DECK LATERAL LOAD CONNECTIONS TO MEET THE 2009/2012 IRC FOR MULTIPLE CONDITIONS

Background

When decks are supported by attachment to an adjacent structure, the International Residential Code® (2000 through 2012 IRC) requires a positive attachment to that structure to resist lateral (horizontal) loads. These loads can result from wind or seismic forces acting on a deck or from occupants on the deck moving around. If the band joist, deck ledger or deck joists were to pull away from the primary structure as a result of lateral forces, the deck would not be supported for gravity (vertical) loads and would likely collapse *(see Figure 1)*.

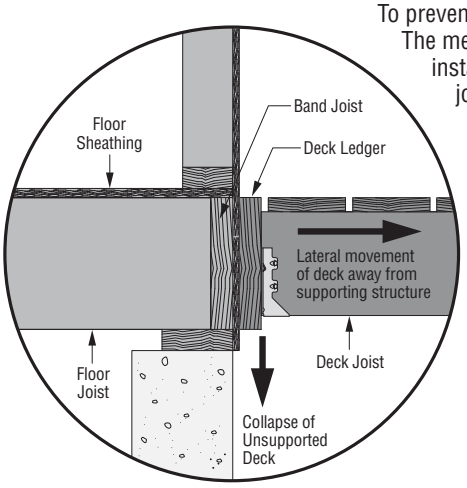

Figure 1

To prevent this, the 2009 and 2012 IRC include an approved method to resist these lateral loads. The method calls for holdown devices with a minimum allowable load of 1,500 lbs. to be installed in at least two locations per deck. The holdowns connect a deck joist to a floor joist in the supporting structure that is nailed to the floor sheathing above *(see Figure 2)*.

The Simpson Strong-Tie® DTT2 deck tension tie may be used in this critical connection assembly to satisfy the provisions of the IRC and the AF&PA *Prescriptive Residential Wood Deck Construction Guide* (DCA6). Versatile and cost-effective, the DTT2 fastens quickly and easily using Simpson Strong-Tie Strong-Drive® SDS screws, which install with no pre-drilling and are included with each DTT2 connector. The DTT2 is available in ZMAX® coating (DTT2Z) and stainless steel (DTT2SS).

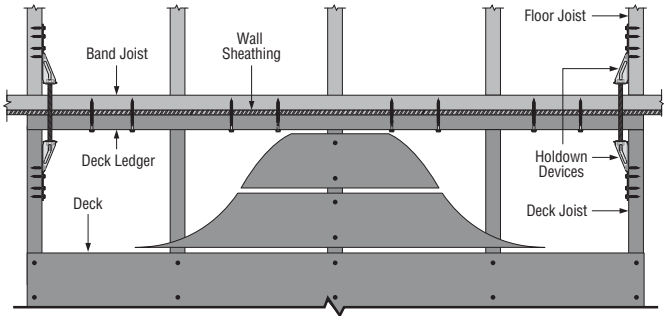

Figure 2

Conditions Not Shown in the IRC

The 2009/2012 IRC detail does not specifically address some common framing conditions. When these are encountered, alternate methods of construction must be approved by the building official to ensure they satisfy the intent of the code and are at least equivalent to the prescribed method. Several alternate construction methods are shown here and are subject to approval by the building official.

Condition A – Floor Joist Framing Does Not Line Up with the Deck Joist

The DTT2 may be installed with a maximum allowable offset of 1½" when the ties are installed at least 18" apart. Larger offsets may require an additional deck joist be added to line up with the floor joist *(see Figure 3)*.

Condition B – Floor Joist Framing is Perpendicular to the Deck Joist

Full-height blocking between joists is a common construction method when lateral load is applied perpendicular to floor framing. The blocking for this application would have to extend into the floor framing far enough to permit enough fasteners from the floor sheathing to transfer 1,500 lbs. An 8d common nail (0.131" x 2½") through $^{23}/_{32}$" wood structural-panel floor sheathing (G = 0.50) into SPF or better blocking (G ≥ 0.42) has an allowable lateral design value of 131 lbs. *(1.60 load duration factor*)*. This installation would require 12 nails through the floor sheathing into the blocking. It is recommended the blocking extend into the floor at least two joist bays and the DTT2 be installed in the furthest blocked bay *(see Figure 4)*. When nails into the floor sheathing cannot be installed, see Condition E.

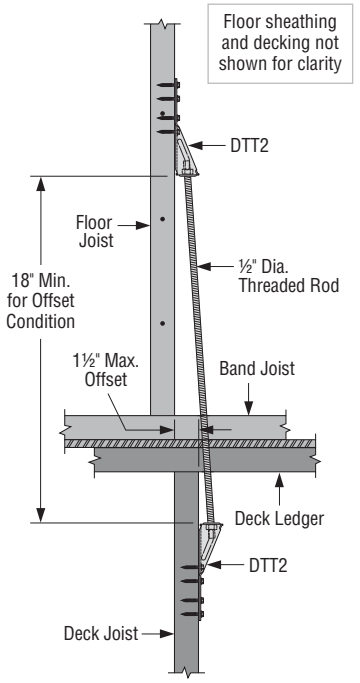

Figure 3

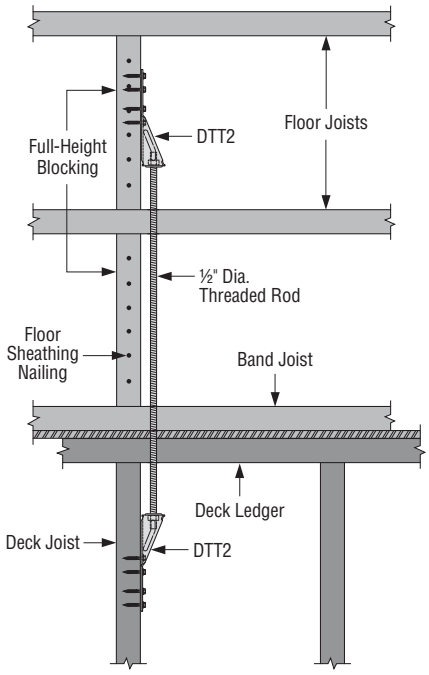

Figure 4

** A load duration factor of 1.60 corresponds to a 10-minute duration of maximum load, adjust for other durations.*

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Condition C – Floor Joist is a Wood Truss or I-Joist

The DTT2 must be installed on a minimum 2x wood member. Some wood truss and I-joist manufacturers have developed details to attach a horizontal 2x member to their product to transfer a 1,500-lb. lateral load. Contact the manufacturer of the engineered floor component for more information.

Condition D – Top of Deck Steps Down Below Top of Floor

The DTT2 may be installed with as little as 4" of vertical overlap between the floor joist and deck joist depths. Note that the code prescribed connection between the deck ledger and band joist to support gravity loads will require much more overlap. When a step down results in a deck ledger that is attached to a concrete or grout-filled CMU foundation wall, the DTT2 may attach to a ½" diameter anchor rod that is attached to the wall *(ledgers are not permitted to be supported by stone or masonry veneer)*. The anchorage and the wall should be designed to support a 1,500-lb. lateral load *(see Figure 5)*.

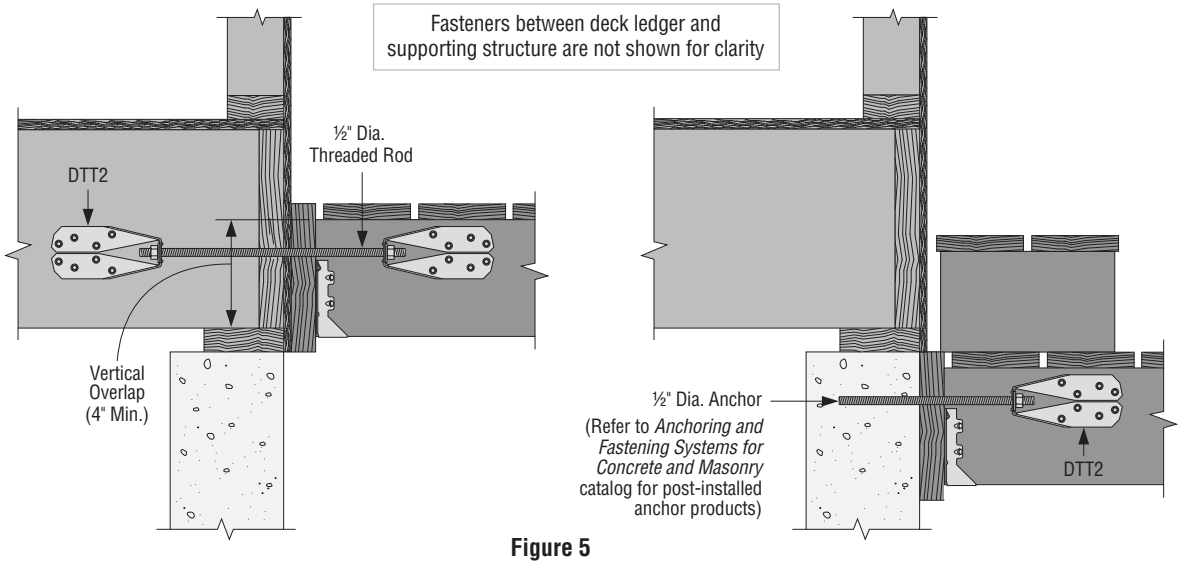

Figure 5

Condition E – No Access to the Top of the Floor Sheathing

When the floor sheathing to joist nailing specified in the IRC cannot be installed, an alternate connection capable of transferring 1,500 lbs. to the floor sheathing is required. Simpson Strong-Tie has evaluated the A35 framing angle installed with SPAX® #6 x ½" pan head, full-thread screws* in ½" minimum plywood or OSB sheathing. The installation shown in Figure 6 has an allowable lateral load of 425 lbs. per A35 *(based on a 3.0 factor of safety)*. Use four A35 framing angles to meet the 1,500-lb. requirement. When fastened to full-height blocking (see Condition B), use at least two A35 framing angles on each block.

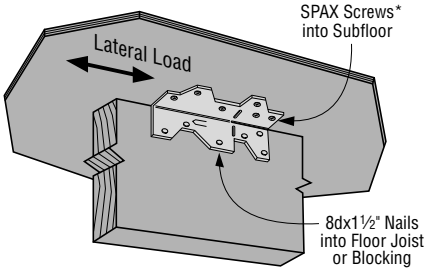

Figure 6

Condition F – No Access to Floor Joist

Where a positive connection to the primary structure cannot be made or verified during inspection, the IRC requires the deck to be self supporting.

Summary

The IRC provides an approved method to resist the lateral loads that can result from wind-, seismic- or occupant-related forces acting on a deck when it is supported by attachment to a ledger. However, as demonstrated not all framing conditions are addressed. When the conditions listed here exist, consider the versatile DTT2 holdown to transfer lateral loads to the supporting structure. Refer to the current *Wood Construction Connectors* catalog for holdown installation information.

Available Threaded Rod Sizes

Model No.	Dia. (in.)	Length (in.)	Finish
ATR½x18HDG	½	18	HDG
ATR½x36HDG	½	36	HDG
ATR½x18SS	½	18	Stainless Steel
ATR½x36SS	½	36	Stainless Steel

**Call (888) ABC-SPAX for local availability of SPAX #6x½" pan head, full-thread screw (part #0111010350135).*

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