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JLC's

Letters

Stripping Not Fine & Dandy

To the Editor:

Reading the January *JLC*, I almost choked when I got to the *Notebook* piece "Stripping in Boston." As a small residential remodeler in the Boston area, I am well aware of the problem and keep holding my breath that our company doesn't fall victim to this practice.

How can you inform us about this practice, and even quote a union rep, without presenting the other side? You report it like it's fine and dandy to steal 80% of the carpenters from a company. I can't help wonder what impact that had on the job in progress. Maybe that story is warranted. I expect more of you. Please do not publish my name and address lest I fall victim to the fate the other contractor encountered.

Anonymous
Lexington, Mass.

Stiffening Floors

To the Editor:

The article "Cross-Bridging Proves Its Worth in I-Joist Stiffness Tests" (*Notebook,* 3/00) was right on. We are a custom builder in upstate New York and we build exclusively with I-joist floor systems. Today's customers are going with designs utilizing large open rooms. These open rooms require taking the floor systems to their limits, sometimes with mixed results.

Vibration is as important as or even more important than deflection as a design criteria. This is more an indication of the level of comfort the end user realizes.

Our preference for reducing vibration is to add strapping to the underside of the joist (where a direct applied ceiling is not used). We have field tested this method with very satisfactory results. We feel cross-bridging would work fine but would be a source of floor squeaks. Installing the joists at closer spacing has many more disadvantages than benefits. First of all it is considerably more expensive. Mechanical contractors do not like it at all — tighter work spaces, prefab panning doesn't work as well. So the strapping is the winner in our eyes.

Art Pakatar
Belmonte Builders,
Clifton Park, N.Y.

Staying Healthy

To the Editor:

I am happy to see two older and hopefully healthy carpenters featured on the February cover. For those of us who thrive on building, staying healthy and injury-free are at least as important as knowing construction techniques. How about an online forum dedicated to health and safety? *JLC* covers the topic, but more is better; we all want to avoid a bad career-ending day.

Jim Porter
via e-mail

Vapor Barriers vs. Retarders

To the Editor:

Regarding Joe Lstiburek's answer to the ceiling vapor barrier question (*On The House,* 2/00): It doesn't matter where the home is, nor the season. Moisture levels need to be controlled both for comfort of the occupants and for structural and furniture stability. I also take exception to the hair-splitting distinction between a vapor barrier and a vapor retarder.

In cold weather, the outside air cannot hold much moisture. Then, to compound the problem, furnaces send more moisture up the chimney (assuming there is no self-contained combustion system). Thus, indoor RH tends to hover around 10%. This makes people feel cold and can cause sinus headaches, creates static electricity, causes six-panel doors to shrink, and plays havoc with furniture. Humidifiers can stabilize this …. Conversely, in the summer, keeping high humidity outside makes one feel cooler inside, minimizes the time the AC unit has to run, and helps keep furniture stable and doors from swelling.

The key to both of these extremes is an effective *vapor barrier system*. A 6-mil barrier addresses both situations. It also keeps humidity out of the insulation, which lets that material do its intended job. Frost won't form in the attics or eaves if there isn't enough moisture to support it. This isn't rocket science, just basic physics. Homes in the deep South also need to address these issues, but with a modified placement (still on the hot side of the wall).

Craig Brown
The Domicile Doctor
via e-mail

Joe Lstiburek responds: I have several problems with your letter. It turns out that it is not basic physics. (And by the way, I am a rocket scientist: I have an aerospace engineering degree as well as a doctorate in building physics.)

Let's start with what we agree on: Moisture levels need to be controlled for comfort, costs, and structural and other reasons, regardless of where the home is or the season. In cold weather, the outside air cannot hold much moisture. Interior relative humidity should be higher than 20% and below 60% for the reasons stated.

Now, let's focus on the areas of disagreement. The key to moisture control is not an effective vapor barrier system. The key is the control of air-transported moisture. This requires an air barrier system or air pressure control that may or may not be combined with an air barrier system. There is a big difference between air-transported moisture and vapor diffusion. Proponents of vapor barrier systems tend to confuse these two transport mechanisms — do they control the vapor diffusion part, the air transport part, or both? It is not always clear.

What is clear is that air transport is far more significant than vapor diffusion. What is also clear is that you do not need a 6-mil polyethylene barrier to control air-transported moisture…. Although 6-mil polyethylene is an excellent vapor barrier, it is often a very poor air barrier. … I agree that it is possible to install 6-mil polyethylene as an air barrier. The key point is that although air barriers are a good idea everywhere, vapor barriers are not.

Moisture flow by vapor diffusion is governed by the second law of thermodynamics (basic physics to some, not so basic to others). Moisture will flow by diffusion because of a concentration gradient as well as a temperature gradient ("from more to less" as well as "from warm to cold"). This means that it tends to go from the inside out up north and from the outside in down south. In the middle of the country, part of the year it goes from the inside out and part of the year it goes from outside in.

It is easy to say let's put a vapor barrier on the inside up north and on the outside down south. It is much harder to define "north" and "south." Everyone can agree to put a vapor barrier on the inside in Burlington, Vt., and on the outside in Miami, Fla. It is a little more difficult to agree on where to put a vapor barrier in other locations. If you put a vapor barrier on the inside in Washington, D.C., half of the year it will be in the wrong place. You certainly do not want to put a vapor barrier on both sides of the wall. It's pretty obvious that you do not want a

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vapor barrier at all in most assemblies in mixed climates. "Flow-through" design makes more sense in mixed climates where vapor diffusion is slowed down, but not stopped. Hence, the term vapor diffusion retarders.

It turns out that the "hair-splitting" distinction between a vapor barrier and a vapor retarder is not hair-splitting at all, but a necessity. Take, for instance, a common building material: kraft-faced fiberglass insulation. Is the kraft facing a vapor barrier or not? It depends on the time of year. If the facing is installed towards the interior in a climate such as Washington, DC, it is a vapor barrier in the winter and a vapor retarder in the summer. How is this so?

The kraft facing is impregnated with bitumen and the paper-bitumen composite is hygroscopic. It adsorbs water as the relative humidity rises. As the quantities of adsorbed water increase, the vapor permeability of the composite changes. This is reflected by the differences between dry-cup permeability test values and wet-cup permeability test values… Under dry-cup testing, the kraft facing has a perm rating of 1 perm, and under wet-cup testing the kraft facing has a perm rating of 5 perms. In the winter months, when the inside relative humidity is low, we have a vapor barrier on the inside. In the summer months, when the inside relative humidity is high, we have vapor retarder on the inside, which permits drying to the inside. It would be a bad idea to replace this kraft facing with a 6-mil polyethylene sheet, which would trap water in the wall assembly during the summer.

One problem in our industry is the view that the installation of a polyethylene vapor barrier on the inside of buildings is the answer to all moisture problems. Unfortunately, this view is responsible for many more building failures than building successes.

Joseph Lstiburek, Ph.D., P.Eng.
Building Science Corporation
Westford, Mass.

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