Q&A

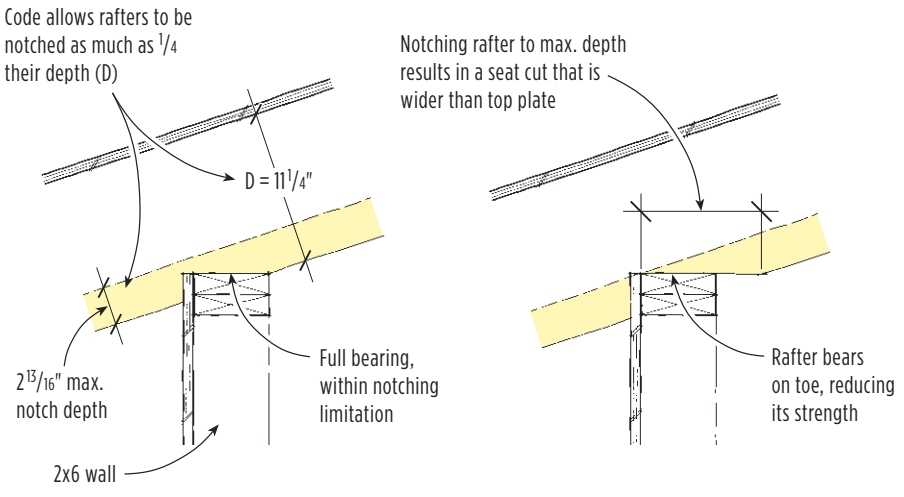
Q. Sizing the Birdsmouth

When laying out the seat and heel cuts on a rafter, how large should the notch be?

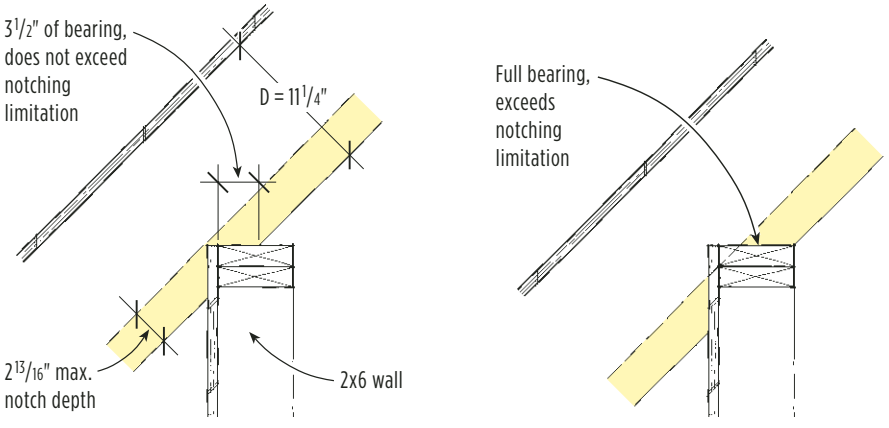
A. *Tim Uhler, a lead framer for Pioneer Builders in Port Orchard, Wash., responds:* According to the IRC, rafters and ceiling joists need to have at least 1½ inches of bearing when supported by wood or metal (R802.6, 2006 IRC). While this clearly establishes the horizontal seat cut's minimum length, its maximum length varies according to the size of the rafter and the pitch of the roof.

For example, the IRC allows the ends of rafters to be notched as much as one-fourth their depth (R802.7.1), but on a shallow-pitched roof this can result in a seat cut that's wider than the top plate. When that happens, roof loads are carried by the toe rather than the heel of the rafter, reducing the rafter's bearing capacity and increasing chances that the rafter will split (see illustration). Instead, the seat cut should be no wider than the width of the plate.

Shallow-Pitched Roof
(Example: 2x12 rafter at 4/12 pitch)



Steep-Pitched Roof
(Example: 2x12 rafter at 12/12 pitch)



But using the width of the top plate to determine the length of the seat cut can also get you in trouble; as the roof pitch increases, so does the likelihood of overnotching.

To illustrate, a 2x12 rafter that meets the IRC's D/4 notching limitation cannot have a notch deeper than 2 13/16 inches (11 1/4 divided by 4). This isn't a problem on a roof with a shallow 4/12 pitch, since the seat cut could be as long as 8 7/8 inches. But for a 2x12 rafter on a roof with a steeper 12/12 pitch, the seat cut can be no longer than 4 inches before the D/4 limitation is exceeded. If the rafter is cut for full bearing on a 2x6 wall, the resulting notch would be deeper than 2 13/16 inches.

Keep in mind that even if your rafter stock is sized larger than it needs to be for its span,

you still shouldn't overnotch. This is because larger knots are allowed in 2x10s and 2x12s than in 2x6s and 2x8s; overnotching a large rafter voids the grade stamp and may compromise the stock's structural integrity.

To simplify matters, I use the cutting capacity of my 10¼-inch Big Foot saw (702/565-9954, www.bigfootsaws.com) to help determine the size of the birdsmouth. I typically gang cut my rafters, and 90 percent of the time I set the saw to 3 inches to make the seat cut for both 2x10 and 2x12 rafters.

I've found that making a 2½- to 3½-inch seat cut (depending on the rafter stock and the slope of the roof) seems to work better than trying to match the seat cut to the width of the plate, because I don't have to worry about whether my birdsmouth cuts weaken the rafter.

When rafters are gang cut, the saw's cutting capacity helps determine birdsmouth dimensions; a 10¼-inch Big Foot saw is capable of making a 3-inch seat cut, which is suitable for a wide range of roof pitches and rafter sizes.

Q. Exposed Gas Line

A client wants to install an outdoor gas fireplace. The most logical route for the gas supply extends from a roof-mounted furnace 60 feet along an exterior parapet wall and then down. Are there any requirements for lightning protection in such an exposed installation?

A. *Mike Casey, a plumber licensed in Connecticut and California and co-author of* Code Check Plumbing, *responds:* While there may be local requirements for lightning protection, there are none in either the 2006 IRC or the 2006 Uniform Plumbing Code. As always, consult your local building department for specific questions regarding gas piping installation, which will need a plumbing permit and should be performed by a licensed plumbing contractor or gas-fitter.

In general, exterior gas piping should be galvanized steel and installed a minimum of 3½ inches above grade (if buried, the piping must be corrosion-protected). In addition, pipe sizing rules are very specific and depend on the input rating (in Btu/hour) of the appliance. That means there may be limitations on connecting to the existing furnace pipe, depending on the input rating of that appliance, the size of the pipe feeding it, and the input rating of the proposed gas fireplace.

Q. Is Fiberglass Insulation A Health Hazard?

As a home inspector, I'm exposed to fiberglass insulation almost every day, and although I wear a dust mask, I'm concerned that this may not provide enough protection. I also am concerned about the possible health hazards to the occupants of these homes, particularly when there's exposed fiberglass in basement areas used as shop space or as play areas for children. It seems to me that fibers could become airborne when someone walks on the floor above these rooms. What are the real risks?

A. *Jeffrey May, principal scientist at May Indoor Air Investigations in Cambridge, Mass., responds:* Because the exposed fibers in fiberglass batts are largely glued together, they are only aerosolized (broken up and suspended in the air) when there is a direct physical disturbance, such as during installation or while mechanical work is being performed in an insulated area. Even then, these fibers don't stay in the air long, and eventu-

ally they accumulate in the floor dust. Otherwise, the number of fiberglass fibers in the air is probably rather low, with most of them too large to be inhaled into the lungs.

Occasionally, there are a few respirable fibers (ones that are short and thin enough to be inhaled), but the theory is that — unlike highly stable asbestos fibers — they ultimately dissolve in the lung fluids. Fiberglass fibers are still considered to be "possible" carcinogens, but they have remained in this category for some time and have not advanced to actual carcinogen status. So I would say that the risk to both you and the home's occupants is quite low.

Actually, drop ceiling tiles mounted in a grid system suspended from the ceiling or fastened directly to the ceiling joists also contain glass fibers and glass particulates; they may pose a greater risk than insulation, which is usually covered by ceiling and wall finishes. When installed over carpeting, for example, the glass particles and fibers that collect in the fabric can be released by foot traffic, causing irritation in some cases when there is skin contact.

For home inspectors, a NIOSH-rated N95 particle mask should be fine for eliminating most inhalation exposure. Of course, fibers that accumulate on clothing could cause additional exposure even when away from the source, which is a good reason to wear coveralls in crawlspaces while doing inspections.

Q. Aluminum Roofing

How common is aluminum standing-seam roofing? It seems that this profile would be better suited for heat-related expansion and contraction than corrugated aluminum panels fastened through their face, but my local suppliers carry only steel standing seam.

A. *Todd Miller, president of Classic Metal Roofing Systems in Piqua, Ohio, responds:* Aluminum is a perfectly viable material for standing seam, though probably 85 percent of metal standing-seam roofing is produced from either galvanized steel (which has a protective metallic coating that is primarily zinc) or galvalume (which has a protective coating that is primarily aluminum). Aluminum and copper each make up about 5 percent of the market, with other types of metals — zinc, stainless, terne — accounting for the remaining
5 percent.

One advantage of aluminum is its permanent rust resistance. Even though aluminum roofing always has a prepainted finish, less care is required during installation to protect cut edges or prevent minor scratches than with steel roofing, most of which is also prepainted (though galvalume is sometimes supplied with a clear-coat finish). Also, because aluminum roofing loses heat more rapidly than steel roofing, it can be a more energy-efficient choice in warm climates.

For a given thickness, aluminum standing-seam roofing doesn't have as much structural rigidity as steel roofing — which is often installed over purlins — but there are aluminum standing-seam panels that are strong enough to be installed without decking. Typical thickness for aluminum standing seam ranges from .032 inch to .050 inch, with the heavier products being the ones that can be installed over purlins rather than decking. By comparison, steel standing-seam roofing typically ranges from .015 inch to .030 inch thick.

You should expect to pay about 10 percent to 20 percent more for aluminum standing-seam roofing than for galvanized steel and galvalume standing-seam roofing panels (which are generally similar in price). Companies that offer aluminum standing seam include ATAS International (800/468-1441, www.atas.com); Classic Metal Roofing Systems (800/543-8938, www.classicroof.com), and Petersen Aluminum (800/722-2523, www.pacclad.com).

GOT A QUESTION?

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