Does 4 x 750 = 2 x 1,500?

While the new lateral load provisions referenced in the 2015 IRC (four 750-lb. deck-to-house connections vs. two 1,500-lb. anchors permitted by previous versions of the IRC) look good on paper, there are several issues to consider if the anchors are lag-screwed to a mudsill.

Almost all sill-plate-to-concrete-foundation connections have oversized anchor-bolt holes. When this situation exists, there is potential for impact loading at the anchor-bolt-to-wood interface and at the connection to the sill due to slip. At a minimum, impact loads are typically twice the initial force. For example, if the connection is rated for 750 lb., the impact force at a minimum would be 1,500 lb.

But if there is a gap between the anchor bolt and the wood (which there is when the anchor-bolt hole is oversized), the impact force during slip or a seismic event would be even greater than 1,500 lb. When the sill plate slips, it creates an impact force greater than 1,500 lb. as the initial "gap" between the anchor bolt and wood hole is closed. If the load is cyclical, as during an earthquake, the gap would be enlarged, leading to impact forces even greater than the initial "slip gap force" of +1,500 lb. In fact, those forces could exceed by 2.5 times the initial 750-lb. load. In addition, many sill plates are structurally compromised, either because of deterioration due to termites or rot, or because the sill plates have already split at the anchor-bolt-to-wood interface (see photo, left).

Inspect a sill plate carefully for structural issues before fastening a lateral load anchor to it.

Studies of lateral loading on decks suggest that when loads are gradually applied to a 12-by-12-foot deck, forces on the tension connections range between 250 lb. to 750 lb. This means that if the deck experiences an impact load, the minimum load to the tension connections would be 500 lb. to 1,500 lb.—assuming that there's no gap between the sill and the anchor bolt. When there is a gap between the sill and the anchor bolt (which is frequently the case) and slip occurs, impact loads could be 625 lb. to 1,800 lb., values that would approach—and in many cases exceed—the 750-pound rating of one of the tension connections.

Assume that four 750-lb. tension connections are installed on a 12-by-12-foot deck and spaced evenly across the deck ledger. If the first tension connection fails for any reason, the load on the next tension connection would be 334 lb. to 1,000 lb. Under an impact load, loads on the connection could be 668 lb. to over 2,000 lb. Once the first 750-lb. connection is compromised in any of the scenarios noted above, then the remaining three will fail like a zipper.

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Keeping an Eye on Safety

I noticed in the cover photo of the Nov/Dec 2014 issue of *Professional Deck Builder* that the worker who appears to be operating the tile saw is wearing his safety glasses in the wrong place. They are designed to protect the eyes, not the forehead. He should also be wearing hand protection, since cut tiles can have sharp edges. Cut pieces should be disposed of in a proper container and not left underfoot where someone can trip over them.

I realize that promoting safety and professionalism in the building trades is a challenge, as many small businesses either do not understand, or fail to communicate to their employees, the nature of safety gear or the reasons why it should be used. But in the future, please consider these comments—which are offered to support and promote safety, not to criticize the article, the individual, or the companies represented—and try to show the proper use of PPE, or personal protective equipment.

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