

CHANGE TYPE: Modification

CHANGE SUMMARY: The code sets the maximum allowable spacing for deck joists supporting the various types of common decking materials. 2009 IRC R502.2.2 Decks was relocated to Section R507.1 in 2015 code.

2015 CODE: **R507.1** (2009 IRC R502.2.2) **Decks.** Wood-framed decks shall be in accordance with this section or Section R301 for materials and conditions not prescribed herein. 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.

R507.4 Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.4. Wood decking shall be attached to each supporting member with not less than (2) 8d nails or (2) No. 8 wood screws.

TABLE R507.4 Maximum joist spacing

Material type and nominal size	Maximum on-center joist spacing	
	Perpendicular to joist	Diagonal to joist^a
1 1/4-inch thick wood	16 inches	12 inches
2-inch thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.3 (2009 IRC R502.1.7 and R502.2.2.4)	In accordance with Section R507.3 (2009 IRC R502.1.7 and R502.2.2.4)

For St: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Maximum angle of 45 degrees from perpendicular for wood deck boards



Decking

IRC R507.1
(2009 IRC R502.2.2),

IRC R507.4
(No 2009 Section)

Decking

CHANGE SIGNIFICANCE: The new Table R507.4 sets the maximum joist spacing for support of decking materials. The spacing is based on the type and thickness of the decking material and its orientation to the joist. Decking placed diagonally to the direction of the joists must span a greater distance than decking installed perpendicular to the joists. Therefore, a diagonal installation requires reduced spacing of the supports. The joist spacing values reflect current construction conventions and recommended best practices. The new table mirrors the organization and format of Table R503.1, Minimum Thickness of Lumber Floor Sheathing, based on the support spacing. However, the new spacing values for support of decking are based on typical decking materials which perform satisfactorily in deck construction and match current construction practices.

Lumber decking with a 2-inch nominal thickness allows a joist spacing of 24 inches on center when applied perpendicular to the supports and 16 inches on center when applied diagonally. For nominal 1¼-inch wood decking, the spacing is reduced to 16 inches and 12 inches, respectively. The 2009 IRC addresses exterior wood/plastic composites in Sections R502.1.7, R502.2.2.4 and R317.4 which make reference to ASTM D 7032 and the manufacturer's instructions.

CHANGE TYPE: Modification

CHANGE SUMMARY: Where the prescriptive deck lateral load connection that has appeared in the previous editions of the code is chosen as a design option, the code now requires the two hold-down devices to be within 2 feet of the ends of the deck. A new lateral load connection option prescribes four hold-downs installed below the deck structure. The 2009 IRC Section R502.2.2.3 was relocated to R507.2.4 in the 2015 code.

IRC R507.2.4 (2009 IRC R502.2.2.3) Deck Lateral Load Connection

2015 CODE: R507.2.4 (2009 IRC R502.2.2.3) Deck lateral load connection. The lateral load connection required by Section R507.1 (2009 IRC R502.2.2) shall be permitted to be in accordance with Figure R507.2.3(1) (2009 IRC Figure R502.2.2.3) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure R507.2.3 (1) (2009 IRC Figure R502.2.2.3), Hold hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N). Where the lateral load connections are provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 1500/750 pounds (6672/3336 N).

CHANGE SIGNIFICANCE: The 2009 IRC addresses decks in Section R502.2.2. Deck requirements were reformatted and relocated to Section R507 in the 2012 IRC, where they remain in the 2015 IRC. The prescriptive deck lateral load connections have frequently been misunderstood. Initially, a figure was added to the 2009 IRC to depict one possible connection of a

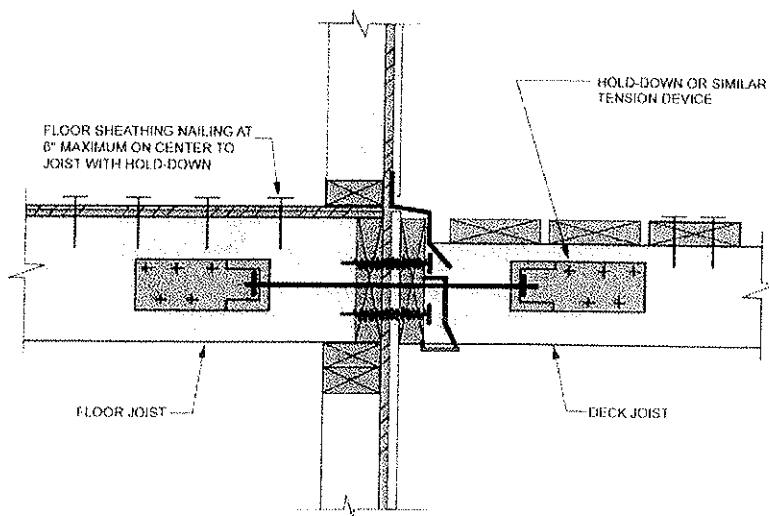


Figure R507.2.3(1) (2009 Figure R502.2.2.3)
Deck attachment for lateral loads

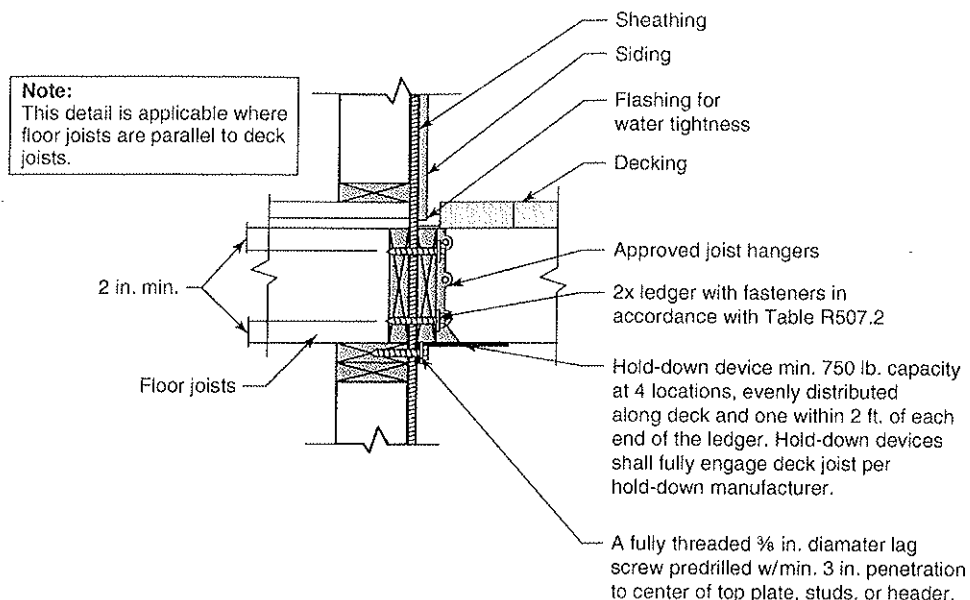


Figure R507.2.3(2) (No 2009 figure)
Deck attachment for lateral Loads

deck structure to a dwelling to resist lateral loads. Since that edition, many designers and jurisdictions have mistakenly thought the connection was required. The connection comes from FEMA 232, the *Homebuilder's Guide to Earthquake Resistant Design and Construction*, and is a connection suitable to resist lateral loads during an earthquake in high seismic regions. Testing had not been done to determine an appropriate connection for lateral loads in low-seismic regions or a connection suitable for easy construction in existing dwellings.

In the hearings for the 2015 IRC, a number of proposals were brought forward, including those related to lateral load connection options. This code change combines proposals accepted by the IRC committee and those modified during public comment hearings.

The connection using hold-downs to tie the deck joists at two locations to floor joists in a dwelling in Figure R507.2.3(1) (2009 IRC Figure R502.2.2.3) remains one potential solution. New Figure R507.2.3(2) (No 2009 figure) offers a second solution for lateral load connection of the deck to the dwelling. Four angles connect the base of the deck to the house structure. The angles are fastened to the bottom of the deck joist and a $\frac{3}{8}$ -inch lag screw is installed through the ledger and into blocking or the band joist (rim board) on the backside of the exterior wall sheathing. This solution is another prescriptive option that is not required but is a method to resist lateral loads by applying angles underneath the deck so that ceiling finishes and flooring materials in an existing house do not need removal as would be required by the first option.

The method with angles arises from the common occurrence of constructing decks for existing houses. Use of hold-downs applied to floor joists requires removal of finish ceiling materials when a deck is added after initial construction. In addition, the previous detail required additional nailing through the dwelling floor sheathing into the floor joist to improve the lateral load capacity, necessitating the removal of floor finishes as well as ceiling finishes.

CHANGE TYPE: Addition

CHANGE SUMMARY: New sections and tables provide prescriptive methods for joists and beams in deck construction. Section R507.5 describes requirements for deck joists, Section R507.6 lists requirements for deck beams, and Section R507.7 describes minimum bearing requirements for joists and beams. 2009 IRC R502.3 no longer applies to deck joists instead Section R507.5 applies.

2015 CODE: **R507.5 Deck Joists.** Maximum allowable spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joists shall be permitted to cantilever a maximum of one-fourth of the actual, adjacent joist span.

R507.5.1 Lateral Restraint at Supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not less than (3) 10d (3-inch by 0.128-inch) (76 mm by 3 mm) nails or (3) No. 10 by 3-inch (76 mm) long wood screws.

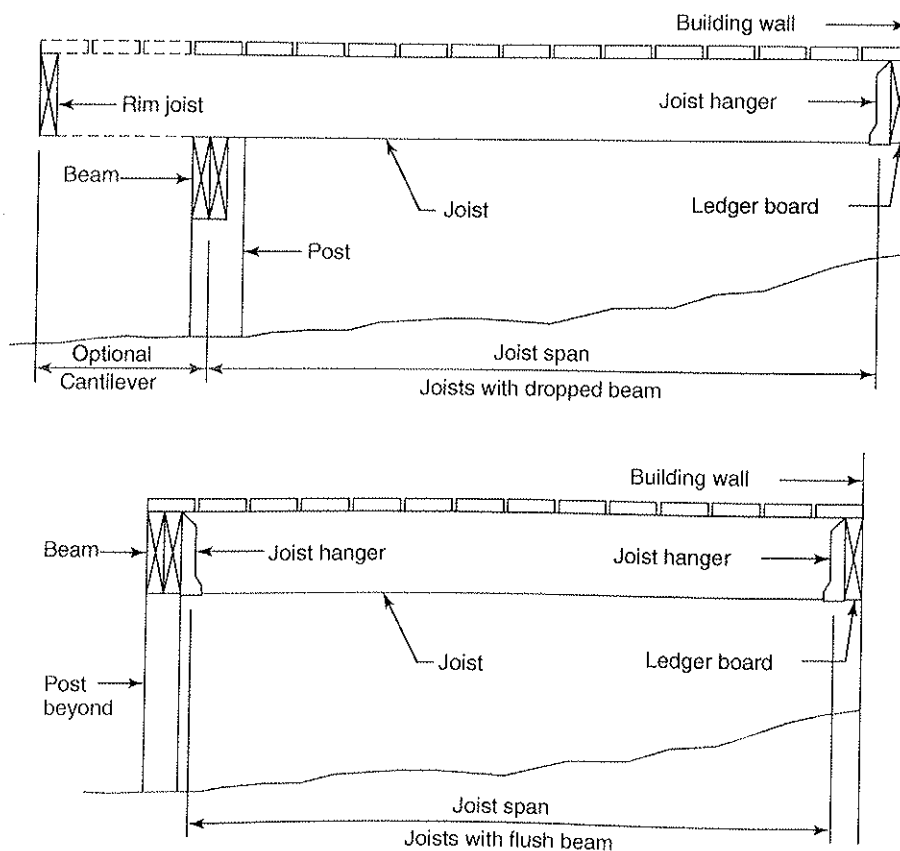


Figure R507.5 (No 2009 IRC figure)
Typical deck joist spans

**IRC R507.5,
IRC R507.6,
IRC R507.7**
(No 2009 Sections)

Deck Joists and Beams

TABLE R507.5 Deck Joist Spans for Common Lumber Species^f (ft.-in.)

Species ^a	Size	Spacing of Deck Joists With No Cantilever ^b (inches)			Spacing of Deck Joists With Cantilevers ^c (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	6-8	6-8	6-8
	2 × 8	13-1	11-10	9-8	10-1	10-1	9-8
	2 × 10	16-2	14-0	11-5	14-6	14-0	11-5
	2 × 12	18-0	16-6	13-6	18-0	16-6	13-6
Douglas fir-larch ^d , hem-fir ^d , spruce-pine-fir ^d	2 × 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 × 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 × 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 × 12	18-0	15-9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 × 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 × 8	11-8	10-7	8-8	8-6	8-6	8-6
	2 × 10	14-11	13-0	10-7	12-3	12-3	10-7
	2 × 12	17-5	15-1	12-4	16-5	15-1	12-4

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

- a. No. 2 grade with wet service factor.
- b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
- c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.
- d. Includes incising factor.
- e. Northern species with no incising factor.
- f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

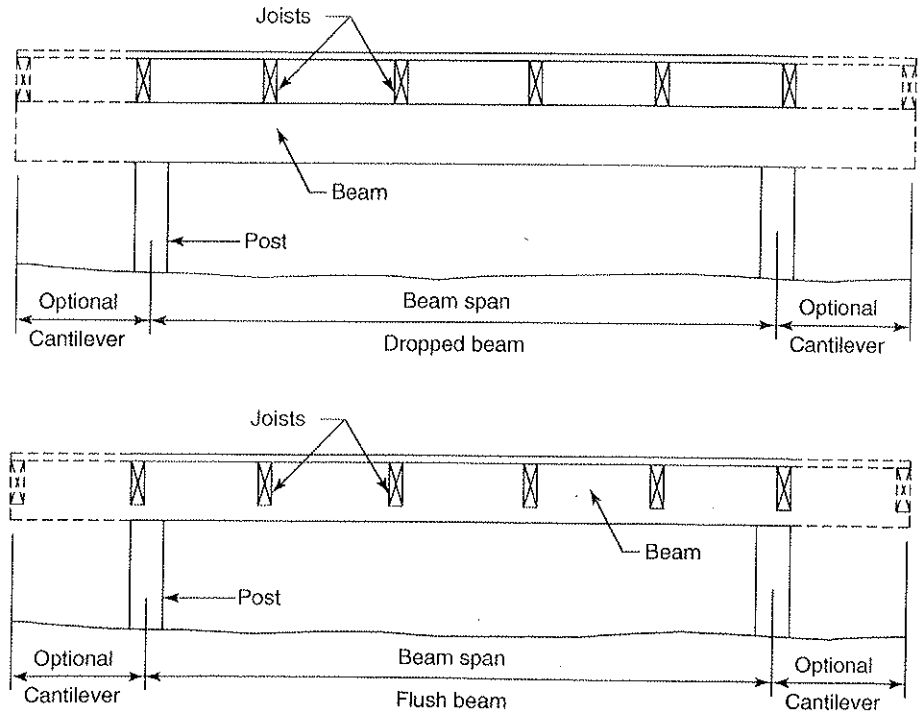


Figure R507.6 (No 2009 IRC figure)
Typical deck beam spans

R507.6 Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d (3-inch by 0.128-inch) (76 mm by 3 mm) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multispan beams shall be located at interior post locations.

R507.7 Deck Joist and Deck Beam Bearing. The ends of each joist and beam shall have not less than 1½ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists bearing on a beam shall be connected to the beam to resist lateral displacement.

TABLE R507.6 Deck Beam Span Lengths^{a,b} (ft.-in.)

Species ^c	Size ^d	Deck Joist Span Less Than or Equal to: (feet)						
		6	8	10	12	14	16	18
Southern pine	2-2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2-2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2-2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2-2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3-2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3-2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3-2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
	3-2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
Douglas fir-larch ^e , hem-fir ^e , spruce-pine-fir ^e , redwood, western cedars, ponderosa pine ^f , red pine ^f	3 × 6 or 2-2 × 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2-2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2-2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2-2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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

- Ground snow load, live load = 40 psf, dead load = 10 psf, L/A = 360 at main span, L/A = 180 at cantilever with a 220-pound point load applied at the end.
- Beams supporting deck joists from one side only.
- No 2 grade, wet service factor.
- Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
- Includes incising factor.
- Northern species, Incising factor not included.

R507.7.1 Deck Post to Deck Beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.7.1 or by other equivalent means capable to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

Exception: Where deck beams bear directly on footings in accordance with Section R507.8.1.

CHANGE SIGNIFICANCE: The 2015 IRC includes additional details for decks in an effort to provide prescriptive methods for conventional wood deck construction. There are a large number of construction methods that have long been in practice and are widely accepted. Designers and builders have used available information for determining joist and beam spans, as well as support and connection details. The new information and span tables in the code reflect a desire by many code users for more prescriptive guidance specific to decks.

Deck support provisions now describe maximum joist and beam spans, minimum connections between beams and posts, and minimum bearing length. New span tables specifically for decks are introduced. The span tables addressing joist and beam length are not based on the existing tables in IRC Chapters 5 and 6. Spans are shorter than listed in the current floor joist tables. The deck tables assume use of the joists in outdoor, potentially wet, conditions.

The new tables are based on wood capacity using the *National Design Specification for Wood Construction* (NDS). Additional wood species have also been included, such as redwood, western cedar, ponderosa pine and red pine, that are not included in the existing joist and beam span tables. The deck joist and beam tables assume #2 grade wood, wet use, and incising, when applicable. Incising is done to assist chemical additives to soak deeper into preservative-treated lumber. Incising is only assumed in lumber species that are preservative treated, such as douglas fir and hemlock fir, and resistant to pressure treatment. Southern pine more easily absorbs preservatives during the pressure-treating process and does not require incising.

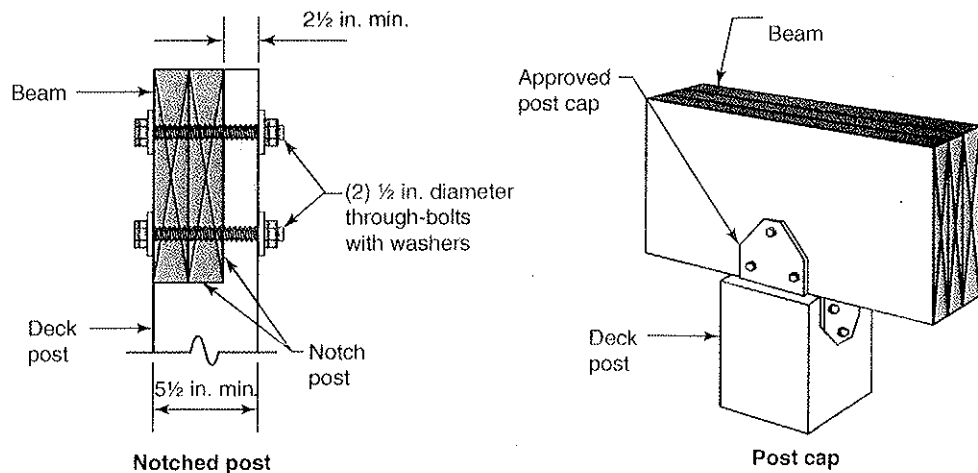


Figure R507.7.1 (No 2009 IRC figure)
 Connection of deck posts to deck beam

In addition to the new span tables, the code now addresses connection details between beams and posts specific to deck construction. The connection details illustrated in Figure R507.7.1 offer two options. The first requires support by a notched post with two ½-inch-diameter through-bolts with washers. The notch must provide 3 inches of bearing for the width of the beam with a minimum 2½ inches of the post remaining for the through-bolt connection. This type of connection will require a minimum nominal 4 × 6 post to provide the necessary 5½-inch cross section. The second option for beam-to-post connection is a manufactured connector commonly called a "post cap." The connector must be approved by the building official and must be sized for the post and beam sizes. Other equivalent connection details are also acceptable.

Bearing requirements for deck beams and joists in Section R507.7 are consistent with bearing requirements in Section R502.6 of the IRC.

Other decking provisions are addressed in Section R507.4 and Table R507.4.

IRC R507.8

(No 2009 Section)

Deck Posts

CHANGE TYPE: Addition

CHANGE SUMMARY: New Section R507.8 establishes minimum sizes of wood posts supporting wood decks and describes the requirements for connection of deck posts to the footing.

2015 CODE: **R507.8 Deck Posts.** For single-level, wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be in accordance with Table R507.8.

TABLE R507.8 Deck Post Height^a

Deck Post Size	Maximum Height ^a
4 × 4	8'
4 × 6	8'
6 × 6	14'

For SI: 1 foot = 304.8 mm

a. Measured to the underside of the beam.

R507.8.1 Deck Post to Deck Footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers' instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers.

CHANGE SIGNIFICANCE: As part of a more detailed prescriptive deck design option, the 2015 IRC adds provisions for sizing wood posts and connecting posts to the foundation for a deck. The post-sizing provisions are presented in tabular form. Depending on the height of the post, the code permits nominal 4 × 4, 4 × 6, and 6 × 6 wood posts. In practice, nominal 6 × 6 posts are most commonly used. The code does not prescribe the species or grade for deck posts. Section R317 addresses protection of wood against decay. A minimum post-to-footing connection is required to provide lateral restraint and prevent lateral displacement. The code requires manufactured connectors to be installed in accordance with the manufacturer's requirements where less than 12 inches of footing embedment exists.

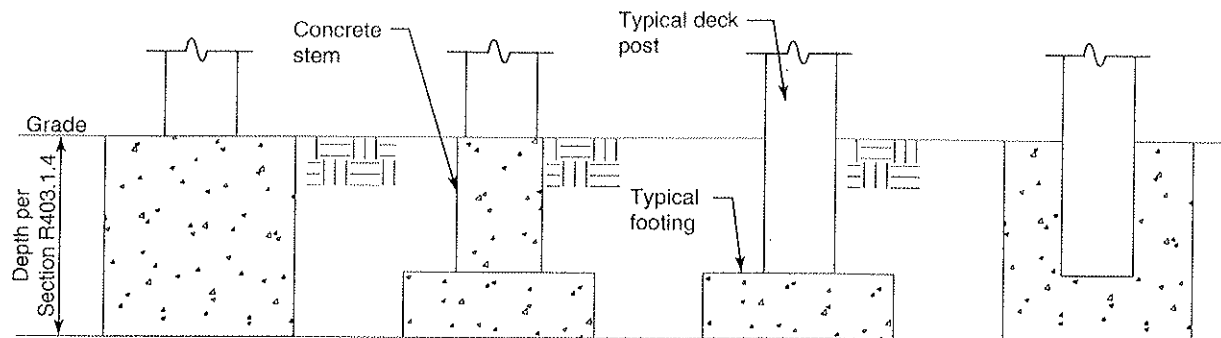


Figure R507.8.1 (No 2009 IRC figure)
Typical deck posts to deck footings