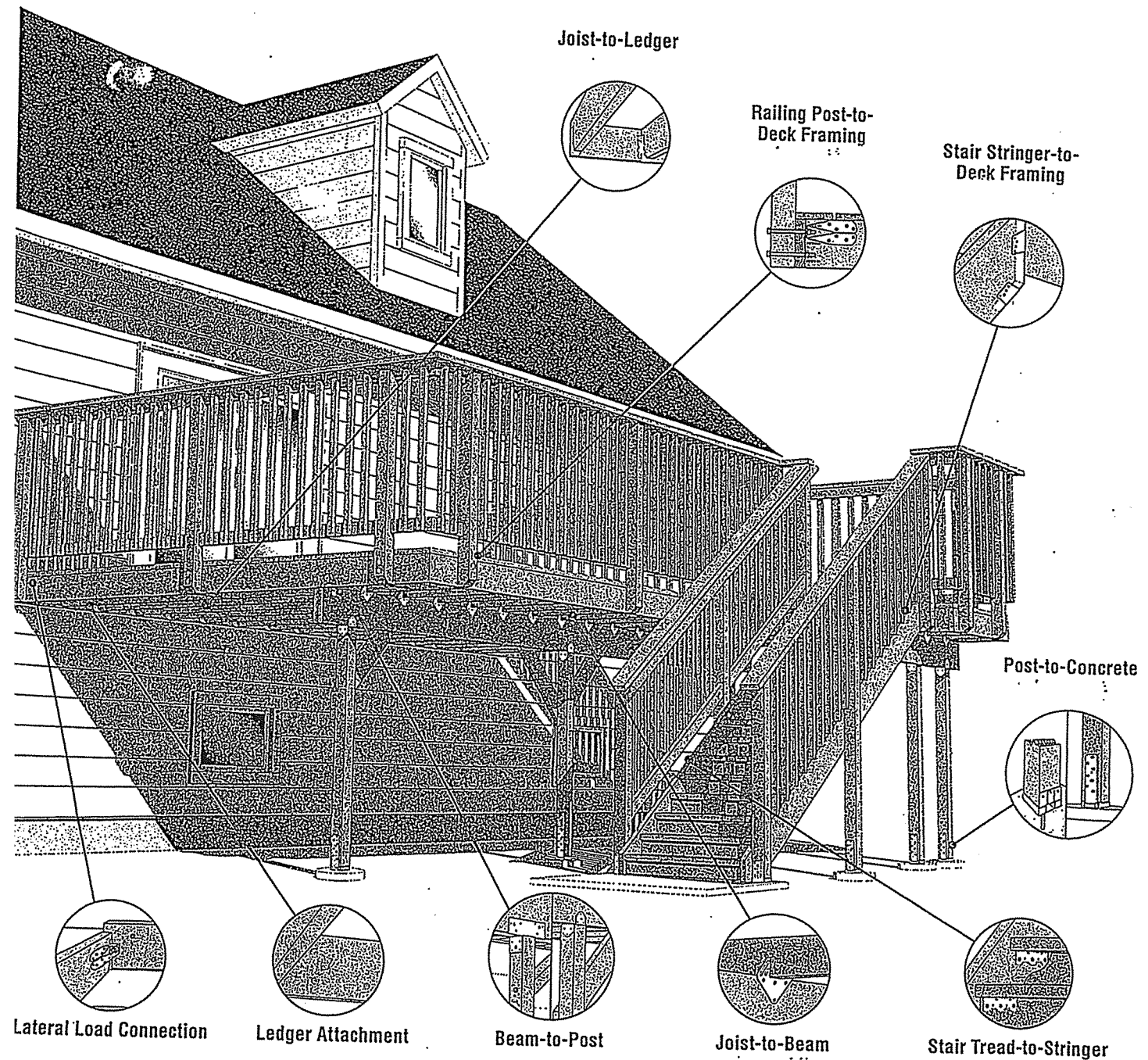


GUIDE TO A CODE COMPLIANT DECK

Critical Deck Connections

A system of key connections throughout the deck framing, also known as a continuous load path, is essential to building a safe, code-compliant deck. When this system of connections is made properly, loads are transferred throughout the deck's frame and into the ground and/or the adjacent structure to which the deck is connected.

The connections called out below are necessary in order to create an effective continuous load path.



Railing Post-to-Deck Framing

Code Requirements

When required

- ✓ Guards shall be located along many surfaces more than 30" above the floor or grade below including porches, balconies, raised floor areas, stairways, landings and open-sided walking surfaces.

IRC 2006, Section R312.1

IBC 2006, Section 1013.1

Height

- ✓ Guards shall be a minimum of 36" tall (IRC) or up to 42" tall for certain occupancies (IBC).

IRC 2006, Section R312.1

IBC 2006, Section 1013.2

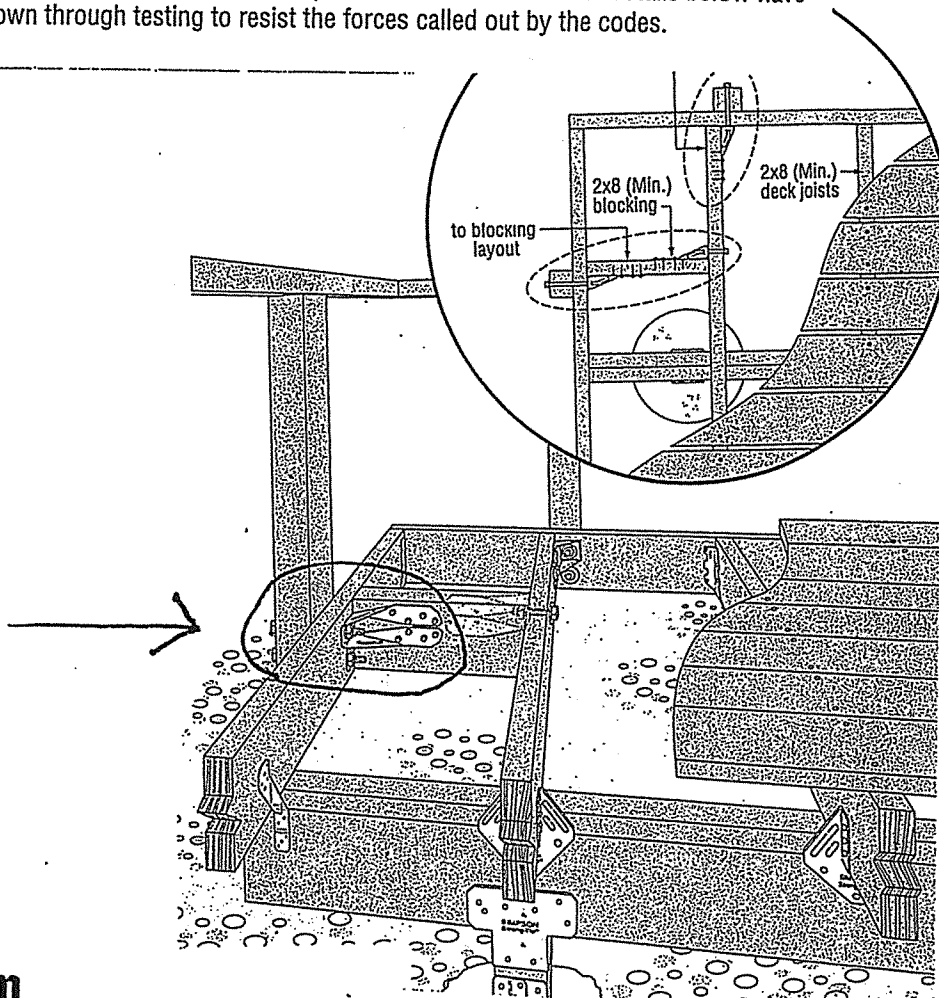
Load Resistance

- ✓ Handrail assemblies and guards shall be able to resist a single concentrated load of 200 pounds, applied in any direction at any point along the top.

IRC 2006, Table R301.5

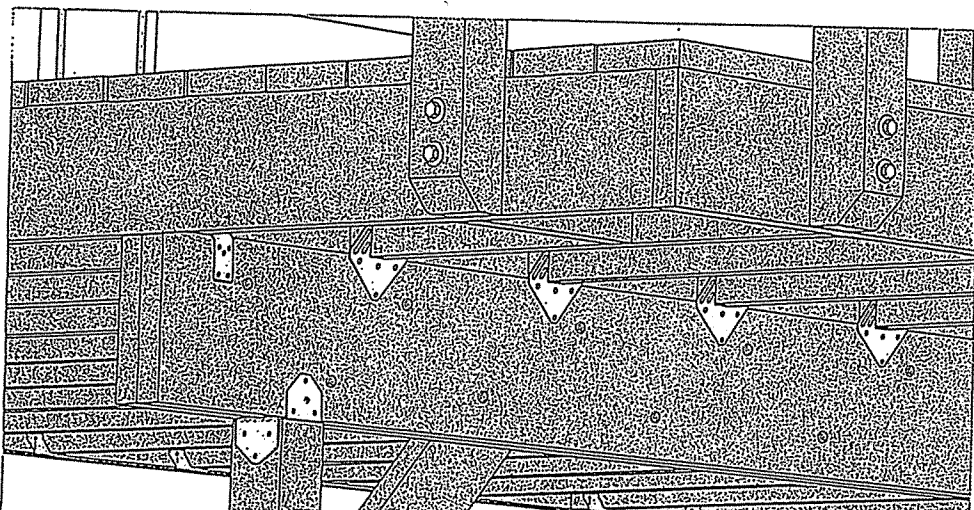
IBC 2006, Section 1607.7.1

The railing connection is one of the more crucial connections pertaining to safety, and it is often inadequately constructed. In order to provide the required load resistance at the hand rail, the post must not only be fastened to the rim joist, but also tied back into the joist framing. Machine bolts through the post and rim joist alone do not typically meet the performance requirements of the code. The details below have been shown through testing to resist the forces called out by the codes.



Joists Bearing on a Beam

At the point where the joist bears on top of a beam, there must be a connection to resist lateral and uplift forces. Blocking or framing is also required to prevent overturning of the joists.



Code Requirements

- ✓ Where posts and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against uplift and lateral displacement.

IRC 2006, Section R502.9

IBC 2006, Section 2304.9.7

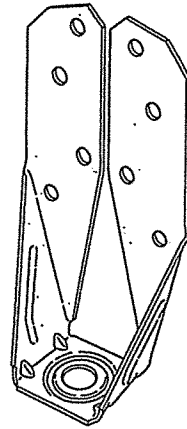
- ✓ Joists must be supported laterally at the ends by solid blocking or attachment to a full depth header, band or rim joist (IRC & IBC). Lateral restraint must be provided at each support (IRC only).

IRC 2006 Section R502.7

IBC 2006 Section 2308.8.2

Lateral Load Connection

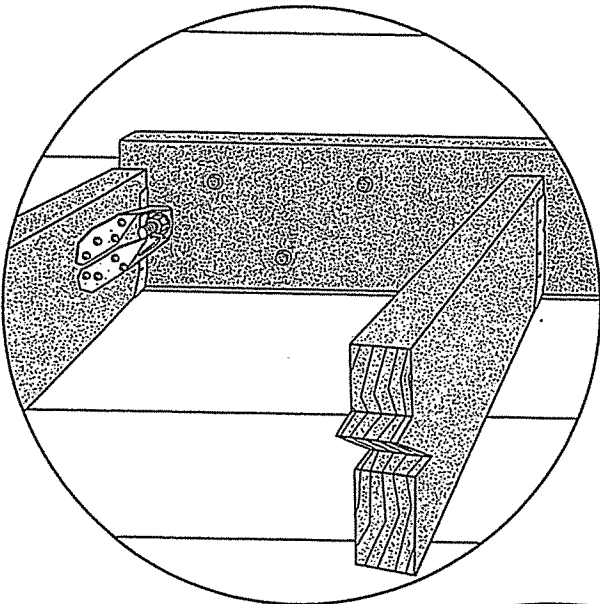
For decks that are partially supported by an adjacent structure, the connection between the deck and that structure is vital. A bolted or screwed ledger-to-rim board connection is suitable to support gravity loads, however in some cases the building codes require a connection that is able to resist higher lateral loads. In these situations tension ties are typically called out to tie the joists of the deck directly to the joists of the structure.



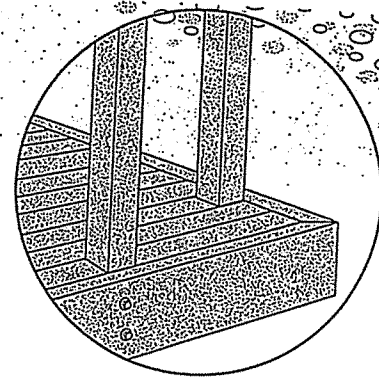
* Code Requirements

- ✓ The lateral load connection required by Section R502.2.2 shall be permitted to be in accordance with Figure R502.2.2.3. Hold-down tension devices shall be provided in not less than two locations per deck, and each device shall have an allowable stress capacity of not less than 1500 lbs.

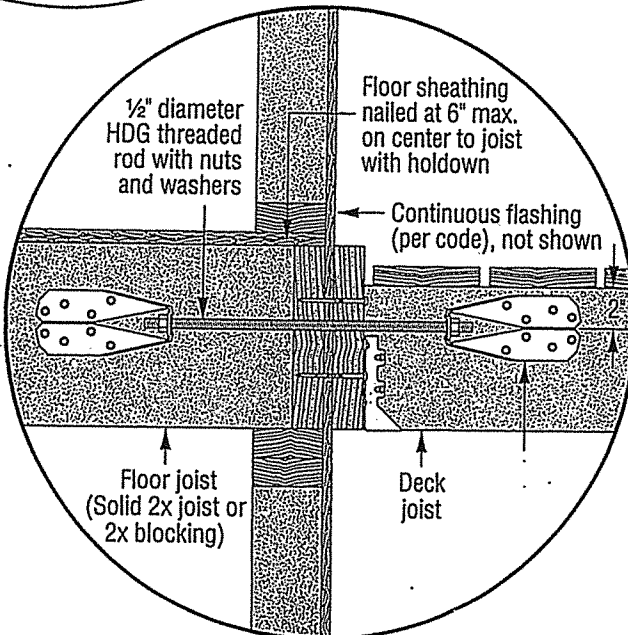
IRC 2009 Section R502.2.2.3



Deck to Ledger
Installation Detail



Deck to Ledger
Installation
Section View



Ledger Attachment

R502.2.2 Decks. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

X Inspection Required

❖ If an exterior wall is used to support a deck, the deck framing must be positively attached to the building structure. This connection design must include a consideration of both vertical and lateral loads, and the connection must be available for inspection. If it is not, this method of support is not permitted and the deck must be self-supporting.

If a deck has cantilevered framing, the framing must have a connection to its support that is designed to resist any uplift resulting from the full live load acting on the cantilevered span only. This load condition will produce maximum uplift at the support opposite the cantilevered end.

Code Requirements

* ✓ Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal.

IRC 2006 Section R502.2.2
IBC 2006 Section 1604.8.3

* ✓ The lag screws or bolts shall be placed 2" from the bottom or top of the deck ledgers and between 2"-5" in from the ends. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.

IRC 2009 Section R502.2.2.1.1

* ✓ Deck ledger connections not conforming to Table R502.2.2.1 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.

IRC 2009, Section R502.2.2.2.

* **R502.2.2.1 Deck ledger connection to band joist.** For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or approved decay-resistant species, and a 2-inch (51 mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with 1/2-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R502.2.2.1. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.

TABLE R502.2.2.1

* **FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST^{a, b}**
(Deck live load = 40 psf, deck dead load = 10 psf)

JOIST SPAN	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	On-center spacing of fasteners ^{d, e}						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing ^a	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers ^{b, h}	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2".

c. Ledgers shall be flashed to prevent water from contacting the house band joist.

d. Lag screws and bolts shall be staggered in accordance with Section R502.2.2.1.1.

e. Deck ledger shall be minimum 2x8 pressure-preservative-treated No.2 grade lumber, or other approved materials as established by standard engineering practice.

f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1 inch thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.

g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.

h. Wood structural panel sheathing...