PHOTO BY MIKE GUERTIN

Right-Sizing Deck Joists

Making sense of the 'Maximum Deck Joist Span' table in the 2021 IRC

by Mike Guertin

I used to size deck joists and beams by what I guessed would pass muster with the local building official. After submitting my deck plans, I'd keep my fingers crossed that they'd be approved, hedging my bets by sizing the joists larger than I guessed they'd need to be and reducing beam spans by placing footings closer together. Because my framing plans were rarely questioned, I figured I was doing something right.

But during a discussion about deck framing with a building official, I realized that he ran into the same challenge. Without tables for deck framing in the code, he didn't have a simple resource to determine whether I and other deck builders sized joists and beams properly. One solution, of course, would have been to require an engineer to design the framing, but thankfully most officials were reluctant to add that expense to our jobs. When I asked one official how he determined whether a joist could span the designed distance, he said he used floor-joist tables intended for interior floor framing. But those tables don't have wet service or incising factors applied, so they aren't applicable for deck design.

First Code Appearance

Both deck builders and code officials were happy when deck joist- and beam-span tables were introduced in the 2015 International Residential Code. These tables gave deck builders a way to select joist and beam sizes to satisfy their designs and the code, and they gave building officials a needed resource for evaluating deck frame designs during plan review. I started using them regularly when planning frames for deck designs, but as with any new tool you become infatuated with the first few times you use it, it wasn't long before I realized the tables' shortcomings and limitations.

Even though the old joist-span table wasn't ideal, I was still fortunate to be able to use it—not all deck builders could. The 2015 table was designed for a 10-pound-per-square-foot (psf) dead load and 40-psf live load, and because I work in an area with a snow load less than 40 psf, I could apply the table; deck builders in areas with snow loads greater than 40 psf weren't so fortunate. They would have to do a deep dive into the

Navigating the Deck Joist Span Table in the 2021 IRC

Example: Project built in a 30-psf ground snow load area with southern pine joists. Default to the major 40-psf live load row, then narrow further to the southern pine sub-row (leaving only four joist size rows).

TABLE R507.6
MAXIMUM DECK JOIST SPANS

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches)			MAXIMUM CANTILEVER[d,f] (feet-inches)							
			Joist spacing (inches)			Joist back span[g] (feet)							
			12	16	24	4	6	8	10	12	14	16	18
40 live load	Southern pine	2 × 6	9-11	9-0	7-7	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	13-1	11-10	9-8	1-0	1-6	2-0	2-6	2-3	NP	NP	NP
		2 × 10	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-4	3-4	NP
		2 × 12	18-0	16-6	13-6	1-0	1-6	2-0	2-6	3-0	3-6	4-0	4-1
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	9-6	8-4	6-10	1-0	1-6	1-4	NP	N			
		2 × 8	12-6	11-1	9-1	1-0	1-6	2-0	2-3	2			
		2 × 10	15-8	13-7	11-1	1-0	1-6	2-0	2-6	3			
		2 × 12	18-0	15-9	12-10	1-0	1-6	2-0	2-6	3			
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	8-10	8-0	6-10	1-0	1-4	1-1	NP	N			
		2 × 8	11-8	10-7	8-8	1-0	1-6	2-0	1-11	NP	NP	NP	NP
		2 × 10	14-11	13-0	10-7	1-0	1-6	2-0	2-6	3-0	2-9	NP	NP
		2 × 12	17-5	15-1	12-4	1-0	1-6	2-0	2-6	3-0	3-6	3-8	NP
50 ground snow load	Southern pine	2 × 6	9-2	8-4	7-4	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	12-1	11-0	9-5	1-0	1-6	2-0	2-5	2-3	NP	NP	NP
		2 × 10	15-5	13-9	11-3	1-0	1-6	2-0	2-6	3-0	3-1	NP	NP

Rows omitted for space considerations

Table now includes joist spans for areas with 50-, 60-, and 70-psf snow loads.

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches)			MAXIMUM CANTILEVER[d,f] (feet-inches)							
			Joist spacing (inches)			Joist back span[g] (feet)							
			12	16	24	4	6	8	10	12	14	16	18
70 ground snow load	Southern pine	2 × 6	8-3	7-6	6-5	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	10-10	9-10	8-2	1-0	1-6	2-0	2-2	NP	NP	NP	NP
		2 × 10	13-9	11-11	9-9	1-0	1-6	2-0	2-6	2-9	NP	NP	NP
		2 × 12	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-5	3-5	NP
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	7-11	7-1	5-9	1-0	1-6	NP	NP	NP	NP	NP	NP
		2 × 8	10-5	9-5	7-8	1-0	1-6	2-0	2-1	NP	NP	NP	NP
		2 × 10	13-3	11-6	9-5	1-0	1-6	2-0	2-6	2-8	NP	NP	NP
		2 × 12	15-5	13-4	10-11	1-0	1-6	2-0	2-6	3-0	3-3	NP	NP
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	7-4	6-8	5-10	1-0	1-4	NP	NP	NP	NP	NP	NP
		2 × 8	9-8	8-10	7-4	1-0	1-6	1-11	NP	NP	NP	NP	NP
		2 × 10	12-4	11-0	9-0	1-0	1-6	2-0	2-6	2-6	NP	NP	NP
		2 × 12	14-9	12-9	10-5	1-0	1-6	2-0	2-6	3-0	3-0	NP	NP

"Maximum Cantilever" column is divided into eight sub-columns by "Joist Back Span" in 2-foot increments from 4'-0" to 18'-0" deck depth.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.
NP = Not Permitted.
a. Dead load = 10 psf. Snow load not assumed to be concurrent with live load.
b. No. 2 grade, wet service factor included.
c. $L/\Delta = 360$ at main span.
d. $L/\Delta = 180$ at cantilever with a 220-pound point load applied to end.
e. Includes incising factor.
f. Incising factor not included.
g. Interpolation allowed. Extrapolation is not allowed.

Permits interpolation between joist lengths listed in tables (see "Interpolating Maximum Cantilever," page 13)

Figure 1. The major difference between the deck-joist-span table in the 2021 edition of the IRC (Table R507.6) and earlier versions of the table is that it allows joists to be sized for 50-, 60-, and 70-psf ground snow loads. In addition, it is now a little easier to calculate the maximum cantilever allowed for each joist according to species, size, and spacing.

AWC's *Wood Frame Construction Manual* and spend some time crunching numbers or hire an engineer to determine framing member sizes. Another shortcoming of the table was the odd, two-step process to determine cantilever distances that left users scratching their heads.

The joist-span table updated in the 2018 IRC simplifies cantilever spans a little. Even bigger changes came in the 2021 IRC, which expands the joist-span table to include 50-, 60-, and 70-psf snow loads, permits us to interpolate between lengths listed in the tables, and makes the cantilever section in the joist-span table a little simpler to apply.

In this article, I'll explain how to navigate the updated deck-joist-span table (R507.6), how joist spans and cantilevers are measured, and how I select joists for a deck design. I'll also introduce how to interpolate the maximum cantilever when the joist back span falls between two columns on the table. Later, in an upcoming article, I'll discuss how to size a beam using the 2021 IRC beam-span tables.

Reading the Joist Table

There are two field sections in Table R507.6 "Maximum Deck Joist Spans"—the "Allowable Joist Span" column and the "Maximum Cantilever" column (**Figure 1**). The lengths listed in the field for each section are controlled by four factors: load, wood species, nominal joist size, and either on-center joist spacing (for joist span) or joist span (for cantilever).

The joist-span column is divided into three sub-columns by joist spacing: 12, 16, and 24 inches on-center (o.c.). The maximum cantilever column is divided into eight sub-columns by "Joist back span" (that is, joist span) in 2-foot increments from 4 feet to 18 feet.

The other factors are oriented into rows. The four major rows are based on the live and snow loads in psf—40 live and 50, 60, and 70 snow.

Each major load row is further divided into three wood species groups: southern pine; Doug fir-larch/hem-fir/spf; and redwood/western cedars/ponderosa pine/red pine. And those sub-rows are each divided again by joist size: 2x6, 2x8, 2x10, 2x12.

Though the table looks large and intimidating, you only have to focus on a small portion. Let's say you're building in a 30-psf ground-snow-load area with southern pine joists. You'll default to the major 40-psf live-load row and then narrow further to the southern pine sub-row. That leaves only the four joist-size rows.

Measuring Joist Span

Before you can apply the table, you need to know how the deck joist span is measured. Figure R507.6 "Typical Deck Joist Spans" includes four illustrations depicting the joist-span measurement points for two decks attached to a wall by a ledger—one with a flush rim beam and one with joists cantilevering over a dropped beam—and two free-standing decks—one with flush beams and one with cantilevers. The important thing to note is that the joist span is measured from the center of the joist bearing at each end. Some people confuse "joist span" with "deck depth" (the distance from exterior wall surface to the outside of the rim joist).

If the deck is framed from a ledger to a

Live Load, Snow Load, and Dead Load

The dead load assumed in all the Section R507 Deck tables is 10 psf. Dead load is the weight of all the materials—like posts, beams, joists, decking, and railing—used to build the deck. I've measured the weight of some decks I've built and the dead loads ranged from 5 psf when we're using wood decking to 7 psf when decking with a heavy composite. So the 10-psf dead load assumed in the table is fairly conservative. But 10 psf would not apply to extra-heavy decking types like concrete decking planks or concrete pavers, so you wouldn't be able to size a joist or beam using the code tables.

Live load comprises people and stuff that inhabit the deck. Live load would include portable things like tables, chairs, coolers, umbrellas, and entertainment equipment you can carry on and off a deck. It would not include a hot tub or built-in outdoor kitchen with a stone top or masonry-clad fireplace. Heavy, permanent equipment requires a load calculation and heavy-duty framing and larger footings that the code tables don't factor for.

Ground snow load (snow load) is the weight of snow typical for a region. You can find the ground snow load for an area in which you're building a deck in Table 301.2 that is filled out by a local building department and by checking figures R301.2(3) and R301.2(4) in the IRC.

Footnote "a" in Table R507.6 states, "Snow load not assumed to be concurrent with live load." This means you don't add snow load to live load; instead, you apply whichever is greater for your area. The live load default for residential construction is 40 psf, so that's the minimum load. If you build in an area with a snow load less than 40 psf, then you would use the 40-psf major row. If you build in a 50-, 60-, or 70-psf snow load area, then you would apply the applicable row. If you're in an area with a snow load greater than 70 psf, then you'll probably need an engineer to size your joists and beams. —*M.G.*

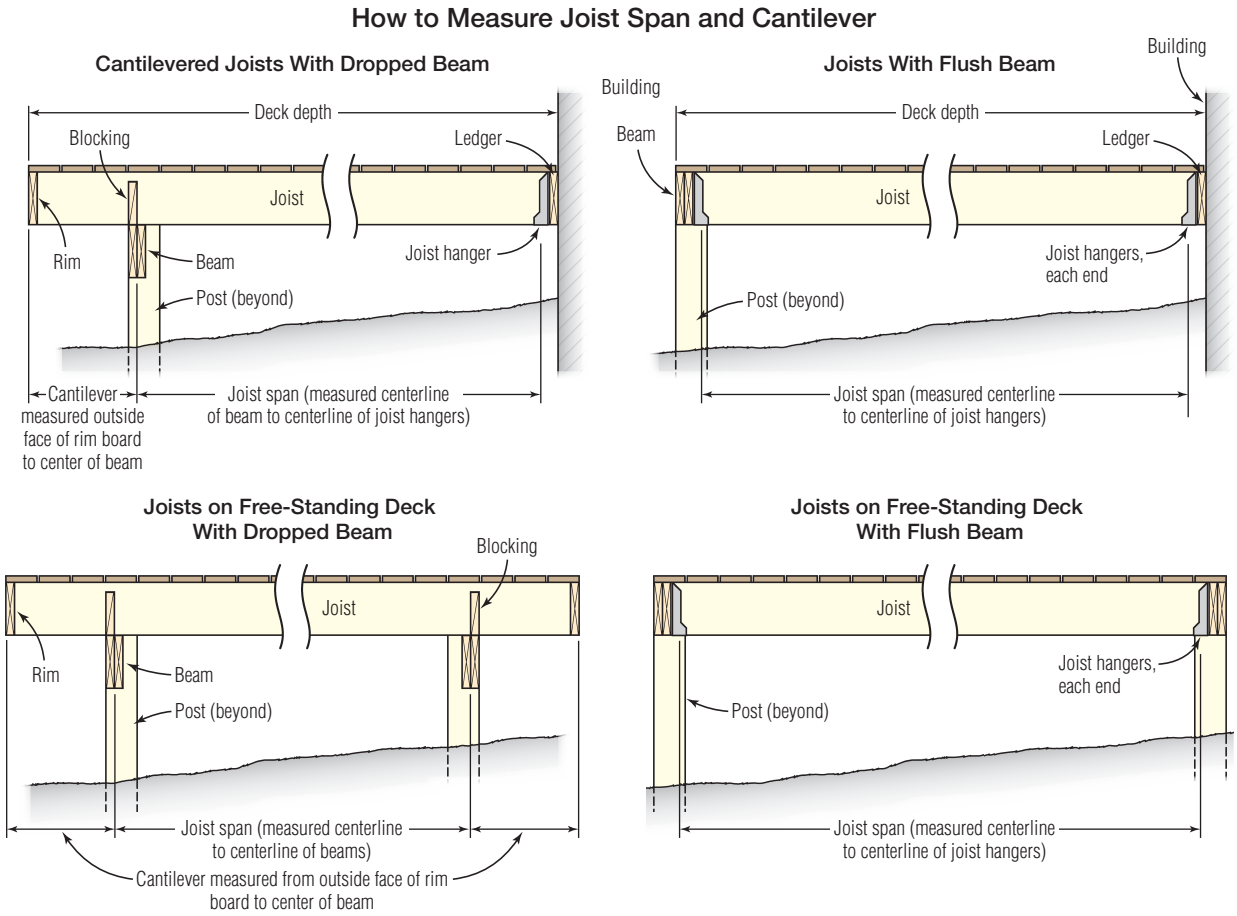

Figure 2. The depth of a deck depends on joist span, cantilever (if any), and other considerations that can add as much as 6 1/2 inches. The illustrations above (adapted from Figure 507.6 in the 2021 IRC) show where measurements for joist span and cantilever begin and end, and how to account for ledgers, rim beams, and hardware when sizing joists.

flush rim beam at the outside, then the span measurement is taken from the center of the joist hanger at the ledger end and the center of the joist hanger at the beam end. Many joist hangers used on decks have a 2-inch-deep saddle that the joists rest on. So a deck with a two-ply flush beam at one end and a single-ply ledger at the house end essentially "gains" 4 inches of deck depth at the outside end and 2 1/2 inches at the inside end—a total of 6 1/2 inches. This may seem like an insignificant distance, but using deck depth instead of joist span may lead you to look down the wrong joist-span column and size the beam with shorter spans than necessary (more about beam sizing in a follow-up article).

On decks where the joists cantilever over a dropped beam, the span measurement is taken from the center of the joist hanger at the ledger end to the center of the beam. The cantilever portion of the joist is not counted as joist span. The depth of a deck with cantilever joists can be several feet greater than the joist span due to the cantilever portion (**Figure 2**).

Measuring Joist Cantilever

The cantilever is measured from the center of the beam to the outside edge of the cantilever, but where that point is can be confusing. The code figure depicts only one of several possible details: the measurement point at the outside face of the rim board—which is also where the figure depicts the edge of the last deck board. If the deck board overhangs past the rim board, then should that projecting edge of decking be the measurement point for cantilever span? What if a fascia board is installed over the rim board and then the decking overhangs the fascia?

In practice, someone could stand on a decking board at its outer edge and thereby put a load that carries back to the deck joists. I would err on the side of being conservative here and measure the cantilever to the outer edge of the decking and not just to the face of the rim board.

We're only talking about an inch or

Selecting Joists for a Deck Design

TABLE R507.6 MAXIMUM DECK JOIST SPANS

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches) Joist spacing (inches) 12	16	24	MAXIMUM CANTILEVER[d,f] (feet-inches) Joist back span[g] (feet)
40 live load	Southern pine	2 × 6	9-11	9-0	7-7	
		2 × 8	13-1	11-10	9-8	
		2 × 10	16-2	14-0	11-5	
		2 × 12	18-0	16-6	13-6	
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	9-6	8-4	6-10	
		2 × 8	12-6	11-1	9-1	
		2 × 10	15-8	13-7	11-1	

Example: A flush-framed deck with a double rim beam, an outside dimension of 13'-6", southern pine, and a 40-psf live load. (The deck design also calls for synthetic decking laid diagonally.) Go to 40-psf southern pine row, choose closest allowable spans; in this case, 13'-1" for southern pine 2x8s at 12" o.c.

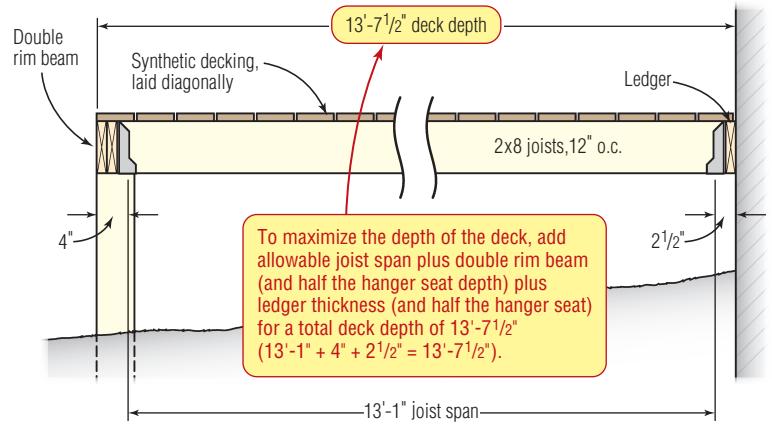

Figure 3. In this example, a deck with a flush double rim-beam with an outside dimension of 13 feet 6 inches and synthetic decking laid diagonally, choose the 12-inch-o.c. joist-spacing column. From the table, find the closest allowable span: 13 feet 1 inch (2x8s at 12 inches o.c.) under the 40-psf southern pine row. Adding 4 inches (to account for the double rim beam and half the width of a joist hanger) and 2 1/2 inches (to account for the ledger and half the width of a joist hanger) to the 13-foot-1-inch joist span yields a 13-foot-7 1/2-inch maximum deck depth.

two between a fascia board and decking overhang, but sometimes that may be just the distance you need to start and end with full deck boards at the outside and along the wall. It may be worth checking with your local building department to see if it counts the overhanging decking as part of the cantilever span.

Applying the Table

There are several ways you can approach using the joist table. The inside-out approach starts with a predetermined measurement on a deck plan that you match to lengths listed in the field cells of the table. There's rarely a perfect match but you can choose lengths that are a little greater than the design measurement, then follow rows and columns outward to see what joist-size and spacing options there are to select from.

Inside-out example: Shown in Figure 3 is a flush double rim-beam deck with an outside dimension of 13 feet 6 inches. Knowing that the measurement points are the centers of the joist hangers, we can count on 6 1/2 inches of deck depth that's not counted in the joist span (3-inch beam, 1 inch to center of each joist hanger, and 1 1/2-inch ledger), so the actual joist span is 13 feet 1/2 inch. From the table in the 40-psf southern pine row, the closest allowable spans are: 13 feet 1 inch (2x8s at 12 inches o.c.), 14 feet (2x10s at 16 inches o.c.), and 13 feet 6 inches (2x12s at 24 inches o.c.).

There are other factors that may lead you to select one joist size over another. If you're using synthetic decking laid diagonally, the manufacturer may require 12-inch-o.c. joist spacing, so 2x8s would make the most sense. Cost is another factor; it may be more cost-effective to use 2x12s at 24 inches o.c. if using 2x6 PT decking—which can easily span over joists set at 24 inches o.c.—rather than 2x10s at 16 inches o.c. or 2x8s at 12 inches o.c.

Outside-in example: You can also work from the outside in. Select the joist size and spacing you think will work, then check the joist span length in the field cell to see if your choice meets the joist span of the design. For example, your plan is to use southern pine 2x8s at 12 inches o.c. to span 12 feet for the deck design. Reading down the 12-inch-o.c. joist-spacing column to the matching 2x8 row, you'll find that the allowable joist span is 13 feet 1 inch, so you're good to go. This method doesn't lend itself to maximizing joist span but rather just affirms that a joist species, size, and span won't exceed the maximum distance listed in the field cell.

Organic approach. Or, you can work organically while you're designing a deck plan by checking joist spans and cantilever lengths in the table and adjusting the design to get the most span out of a joist and cantilever.

When using the organic approach, I may have a target deck depth of 13 feet 6 inches and plan to use southern pine 2x10s at 16 inches o.c. 2x10s can span 14 feet, which meets my deck-depth criteria. But reconsidering the deck depth, I could change the design to use the full

14-foot allowable joist span and build a larger deck that's 14 feet 6 inches deep, for the cost of a few more deck boards. Since I usually use PT southern pine lumber, I've almost memorized that small portion of the span table so I can make quick assessments of joist size and spacing when doodling out a rough deck design.

Adding a Cantilever

The 2018 IRC version of the joist table requires a two-step procedure to verify the maximum distance of a joist cantilever over a dropped beam. You have to calculate one-quarter of the back span of the joist (L/4) and compare it to the results from the maximum-cantilever columns in the table. Whichever is less prevails.

The 2021 IRC simplifies the process to a single step: looking at the distance in a table cell. Once you've selected a joist size and know the joist span between the center of the beam and the center of the joist hanger at the ledger, you read down the corresponding joist-back-span column.

For example (following the 40-psf live-load table section), if you're installing southern pine 2x10s at 16 inches o.c. with a 14-foot joist span (the maximum allowable), follow the 14-foot joist-back-span column down to the 2x10 row and read the entry: 3 feet 4 inches (**Figure 4**).

If you want to maximize the depth of the deck, you can add the allowable joist span and maximum cantilever measurements together, in addition to the ledger thickness and half the hanger seat depth at the house side of the deck. So, the maximum total deck depth would be 17 feet 6 1/2 inches from the face of the wall where the ledger is mounted to the edge of the decking when using 2x10s at 16 inches o.c. (14 feet + 3 feet 4 inches + 2 1/2 inches = 17 feet 6 1/2 inches).

You don't have to use the entire cantilever distance allowed, but it is available.

Interpolation

Say your design calls for a deck depth of 14 feet 6 inches, just out of reach for 2x10s at 24 inches o.c. According to Table R507.6, the allowable joist span for a 2x10 would be 11 feet 5 inches, with a maximum cantilever (taken from the "10" joist-back-span column) of 2 feet 6 inches, for a total span of 13 feet 11 inches. Even adding 2 1/2 inches for the ledger and half the hanger seat, the total maximum deck depth is 14 feet 1 1/2 inches. To frame the deck, you could change the joist spacing from 24 to 16 inches o.c. with a joist span of up to 14 feet plus a cantilever to total 14 feet 6 inches. Or you could change the joists to 2x12s at 24 inches o.c. with a joist span up to 13 feet 6 inches plus a cantilever to total 14 feet 6 inches. Or you can interpolate (see Footnote "g" at the bottom of Table R507.6).

Essentially, interpolation means calculating the measurements for cantilevers (in this case) that fall between the 2-foot increments of the joist-back-span columns. For example, a simple interpolation would be a joist-back-span measurement that falls precisely halfway between two columns—say 11 feet, falling

Selecting Maximum Allowable Cantilever

TABLE R507.6 MAXIMUM DECK JOIST SPANS

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches) Joist spacing (inches) 12	16	24	MAXIMUM CANTILEVER[d,f] (feet-inches) Joist back span[g] (feet) 4	6	8	10	12	14	16	18
40 live load	Southern pine	2 × 6	9-11	9-0	7-7	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	13-1	11-10	9-8	1-0	1-6	2-0	2-6	2-3	NP	NP	NP
		2 × 10	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-4	3-4	NP
		2 × 12	18-0	16-6	13-6	1-0	1-6	2-0	2-6	3-6	3-6	4-0	4-1
	Douglas fir-larch[e]	2 × 6	9-6	8-4	6-10	1-0	1-6	1-4	NP	NP	NP	NP	NP
	Hem-f	2 × 8	12-6	11-1	9-1	1-0	1-6	2-0	2-3	2-0	NP	NP	NP
	Spruc												P
													11

Example: To determine the "maximum cantilever" for southern pine 2x10s at 16" o.c. with a 14'-0" maximum allowable joist span and a 40-psf live load, follow the 14'-0" "joist back span" column down to the 2x10 row, find 3'-4".

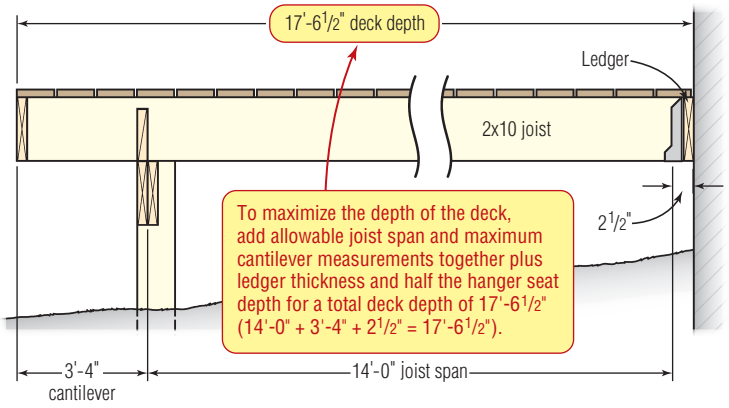

Figure 4. To determine the maximum cantilever for southern pine 2x10s at 16 inches on-center with a 14-foot joist span (the maximum allowable) and a 40-psf live load, follow the 14-foot "Joist back span" column down to the 2x10 row and read the entry—3 feet 4 inches. To maximize the depth of the deck, add the allowable joist span and maximum cantilever measurements together plus the ledger thickness and half the hanger seat depth at the house side of the deck for a total deck depth of 17 feet 6 1/2 inches.

Interpolating Maximum Cantilever

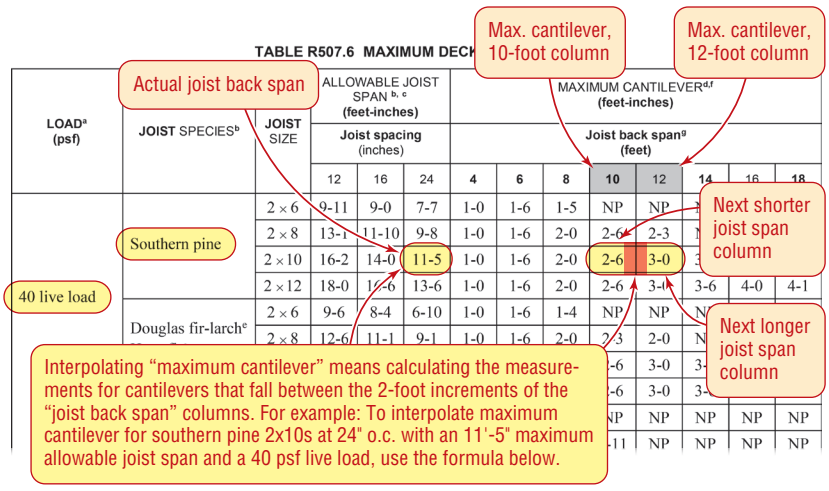

TABLE R507.6 MAXIMUM DECK

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches) Joist spacing (inches)			MAXIMUM CANTILEVER[d,f] (feet-inches) Joist back span[g] (feet)							
			12	16	24	4	6	8	10	12	14	16	18
40	Southern pine	2×6	9-11	9-0	7-7	1-0	1-6	1-5	NP	NP			
		2×8	13-1	11-10	9-8	1-0	1-6	2-0	2-6	2-3			
		2×10	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0			
		2×12	18-0	16-6	13-6	1-0	1-6	2-0	2-6	3-0	3-6	4-0	4-1
	Douglas fir-larch[e]	2×6	9-6	8-4	6-10	1-0	1-6	1-4	NP	NP			
		2×8	12-6	11-1	9-1	1-0	1-6	2-0	2-3	2-0			
									-6	3-0			
									-6	3-0			
									NP	NP	NP	NP	NP
									-11	NP	NP	NP	NP

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Interpolation Formula

$$\text{Interpolated cantilever} = \text{Max. cantilever, 10-foot column (2'-6")} + \left(\text{Actual joist back span (11'-5")} - \text{Next shorter joist span column (10'-0")}\right) \times \frac{\left(\text{Max. cantilever, 12-foot column (3'-0")} - \text{Max. cantilever, 10-foot column (2'-6")}\right)}{\left(\text{Next longer joist span column (12'-0")} - \text{Next shorter joist span column (10'-0")}\right)}$$

$$\text{Interpolated cantilever} = 2'\text{-}6" + (11'\text{-}5" - 10'\text{-}0") \times \frac{(3'\text{-}0" - 2'\text{-}6")}{(12'\text{-}0" - 10'\text{-}0")}$$

$$2'\text{-}6" + (1'\text{-}5") \times \frac{(6")}{(24")} = 2'\text{-}6" + (1'\text{-}5") \times (.25") = 2'\text{-}6" + 4\tfrac{1}{4}" = 2'\text{-}10\tfrac{1}{4}"$$

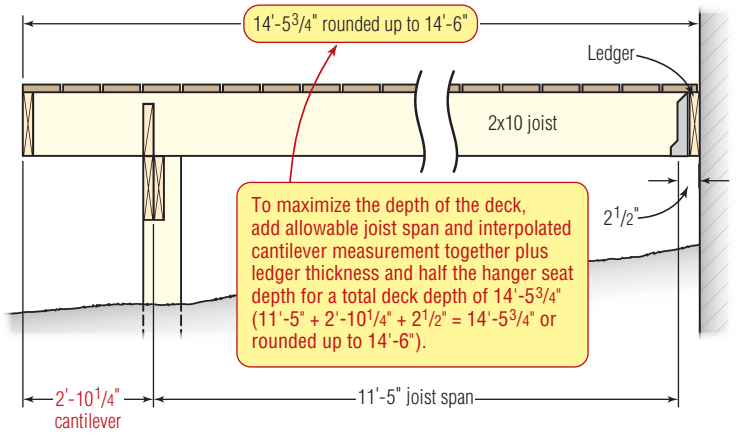

Figure 5. Footnote "g" in Table R507.6 allows for the interpolation of cantilevers that fall between the spans listed in the table, following the process outlined above. Solving for y following the formula above yields 2 feet 10 1/4 inches (the interpolated cantilever), which is then added to the joist back span listed in the table (11 feet 5 inches), plus ledger and half the joist hanger seat (2 1/2 inches) for a maximum deck depth of 14 feet 5 3/4 inches, rounded to 14 feet 6 inches.

between the 10- and 12-foot columns. In this example of 2x10s at 24 inches o.c., the interpolation is easy. The maximum cantilever in the 10-foot column is 2 feet 6 inches and the cantilever in the 12-foot column is 3 feet. Halfway between 2 feet 6 inches and 3 feet is 2 feet 9 inches.

When the actual joist back span is not a simple fraction—like one-half or one-quarter the distance between two columns—the process of interpolation requires a formula. Since the 11-foot-5-inch span is much closer to the 12-foot joist-back-span column that has a 3-foot maximum cantilever, you can eke out a few more inches of cantilever by solving the math formula for linear interpolation. It looks scary, but it's just a simple math and order-of-operations problem (**Figure 5**).

Solving for y in this example, the interpolated maximum cantilever for a joist with an 11-foot-5-inch back span equals 2 feet 10 1/4 inches. Total up the joist span (11 feet 5 inches) + cantilever (2 feet 10 1/4 inches) + ledger and half hanger seat (2 1/2 inches) = 14 feet 5 3/4 inches, rounded to 14 feet 6 inches. Yes, you can round up or down as needed so you don't have fractional results. Even the values in the table are rounded to keep it simple.

Okay, I'm splitting hairs here with interpolation and adding back the ledger and half the hanger seat distance to stretch as much deck depth out of the code table as possible. Most deck builders would probably upsize the joists or reduce the joist spacing and add the extra lumber cost into the job price. And I wouldn't fault anyone for doing that. But there are times where a board stretcher comes in handy, and that is exactly what Table R507.6 and Figure R507.6 have tucked inside.

In a future article about sizing deck beams, I'll use another addition to the 2021 IRC akin to interpolation to get the most out of beam spans and reduce the number of footings in the process. ❖

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