

Q. Thermal Break for a Cathedral Ceiling

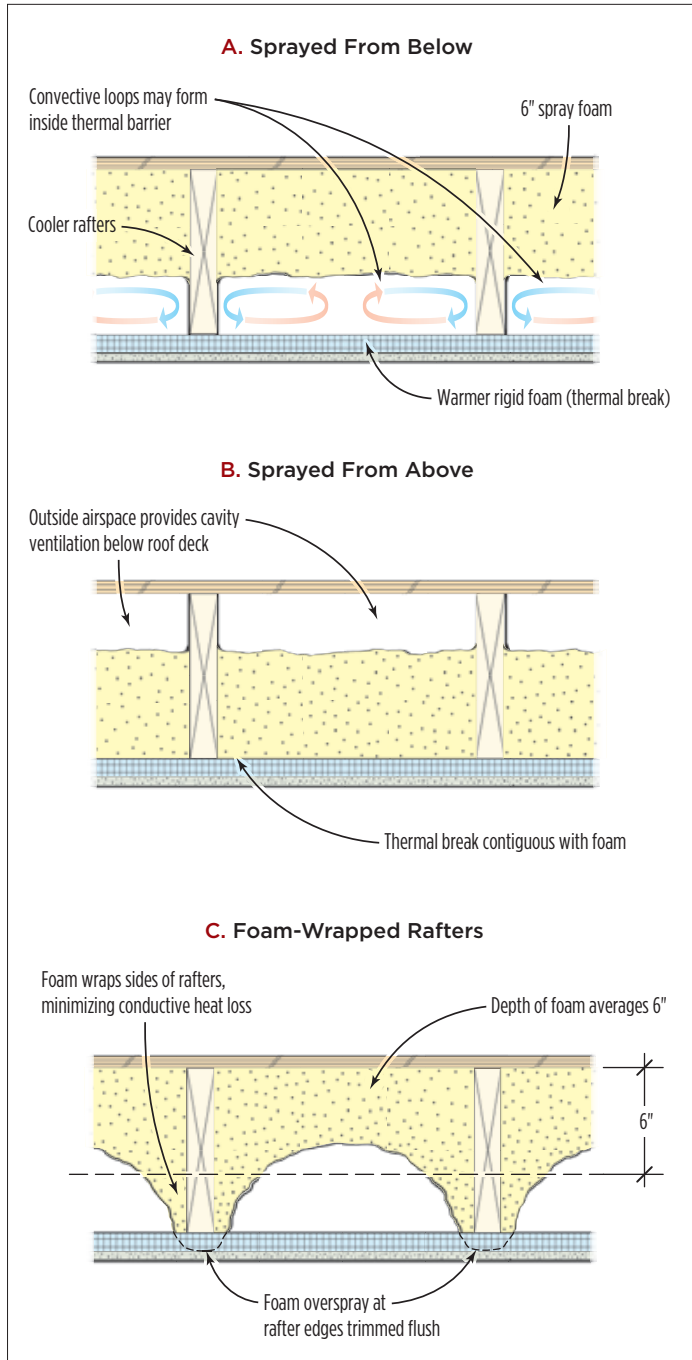
I'm looking at house plans that call for insulating a cathedral ceiling with closed-cell polyurethane foam sprayed against the roof sheathing. If we go this route, would it be possible to

create a thermal break by fastening a layer of rigid foam to the underside of the joists before hanging the drywall?

A. Henri Fennell, of HC Fennell Consulting in North Thetford, Vt., responds: It's true that the wood rafters are the weak link in the insulation system you describe. In the absence of a thermal break, heat from the living space can flow through the drywall into the rafters — which are much more conductive than the surrounding foam — and pass through the rafters to the outdoors. Adding a layer of rigid foam under the drywall would significantly reduce the conductive heat loss. However, this is not an ideal solution, because convective movement of the air between the spray foam and the rigid foam within the rafter bays will speed the transfer of heat from the warm ceiling to the cooler rafters **(A)**.

Thermal-break insulation performs most efficiently when it's contiguous with the primary insulation. Therefore, a better solution would be to apply the spray foam from above, directly against the surface of the rigid foam **(B)**. That approach can complicate job scheduling, since the roof has to be left open until the foam contractor has left the site (see photo, below). But it does improve the thermal performance of the assembly, and provides a ventilation channel between the roof deck and foam within each rafter bay.

In a retrofit situation, of course, the spray foam will ordinarily have to be applied from below. In that case, convective heat loss can be minimized by wrapping the foam up onto the sides of the rafters **(C)**. That profile prevents any direct contact between the air in the rafter bays and the cool surfaces of the rafters themselves. If the volume of foam used is equal to that of the flat application in **(B)**, the R-value at the center of the rafter bay in **(C)** will be slightly lower, but the reduction in heat loss at the foam-wrapped rafters themselves will give the assembly a higher R-value overall. (Some trimming of the overspray at the rafter edges will probably be needed before the rigid-foam thermal break can be applied and fastened).



Q. Will UV Degrade Exposed PVC Plumbing?

Are exposed PVC drain lines underneath a seasonal home elevated on piers susceptible to UV damage? The pipes are exposed to direct sun for at least part of the day, especially when the sun is low. The structure is located in coastal North Carolina.

A. *Michael Casey, a licensed plumbing contractor in California and Connecticut, responds:* Prolonged exposure to the sun may cause white PVC to discolor slightly — turning it yellow or tan — but there's little potential for actual damage. Tests have shown that prolonged exposure may in some cases slightly reduce the impact resistance of pipes and fittings, but not enough to cause system failure.

Still, nearly all plumbing codes — including North Carolina's — require DWV piping to be installed according to either the manufacturer's instructions or a recognized installation standard. PVC pipe manufacturers suggest applying a coating to protect against UV when long-term exposure is expected. Specifically, they recommend cleaning the pipes of dust and grime and then spraying or brushing on a lighter-pigmented water-based latex paint. Do not use oil paint, lacquer, varnish, or stain, all of which contain solvents that could damage the PVC. You can find more information at the Plastic Pipe and Fitting Association's website, ppfahome.org.

Whether a given plumbing inspector will insist that you paint any exposed pipe is, of course, another question.

Q. Drywall Control Joint

I have to repair a drywalled vertical inside corner where a large masonry chimney meets a 2x4 wall. The side of the chimney is covered with drywall that was apparently attached with panel adhesive. Either because the masonry moves at a different rate than the wood frame wall or because it has settled, the paper tape in the corner has ripped and wrinkled. What's a good way to fix this? Is there such a thing as a control joint (to allow differential movement) for drywall, or should I just repair this area and hope for the best? The house is 10 years old.

A. *Myron Ferguson, a drywall contractor in Galway, N.Y., responds:* The best solution I've found for that sort of problem is a product called Trim-Tex's Magic Corner, which consists of two flanges joined by a rubbery, very flexible center section (trim-tex.com). I often use it for off-angle corners like those on Cape-style

ceilings, and it should also work in the situation you describe (as long as the movement is not too extreme). The product attaches with a combination of spray adhesive and divergent-leg staples. The damage you see now may have been caused by lumber shrinkage as well as settling of the chimney. Given the age of the house, there's a good chance that future seasonal movement will be less pronounced.

Q. Preventing Blockage in Homes With Low-Flow Fixtures

With low-flow toilets now required by code almost everywhere, are there steps builders and remodelers can take to prevent problems caused by waste becoming stranded in drain lines?

A. *Jim Stack, a plumbing contractor in Kirkland, Wash., responds:* The drain-line requirements in today's plumbing codes were developed decades ago, and were based on the number of fixtures needed to reliably clean and scour lines of various sizes. At the time, toilets used 3.5 to 4 gallons per flush.

Fast-forward to today, when water use has been reduced by more than half, to an average of 1.6 gallons per flush. The newest generation of high-efficiency toilets, or HETs, use just 1.28 gallons per flush. Most of these fixtures flush well enough to clear the bowl with that amount of water — but once the waste leaves the fixture itself, the lowered flows are not always adequate to carry it along drain lines sized for much larger volumes. I've seen a sharp increase in main-line stoppages in the past 15 or so years, and expect to see more as HETs come into wider use.

It can be helpful to direct the discharge from the clothes washer — which, during its drain cycle, generates the largest outflow of any household fixture — to where it will best contribute to flushing the drain lines. There are two schools of thought on how to do this. One approach is to put the washer discharge as far from where the drain exits the house as possible, allowing it to regularly flush the indoor line of any accumulated solids. The other is to put the washer discharge very near the exit, so the force of the discharge helps clean the drain line to the street.

I generally prefer the second approach, especially in older homes where solids tend to accumulate in rough-surfaced older pipe. Also, before starting a remodeling project, you might want to use a camera to inspect the building drain, especially if there have been problems in the past. That way, both you and the homeowner will know what you may be dealing with in the future.