Air Nail Holding Power

Q. *Do the coatings on power-driven "gun nails" hold as well in the wood as a common nail driven by hand?*

A. *Scott Schiff responds:* The coatings on power-driven nails are plastic polymers known as "thermoplastics." Their main purpose is lubrication: When the nail is driven, they melt from the heat of friction, making the nail slippery so it's easier to drive. This allows the nail-gun to be built smaller and lighter.

When the coating cools, the plastic rehardens and creates a bond between the nail and the wood, so that the nail is harder to pull out.

We've confirmed the added withdrawal resistance of coated gun-driven nails in laboratory testing here at Clemson, using machines to measure the pull-out resistance of individual nails. We've also tested assemblies by nailing a whole panel to framing and applying a suction pressure to the panel. In both kinds of tests, coated gun nails hold better than hand-driven nails of the same size.

If it seems easier to carpenters in the field to pull out a gun-driven nail than a hand nail, maybe that's because of a difference in the way the different types of nails let go. With a coated gun nail, once the bond between the coating and the wood breaks, it's all over — after that, you just have a loose nail in a slippery hole. When a hand-driven common nail is pulled partway out, the part that is still in the wood is holding as tightly as it was before, so you need to keep pulling hard to get it completely out. But in terms of the strength of a building, I think the fact that it takes more force initially to get the coated gun nail loose than it does to pull out the hand-driven nail is more important than the suddenness of the way the coated nail finally gives up.

Keep in mind here, we're comparing nails of the same size. These days, not all the "eight-penny nails" on the market are the same length and thickness. You can buy gun-driven nails that are as long and as thick as the hand-driven common nails they're meant to replace (in areas covered by seismic codes, you may have to). But you could also just go by the withdrawal strength of the nails, rather than by their size. Most manufacturers have received *National Evaluation Reports* (NERs) from the Council of American Building Officials (CABO) that specify how their gun-driven nails or staples can be used in place of the common nails the code is based on. If you need the data that's in the NER, ask the manufacturer for a copy, or contact the International Staple, Nail and Tool Association (ISANTA) at 312/644-0828.

If you want extra holding power, go with a ring-shank or screw-shank nail. Tests show that modified-shank nails hold much better than smooth-shank nails — and if they're coated too, that's just icing on the cake.

In practice, major failures of nailed assemblies, such as the building collapses that happened during Hurricane Andrew, can usually be traced to the way the fasteners were used, not the type of fastener. Make sure you hit the framing (sometimes it's hard to tell). Put the nails close enough together — it's better to use too many than too few. And set the pressure on your gun to drive the nails flush with the surface, not below it. Overdriving a nail or staple makes for a weaker connection.

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Copper vs. Plastic

Q. *I'm currently remodeling a vacation home where the copper plumbing has developed pinhole leaks because of an acid water condition. To save money, my client wants to replace the copper pipes with CPVC plastic, but my plumber says that's a bad idea. Who's right?*

A. *Al King responds:* I agree with your plumber. Plastic pipe resists acidic water better than copper does, but it's a "band-aid" solution — the root of your problem is the water, not the pipes. Even if all your pipes are plastic, the acidic water will cause problems with other parts in the system — riser tubes in the toilet, brass faucets, parts of the water heater, and so on. Also, acidic water affects the flavor of food and drinks made with it. So I advise installing an acid neutralizer (the most widely known is the Culligan system). That will cost about $1,200.

Acidic water aside, plastic pipe is still an option worth considering. But I would recommend cross-linked polyethylene tubing, not CPVC. The main reason to use plastic tubing in a remodeling job is to save labor, because it's flexible enough to snake around obstacles. It usually requires less demolition, less drilling, and fewer joints. But CPVC tubing is rigid, and will actually have a higher labor factor than copper.

If you do install flexible plastic tubing, go with a "home-run" system: Use a dedicated line for each fixture, running back to a central manifold panel (see "Home-Run Holds Promise," *JLC* 8/90).

A home-run system can use either cross-linked polyethylene or the less expensive polybutylene. On my own house, I'd trust the polybutylene, but for a customer, I'd recommend the polyethylene because it doesn't have the reputation problem polybutylene has. The failures that have happened with polybutylene were caused not by the tubing but by problems with the acetyl fittings used at the joints, and the newer brass fittings don't have the same troubles. All the same, a homeowner who might want to sell his house sometime is best advised to avoid polybutylene.

For that matter, if quality is your object, I'd stick with copper. It's the only product with a proven 50-year track record of success. If you solve the acidic-water problem at its root — which you should anyway — copper plumbing will give you a lifetime of satisfaction, and then some. ■

Al King operates a heating and plumbing contracting business in Perkasie, Pa.