds:* Venting the top of rain screen cavities is not recommended. Research has shown that when wind pressurizes one side of a house and depressurizes the opposite side, vents at the top of a rain screen or curtain wall can allow moisture to be sucked into the cavity. Vents at the top of a rain screen do not contribute appreciably to helping the cavities dry out. If the cavities are closed at the top, quicker pressure equalization is possible, and less water will enter the cavity.

The bottom of the rain screen cavities can be screened with insect screen or thin aluminum soffit vent, bent into a U-shape. The screen should be stapled to the sheathing prior to installing the vertical battens, and then later folded over the battens and stapled again.

For more information on rain screen details, see the Canada Mortgage and Housing Corporation's *Best Practice Guide: Wood Frame Envelopes*, available for \$89 Canadian or about \$60 U.S. (613/748-2003; www.cmhc-schl.gc.ca).

## Blotchy Shingles

**Q.** *The shady part of a customer's roof is stained with round, pea-green growths on the asphalt shingles. The round spots are of various sizes, and they are not fuzzy like moss. A bleach solution does not remove these growths. What are they, and how can I remove them?*

**A.** *Jeff Jacobs, a specialist working in product development at 3M, responds:* From the description, it is impossible to identify the discoloration with certainty. The only way to know is to look at a sample under a microscope. If the spots vary in size from a dime to a

dollar and the edges are irregular and flat, it could be a lichen. Otherwise, it could be green algae growing in clumps — although algae is usually removable with a bleach solution.

If the discolored areas can't be cleaned easily, it's probably best to leave them alone. Since it sounds like this discoloration is occurring only in the shaded area, it may help to trim back any overhanging tree limbs, allowing more light to reach the roof. More light could help retard the growth of any organisms partial to damp, shady areas. Any more aggressive roof-cleaning measures are likely to damage the asphalt shingles and result in more harm than good. Lichen and algae are primarily an aesthetic problem, and if left alone will not prematurely degrade the shingles.

## Circuit Breaker Problems

**Q.** *In a residential remodel, we replaced the electrical service panel. Within five days, two of the 15-amp breakers tripped and could not be reset. The breakers were determined to be "defective" and had to be replaced. What could be causing this problem?*

**A.** *Master electrician Sean Kenney responds:* It is certainly possible that the breakers were defective. I have noticed that quality control for electrical equipment has gone down considerably in the past 20 years or so. I would be especially suspicious if the breakers were purchased at a home center or hardware store.

If the panel was replaced to try to solve a problem with tripping circuit breakers or fuses, a contributing factor may be problems with the house wiring. If the house had an overloaded circuit, and the homeowner deliberately installed oversized fuses to keep them from burning out, then correctly sized breakers in a new panel will be easier to trip than the old oversized fuses.

## Carpet Over Ceramic Tile

**Q.** *We are converting a restaurant kitchen into an office and need to install carpet over existing 6x6-inch ceramic tiles with 1/4-inch grout lines. The floor dips 3/4 inch*

near the floor drain. What product can we use to level this floor in preparation for a pad and carpet?

**A.** Patricia Davidson, TechNet professional at the Floor Covering Installation Contractors Association, responds: Before proceeding, verify that the moisture level of the substrate is not excessive. Remove any loose tiles or grout, and cap the drain. Clean the tiles to remove any grease, wax, or coatings that might interfere with adhesion. Then install a Portland-cement-based self-leveling underlayment, following the manufacturer's recommendations. Self-leveling underlayments are available from Ardex (724/857-6400; [www.ardex.com](http://www.ardex.com)) and Mapei (888/300-4422; [www.mapei.com](http://www.mapei.com)).

Once the floor is leveled, cured, and sealed, the carpet can be installed. If you want to include a pad, you have two options: either use "double-glue cushion" — a type of pad that can be glued to both the substrate and the carpet — or install carpet with an attached cushion backing. Do not nail tack-strip into the hardened leveling compound unless you are sure it is at least  $\frac{3}{4}$  inch thick, since nails can shatter the compound where it is thin.

### Deteriorated Duct Board

**Q.** We are renovating a 1980 home. The hvac sub says that since older fiberglass duct board disintegrates from the inside out, all of the ducts should be replaced. Could this be true?

**A.** Jeri Donadee, vice president of H.B. McClure, a heating and cooling contractor in Harrisburg, Pa., responds: When duct board in a crawlspace or attic is not sealed with UL 181 duct tape, condensed moisture can accumulate near unsealed duct joints, leading to duct deterioration. If such deterioration is severe, replacement of the ducts may be necessary. But it is unusual for properly installed duct board to "wear out."

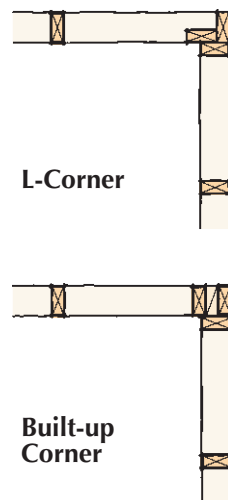
Your subcontractor's diagnosis can be easily confirmed by a visual inspection. Simply cut open a section of duct and look at the interior surface to see if there is any flaking. If the duct is sound,

be sure to reseal the duct using appropriate UL 181 mastic or tape.

### Framing With L-Corners

**Q.** The local framing inspector told us that our L-corners are not acceptable. He says that an L-corner is not as strong as a corner framed with two studs separated by blocking. Is he right?

**A.** Corresponding editor Paul Fisetto responds: As long as you install nailed structural sheathing, an L-corner is certainly strong enough. Extra studs at the corner of a house are unnecessary



for supporting the building's vertical load and provide little significant benefit to improve a frame's racking resistance, which is provided by the nailed sheathing.

When it comes to supporting the vertical (compression) load from upper stories and the roof, the stud at the end of a wall carries about half the load of most other studs. A stud in the center of a wall carries 16 inches of load (8 inches on either side of the stud), while a stud at the end of a wall carries only 8 inches of load — from the stud to a point halfway to the next stud in the wall. Furthermore, most gable ends have studs that redistribute some of the roof loading at the end of the wall.

In most cases, the easiest way to resolve a dispute with an inspector is to agree with the inspector. But in this case it's worth trying to persuade the inspector, since there is an energy conservation benefit to framing with L-corners.

### Asphalt Shingles on Hot Decks

**Q.** Our insulation subcontractor advises us to install dense-pack cellulose in the rafter bays over a cathedral ceiling, without ventilation baffles, and the local building inspector approves. If we don't ventilate under the roof sheathing, what happens to our asphalt shingle warranty?

**A.** Contributing editor Ted Cushman responds: With few exceptions, installing shingles on an unventilated roof deck will void the warranty. The fact that your local building department okayed the installation probably won't help: As one warranty (from the Canadian firm EMCO, which makes Esgard shingles) states, "Where local building codes have specific [ventilation] requirements that differ from the *National Building Codes*, the more stringent requirement must be followed."

In fact, as you might guess from that quote, just having the roof ventilated may not be good enough. The shingle maker has to agree that the ventilation is up to its standards. If the warranty excludes installations with "improper ventilation," that language may be enough to deny a claim.

Unfortunately, shingle warranties provide little protection, whether or not your roof deck is ventilated. Almost no roof is put on perfectly; and if you've deviated from the manufacturer's instructions in any way, your claim can be denied. In the end, it comes down to trust: If manufacturers want to back the product up, they will, and if they don't, they won't. You've got to decide if you want to trust them. And even if a warranty is honored, the money you'll get won't begin to cover costs like tearoff, disposal, or labor.

The real question is, how will the shingles hold up on an unventilated roof deck? They might give out a little sooner than shingles on a ventilated roof, but probably not enough to notice. The most important factor in longevity isn't the level of ventilation; it's the quality of the shingle. The better brands of fiberglass shingles are the ones labeled as passing ASTM Standard D-3462. If you start with a good shingle, what you lose

in shingle life (if anything) you probably more than earn back in energy savings from the added insulation thickness.

At least one manufacturer, CertainTeed, will honor its warranty on an unventilated roof deck, although for a reduced term of ten years (prorated from year one, and with no wind speed rating). CertainTeed has funded a lot of research on the causes of shingle failure, including some long-term studies at university sites in three different climates. In these studies, shingles were applied on ventilated and unventilated cathedral roofs side by side. The research indicates that high temperatures do cut the lifespan of shingles, but only marginally; and it shows that roof ventilation doesn't have much of an effect on shingle temperature anyway (shingle color and roof orientation are more important).

However, ventilation affects not only shingle temperature but also the level of moisture in the roof assembly, as well as the melting and refreezing of snow on the roof. Since these factors can affect how a shingle ages, it may be reasonable for manufacturers to limit or exclude warranty coverage on unventilated roofs.

### Turning Cedar Shingles Gray

**Q.** *What's the best way to treat new white cedar shingles to give them a gray, weathered look?*

**A.** *Martin Obando, director of application specifications for the Cedar Shake and Shingle Bureau, responds: If your customer is unwilling to wait for the natural weathering process, new cedar shingles can be either stained or treated with bleaching oil.*

Using a gray semi-transparent stain is the fastest way to change the color of new shingles. It is important to choose a stain that includes a fungicide, since fungus can cause black stains on cedar shingles.

Bleaching oil, which is available from Cabot Stains (800/877-8246), requires the action of sunlight to change shingle color. Bleaching oil accelerates the natural weathering process and will turn new cedar shingles a uniform gray in 6 to 12 months.

### Staining New Boards to Look Old


**Q.** *We are building an addition on a 25-year-old house. The house has cathedral ceilings with exposed unfinished pine board roof sheathing, and the walls are paneled with unfinished pine boards. The pine boards have darkened with age, and the homeowners want the new pine boards in the addition to match the existing boards. What's the best way to achieve this?*

**A.** *Wood finishes expert Bill Feist responds: The color change in the old*

wood is caused by ultraviolet and visible light. Since the color change is just on the surface, it could be removed by sanding. Of course, sanding all of the existing roof sheathing and paneling to reveal the blond wood underneath would be difficult and tedious, so the best way to achieve a match is to stain the new wood.

That said, it is difficult to stain new pine to exactly match the color of wood that has been slowly changing for 25 years. You should warn the homeowners that an exact match will not be possible. One trick is to thin out some of the stain used on the new wood to also color the old wood — but only slightly.

Over time, the color of the new stained wood will most likely change, but the stain pigments, by blocking some of the light reaching the wood, should slow down that process. Hopefully, with time, the old and the new wood should stay nearly alike.

**GOT A QUESTION?** Send it to On the House, JLC,  186 Allen Brook Ln., Williston, VT 05495; or e-mail to [jlc@bginet.com](mailto:jlc@bginet.com).