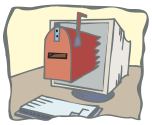
Q&A



GOT A QUESTION?

Send it to Q&A, *JLC,* 186 Allen Brook Lane, Williston, VT 05495; or e-mail to jlc-editorial@hanleywood.com.

Q. Attaching Deck Ledgers to Engineered Rim Joists

Are ledger lag-bolting schedules that were developed for 2-by rim joists adequate for engineered rims? It seems that lag bolts would be more likely to pull out of a thinner engineered rim than out of a thicker 2-by Doug fir rim joist.

A. *Christopher DeBlois, a structural engineer with Palmer Engineering in Tucker, Ga., responds:* You're right. Lag bolts don't get the same purchase in a 1¼-inch-thick engineered LSL (laminated strand lumber) rim joist as they do in 1½-inch-thick framing lumber. If a lag bolt is properly installed, with its tip well through the rim joist and only the threads engaged in the band, its capacity relative to pull-out forces depends on the thickness of the band and the density of the wood. Because LSL rim joists are typically built up of the same wood species used for framing material (and thus have the same approximate density), the big variable is the thickness. A 1¼-inch-thick LSL is five-sixths as thick as 1½-inch-thick 2-by stock, and thus has 16 percent less holding capacity. To provide the same total pull-out strength, you'd need to provide six-fifths the number of bolts, an increase of 20 percent.

Although there may be other variables, the end result for shear and pull-out strength to carry the weight of a deck or porch will be similar — 20 percent more bolts in a 16 percent thinner band will provide about the same capacity. (See "Load-Tested Deck Ledger Connections" [3/04] for bolting schedules for 2-by ledgers.)

Instead of using more lag bolts, an alternate approach (if you can plan ahead) would be to use 1¾-inch LVL material for bands or rim joists wherever you will be bolting a deck or porch to the house. That's the method I used for my own house, and the small increase in materials cost was well worth it when I added the deck a few years later.

To me, a bigger concern than pull-out strength is the strength of the connection between the band and the joists and subfloor when an LSL rim joist is used with wood I-joist floor framing. Because I-joist webs are so

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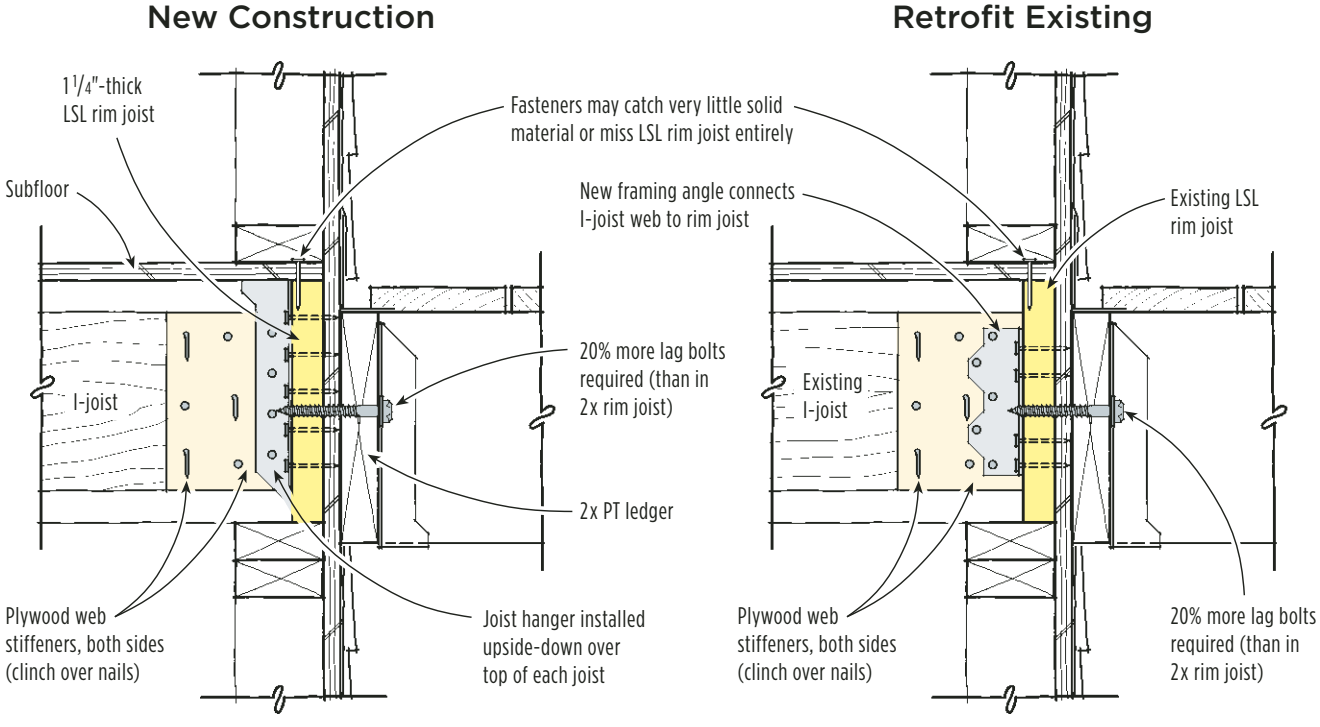

thin, the connection between each joist to the LSL band is weak; therefore, you must rely on the connection of the subfloor to the top of the band to keep from pulling the rim joist off the house. But since this band is thinner than 2-by material, it's a little bit easier for screws or nails from the subfloor to miss the band entirely, or to catch very little solid material. I've seen a deck literally collapse away from a house, taking the LSL rim joist with it. And if the rim joist is at the end of a cantilever or overhang with no wall below, the potential for this type of failure increases dramatically.

To ensure that the rim joist itself is well secured to the floor framing (at least where joists bear on the outside wall), I recommend reinforcing the connection from the joists to the band. In new construction, this can be done by adding plywood web stiffeners on both sides of each joist at their outer end so that they finish flush with the I-joist chords, and by nailing from one side through the OSB web into the stiffener on the opposite face (clinching over any nails that poke all the way through). Then install joist hangers upside-down over the top of the end of each joist before you set the subfloor, nailing the hanger off to both the I-joist and the rim joist to complete the connection (see illustration, page 1).

For existing framing, install light-gauge framing angles (such as Simpson's L70s) to connect the web of each I-joist to the rim joist.

Q. Same Windows, Different Climates?

As a HERS rater working in north-central New England, I've noticed that the U-values of the windows that most builders are installing are quite good — below .35 — but they have low SHGC (solar heat-gain coefficient) values. While it seems that windows with higher SHGC values would be a good idea in cold climates, I've found that most manufacturers offer only low-E windows with these relatively low SHGC values. Why?

A. *Marc Rosenbaum of Energysmiths, a sustainable-design consulting firm in Meriden, N.H., responds:* In the early 1990s, low-E glass optimized to let in visible light while excluding solar short-wave infrared energy pretty much took over the market. Rather than build different kinds of windows for different parts of the country, most major American window manufacturers — recognizing that most new construction was taking place in the warm climates of the Southeast and Southwest — adopted a one-size-fits-all approach to glazing. So although glass manufacturers continue to offer a variety of different types of glazing, most window manufacturers don't give you many options.

When you compare the performance numbers of three representative glazing products, you can see that the solar transmittance of so-called Northern low-E 178 glazing is about 55 percent greater than that of the commonly available 172 low-E glazing (also called low-E II), while its conductance (U-value) is a tad higher, as is its VLT (see chart, below).

Because it allows more of the sun's infrared energy to pass through, 178 glazing is definitely preferable in cold climates — except for cases involving large expanses of west-facing glazing or significantly overglazed southern facades.

An even more effective glazing for the south side of a passive solar building might be Pilkington Energy Advantage glazing, which is better at allowing the sun's heat and light in, though slightly worse in insulating value.

In fact, there is a great variety of glazing available that can be used to optimize the energy performance of homes. Different glazings can be used for different climates and facade orientations, allowing solar heat in where appropriate and excluding it elsewhere. But as you've pointed out, the greatest barrier is availability from the big manufacturers.

For that reason, recently I've been recommending pultruded fiberglass windows from Canadian manufacturers like Accurate Dorwin (888/982-4640, www.accuratedorwin.com) and Thermotech Windows (888/930-9445, www.thermotechwindows.com), as these manufacturers offer a wider choice of glazings and can accommodate triple glazing.

Glazing Type	U-Value (COG)	SHGC	VLT
Cardinal 178 double-glazing low-E, argon fill (sometimes called Northern low-E)	0.28	0.64	0.78
Cardinal 172 double-glazing low-E, argon fill (sometimes called low-E II)	0.26	0.41	0.72
Pilkington Energy Advantage low-E	0.29	0.72	0.75

U-value is conductance (lower is better); measured at center of glass (COG)
SHGC is solar heat-gain coefficient (higher = more solar gain)
VLT is visible-light transmittance (higher is better)
Cardinal supplies most of the residential low-E glass used in North American windows; Pilkington is another major supplier