

A Preview of New Ledger-Bolting Code Requirements

by Glenn Mathewson

The 2012 International Residential Code includes a new and complicated prescriptive requirement for bolting ledgers. The old provisions in the 2009 IRC merely required you to keep the bolts 2 inches clear of the top, bottom, and ends of the ledger. In the 2012 IRC, the prescriptive “allowable bolting regions” are applied to the band joist as well as the ledger. Also, limitations are placed on the relationship of the bolts to one another and to the upper edge of the ledger.

The changes present a number of difficulties for deck builders. For one, in order to comply with the code to the letter when you bolt on a ledger, the inside of the band joist will need to be completely visible.

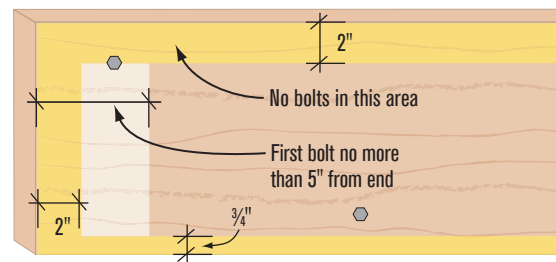
Second, it’s impossible to both comply with the new requirements and construct a conventional deck frame that allows a full step down to the deck from the house — a desirable feature in snowy regions.

And since elsewhere in the 2012 IRC the ceilings of most basements in new construction are required to be covered with drywall, you’ll need get the ledger installed and inspected before drywall contractors arrive.

In a way, these problems have arisen because the 2012 IRC requirements address bolting to the house’s band joist without also describing a method of bolting to the mud sill or to the foundation — two options that would solve many of the problems introduced by the new language. That doesn’t mean you can’t use those methods, but to do so, you will likely be required to hire an engineer.

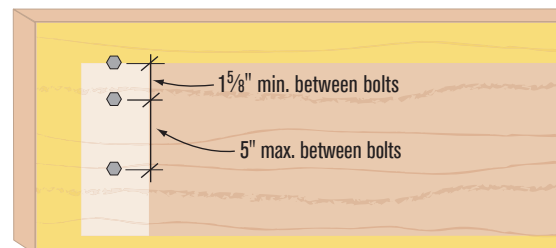
Ledger Bolting Limitations

Universal No-Bolt Zone



Bolts are not allowed to penetrate the ledger in the regions shown in yellow, except as shown at the upper bolt, where half the bolt can be in the no-bolt region. The light-colored area shows where the first bolt can be placed: no farther than 5 inches from the end of every ledger piece, but no closer than 2 inches.

Vertical Relationship Between Bolts

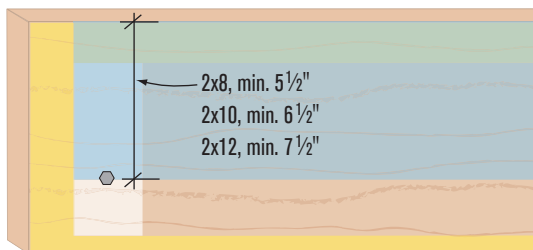


The next parameter to consider is the minimum and maximum vertical distances allowed between bolt centerlines. Vertically, the bolts must be no closer together than $1\frac{5}{8}$ inches and no farther apart than 5 inches. This range is the same for 2x8 to 2x12 ledgers.

Ledger Bolting Limitations continues on next page

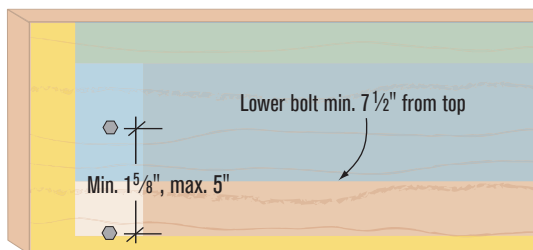
Ledger Bolting Limitations continued

Vertical Relationship Between Top of Ledger and Bottom Bolt



The bottom bolt must be a minimum distance from the top of the ledger. That distance varies depending on the ledger size. For a 2x8 ledger, the bolt must be at least 5½ inches from the top of the ledger (4½ inches is the minimum when the ledger attaches to a 2x8 band joist). For 2x10 ledgers, the minimum distance is 6½ inches, and for 2x12 ledgers, it's 7½ inches.

Allowable Bolting Zone on 2x12 Ledger



Combining the various bolting parameters further restricts bolt locations. In a 2x12 ledger, the bottom bolt must be at least 7½ inches from the top. Because the maximum vertical distance between bolts is 5 inches, the upper bolt can be no closer than 2½ inches from the top, even though the “no-bolt zone” would appear to allow the bolt to be ½ inch higher than that.

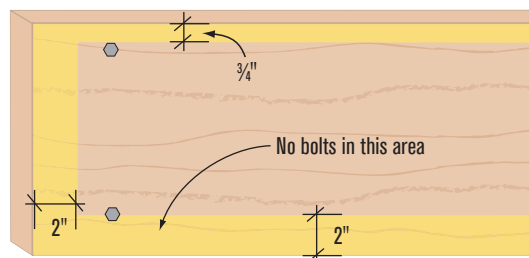
Allowable Band Joist Bolt Locations

Complying with the new ledger bolting requirements would be manageable if it weren't for the no-bolt zones the 2012 IRC adds for the band joist. And because the band joist is hidden by sheathing, siding, and interior finishes, locating those no-bolt zones will be difficult.

The force the bolts exert on the band joist runs in the opposite direction as the force on the ledger, so the no-bolt zones are reversed: On a ledger, the bottom-bolt centerline can be no closer than ¾ inch to the bottom; on a band joist, the centerline of the top bolt can be no closer than ¾ inch to the top. Similarly, the bottom-bolt centerline can be no closer than 2 inches to the bottom of the band joist (despite the fact that the band joist is fully supported by the mud sill). The 2-inch-minimum and 5-inch-maximum distances to the ends of the member apply to the band joist as well.

When you're standing in the backyard, preparing to install the ledger, you don't know where the splices in the band joist are inside the house. But the new code requires that you don't put your bolts too close to them.

Band Joist Bolting Area



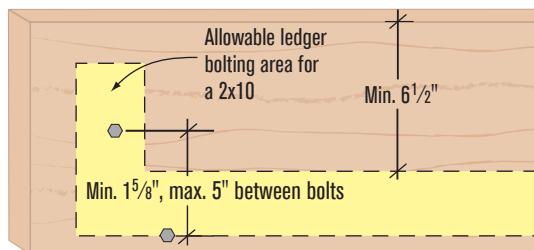
In the 2012 IRC, there are “no-bolt zones” in the band joist as well as the ledger. Bolts can't be closer than ¾ inch to the top of the band joist, nor closer than 2 inches to the bottom.

Ledger and Band Joist Combined

When you combine the allowable bolting locations in the ledger with those in the band joist, the vertical range where the ledger can be placed is limited. That's a problem if you want the deck to be a step lower than the house. I looked at various combinations of 2x8, 2x10, and 2x12 ledgers and band joists, and found that the maximum distance a deck with 1-inch-thick

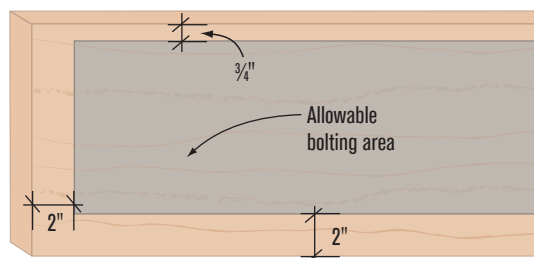
Ledger and Band Joist continued

Ledger Bolting Area



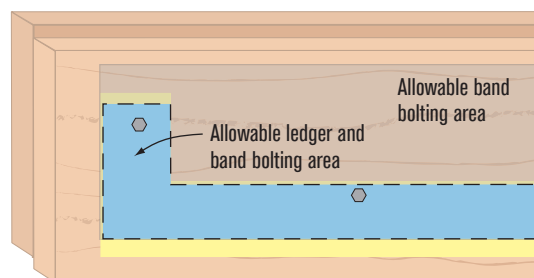
The allowable bolting area on a 2x10 ledger is shaded yellow.

Band Joist Bolting Area



The allowable bolting area on the band joist is shaded gray.

2x10 Ledger and Band Joist Overlay



With the deck flush to the floor, the allowable bolting region of a 2x10 ledger and 2x10 band joist is within the blue area. The allowable region for the bottom bolt restricts the distance the deck can step down at the door. A 2x10 ledger on a 2x10 band joist allows a maximum $\frac{3}{4}$ -inch step down from house to deck.

decking can be stepped down from the house is only $3\frac{3}{4}$ inches (see chart, below). That's with a 2x8 ledger and a 2x12 band joist. With some combinations, you would even need to step up to the deck from the house.

Maximum Step-Downs		
Ledger	Band Joist	Maximum Step Down
2x8	2x8	$1\frac{1}{4}$ "
2x8	2x10	$1\frac{3}{4}$ "
2x8	2x12	$3\frac{3}{4}$ "
2x10	2x8	must step up $1\frac{1}{4}$ "
2x10	2x10	$\frac{3}{4}$ "
2x10	2x12	$2\frac{3}{4}$ "
2x12	2x10	must step up $1\frac{1}{4}$ "
2x12	2x12	$1\frac{3}{4}$ "

What the Future Holds

Should your local municipality adopt the 2012 IRC and enforce it as written, you will run into serious problems. In addition to the step down to the deck becoming very difficult to execute, under the 2012 IRC the size of the band joist and locations of any splices will need to be evaluated and exposed for inspection. Also new in the 2012 IRC, basement ceilings of new homes built with engineered floor joists (I-joists) must be covered in drywall. In that circumstance, the ledger will have to be installed and inspected prior to drywall contractors arriving.

If you opt not to use the prescriptive bolting provisions in the IRC, an alternative connection will need to be designed using "accepted engineering practice." In most states, that work can be legally performed only by a licensed engineer.

About the only way I've been able to come up with to achieve a step down to the deck under the 2012 IRC is to use smaller-profile joists dropped flush to the bottom of larger ledgers. For example, if you use 2x8 joists with a 2x10 ledger on a 2x12 band joist and comply with all the bolt placement requirements, the maximum step possible increases from $2\frac{3}{4}$ inches to $4\frac{3}{4}$ inches. It might look odd for the ledger to run higher than the decking, but at least you'd get the step. ❖

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