

STATE BUILDING CODE INTERPRETATION NO. 16-OCT-02

CODE: 2015 International Residential Code

SECTION: Section R301.5 Live load – Table R301.5 – Minimum Uniformly Distributed Live Loads
Section R507 Exterior Decks

QUESTION: **The state amended the live load in Table R301.5 for decks and balconies from 40 pounds per square foot (psf) to 60 psf.**

The 2015 IRC Section 507- Exterior Decks, includes joist and beam span tables, and a ledger connection table, which contain values for live load on decks and balconies based on 40 psf.

Does the state amendment include tables referred to in Section 507, to ensure deck construction is safely accomplished under the amended uniform live load in Table R301.5?

ANSWER: **No, the state amendment does not include amended tables. However, the revised tables included in this interpretation have been calculated assuming a 60 psf live load.**
The revised tables were developed using the engineering provisions in the National Design Standard (NDS), as published by the American Wood Council (AWC). In general, for Doug-Fir and Hem-Fir lumber (most commonly used in Washington):

- Joist spans are reduced an average of 11%. (Range: 19% decrease to 19% increase. Median: 15% decrease.)
- Beam spans reduced an average of 8% (Range: 30% decrease to 13% increase. Median: 5% decrease). Shorter joist spans most often resulted in no change or increased beam span. Longer joist spans mostly resulted in decreased beam spans.
- Ledger bolt spacing reduced an average of 38% (Range: 17% to 48% decrease. Median: 44% decrease.)

- o Lag bolt spacing reduced an average of 29% (Range: 27% to 30% decrease. Median: 28% decrease.)
- o Through-bolt spacing reduced an average of 42% (Range: 17% to 48% decrease. Median: 47% decrease.)
- o Through-bolt (with ½” stacked washer spacers) spacing reduced an average of 43% (Range: 28% to 48% decrease. Median: 45% decrease.)

SUPERSEDES: None

REQUESTED BY: City of Seattle

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST^{a, b} (Deck live load = 40–60 psf, deck dead load = 10 psf, snow load ≤ 40–60 psf)

CONNECTION DETAILS	JOIST SPAN						
	6' and less	6'1" to 8'	8'1" ² to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
	On-center spacing of fasteners						
½ inch diameter lag screw with ½ inch maximum sheathing ^{c, d}	30 <u>22</u>	23 <u>16</u>	18 <u>13</u>	15 <u>11</u>	13 <u>9</u>	11 <u>8</u>	10 <u>7</u>
½ inch diameter bolt with ½ inch maximum sheathing ^d	36 <u>30</u>	36 <u>22</u>	34 <u>18</u>	29 <u>15</u>	24 <u>13</u>	21 <u>11</u>	19 <u>10</u>
½ inch diameter bolt with 1 inch maximum sheathing ^e	36 <u>26</u>	36 <u>19</u>	29 <u>16</u>	24 <u>13</u>	21 <u>11</u>	18 <u>10</u>	16 <u>9</u>

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

- Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- Snow load shall not be assumed to act concurrently with live load.
- The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- Sheathing shall be wood structural panel or solid sawn lumber.
- Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

**TABLE 507.5
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 <u>8-6</u>	9-0 <u>7-9</u>	7-7 <u>6-9</u>	6-8 <u>7-7</u>	6-8 <u>6-10</u>	6-8 <u>6-0</u>
	2 × 8	13-1 <u>11-2</u>	11-10 <u>10-2</u>	9-8 <u>8-11</u>	10-1 <u>9-10</u>	10-1 <u>8-11</u>	9-8 <u>7-9</u>
	2 × 10	16-2 <u>14-4</u>	14-0 <u>13-0</u>	11-5 <u>10-11</u>	14-6 <u>15-5</u>	14-0 <u>13-4</u>	11-5 <u>10-11</u>
	2 × 12	18-0 <u>17-5</u>	16-6 <u>15-5</u>	13-6 <u>12-7</u>	18-0 <u>17-11</u>	16-6 <u>15-6</u>	13-6 <u>12-8</u>
Douglas fir- larch ^d , hem-fir ^d , spruce- pine-fir ^d	2 × 6	9-6 <u>8-1</u>	8-8 <u>7-0</u>	7-2 <u>5-9</u>	6-3 <u>7-5</u>	6-3 <u>6-9</u>	6-3 <u>5-9</u>
	2 × 8	12-6 <u>10-10</u>	11-1 <u>9-5</u>	9-1 <u>7-8</u>	9-5 <u>9-7</u>	9-5 <u>8-8</u>	9-1 <u>7-7</u>
	2 × 10	15-8 <u>13-3</u>	13-7 <u>11-6</u>	11-1 <u>9-4</u>	13-7 <u>13-3</u>	13-7 <u>11-6</u>	11-1 <u>9-5</u>
	2 × 12	18-0 <u>15-4</u>	15-9 <u>13-4</u>	12-10 <u>10-10</u>	18-0 <u>15-5</u>	15-9 <u>13-4</u>	12-10 <u>10-11</u>
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 × 6	8-10 <u>7-6</u>	8-0 <u>6-9</u>	7-0 <u>5-6</u>	5-7 <u>6-10</u>	5-7 <u>6-2</u>	5-7 <u>5-4</u>
	2 × 8	11-8 <u>9-10</u>	10-7 <u>8-6</u>	8-8 <u>6-11</u>	8-6 <u>8-10</u>	8-6 <u>8-0</u>	8-6 <u>6-11</u>
	2 × 10	14-11 <u>12-0</u>	13-0 <u>10-5</u>	10-7 <u>8-6</u>	12-3 <u>12-1</u>	12-3 <u>10-6</u>	10-7 <u>8-7</u>
	2 × 12	17-5 <u>13-11</u>	15-1 <u>12-1</u>	12-4 <u>9-10</u>	16-5 <u>14-0</u>	15-1 <u>12-2</u>	12-4 <u>9-11</u>

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.

- No. 2 grade with wet service factor.
- Ground snow load, live load = 40–60 psf, dead load = 10 psf, L/Δ = 360.
- Ground snow load, live load = 40–60 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.
- Includes incising factor.
- Northern species with no incising factor
- Cantilevered spans not exceeding the nominal depth of the joist are permitted.

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 x 6	<u>6-11</u> <u>6-4</u>	<u>5-11</u> <u>6-0</u>	<u>5-4</u> <u>5-6</u>	<u>4-10</u> <u>4-7</u>	<u>4-6</u> <u>3-11</u>	<u>4-3</u> <u>3-5</u>	<u>4-0</u> <u>3-0</u>
	2 - 2 x 8	<u>8-9</u> <u>8-11</u>	<u>7-7</u> <u>8-5</u>	<u>6-9</u> <u>7-2</u>	<u>6-2</u> <u>6-0</u>	<u>5-9</u> <u>5-2</u>	<u>5-4</u> <u>4-6</u>	<u>5-0</u> <u>4-0</u>
	2 - 2 x 10	<u>10-4</u> <u>11-11</u>	<u>9-0</u> <u>10-9</u>	<u>8-0</u> <u>9-2</u>	<u>7-4</u> <u>7-8</u>	<u>6-9</u> <u>6-7</u>	<u>6-4</u> <u>5-9</u>	<u>6-0</u> <u>5-1</u>
	2 - 2 x 12	<u>12-2</u> <u>14-5</u>	<u>10-7</u> <u>12-7</u>	<u>9-5</u> <u>11-2</u>	<u>8-7</u> <u>9-4</u>	<u>8-0</u> <u>8-0</u>	<u>7-6</u> <u>7-0</u>	<u>7-0</u> <u>6-3</u>
	3 - 2 x 6	<u>8-2</u> <u>8-1</u>	<u>7-5</u> <u>7-8</u>	<u>6-8</u> <u>7-3</u>	<u>6-4</u> <u>6-10</u>	<u>5-8</u> <u>5-10</u>	<u>5-3</u> <u>5-1</u>	<u>5-0</u> <u>4-7</u>
	3 - 2 x 8	<u>10-10</u> <u>11-3</u>	<u>9-6</u> <u>10-4</u>	<u>8-6</u> <u>9-5</u>	<u>7-9</u> <u>8-10</u>	<u>7-2</u> <u>7-9</u>	<u>6-8</u> <u>6-9</u>	<u>6-4</u> <u>6-0</u>
	3 - 2 x 10	<u>13-0</u> <u>14-5</u>	<u>11-3</u> <u>12-10</u>	<u>10-0</u> <u>11-10</u>	<u>9-2</u> <u>10-10</u>	<u>8-6</u> <u>9-10</u>	<u>7-11</u> <u>8-7</u>	<u>7-6</u> <u>7-8</u>
	3 - 2 x 12	<u>15-3</u> <u>17-3</u>	<u>13-3</u> <u>15-4</u>	<u>11-10</u> <u>13-10</u>	<u>10-9</u> <u>12-7</u>	<u>10-0</u> <u>11-7</u>	<u>9-4</u> <u>10-6</u>	<u>8-10</u> <u>9-4</u>
Douglas fir-larch ^e , hem-fir ^e , spruce-pine-fir ^e , redwood, western cedars, ponderosa pine ^f , red pine ^f	3 x 6 or 2 - 2 x 6	<u>5-5</u> <u>5-5</u>	<u>4-8</u> <u>4-5</u>	<u>4-2</u> <u>3-6</u>	<u>3-10</u> <u>2-11</u>	<u>3-6</u> <u>2-6</u>	<u>3-1</u> <u>2-2</u>	<u>2-9</u> <u>1-11</u>
	3 x 8 or 2 - 2 x 8	<u>6-10</u> <u>7-3</u>	<u>5-11</u> <u>5-9</u>	<u>5-4</u> <u>4-8</u>	<u>4-10</u> <u>3-10</u>	<u>4-6</u> <u>3-4</u>	<u>4-1</u> <u>2-11</u>	<u>3-8</u> <u>2-7</u>
	3 x 10 or 2 - 2 x 10	<u>8-4</u> <u>8-11</u>	<u>7-3</u> <u>7-5</u>	<u>6-6</u> <u>5-11</u>	<u>5-11</u> <u>4-11</u>	<u>5-6</u> <u>4-3</u>	<u>5-1</u> <u>3-8</u>	<u>4-8</u> <u>3-3</u>
	3 x 12 or 2 - 2 x 12	<u>9-8</u> <u>10-4</u>	<u>8-5</u> <u>8-11</u>	<u>7-6</u> <u>7-2</u>	<u>6-10</u> <u>6-0</u>	<u>6-4</u> <u>5-2</u>	<u>5-11</u> <u>4-6</u>	<u>5-7</u> <u>4-0</u>
	4 x 6	<u>6-5</u> <u>6-3</u>	<u>5-6</u> <u>5-11</u>	<u>4-11</u> <u>4-11</u>	<u>4-6</u> <u>4-1</u>	<u>4-2</u> <u>3-6</u>	<u>3-11</u> <u>3-1</u>	<u>3-8</u> <u>2-9</u>
	4 x 8	<u>8-5</u> <u>8-9</u>	<u>7-3</u> <u>7-9</u>	<u>6-6</u> <u>6-6</u>	<u>5-11</u> <u>5-5</u>	<u>5-6</u> <u>4-8</u>	<u>5-2</u> <u>4-1</u>	<u>4-10</u> <u>3-7</u>
	4 x 10	<u>9-11</u> <u>11-0</u>	<u>8-7</u> <u>9-6</u>	<u>7-8</u> <u>8-3</u>	<u>7-0</u> <u>6-11</u>	<u>6-6</u> <u>5-11</u>	<u>6-1</u> <u>5-2</u>	<u>5-8</u> <u>4-7</u>

TABLE R507.6
DECK BEAM SPAN LENGTHS^{a, b} (ft. - in.) (Continued)

SPECIES ^c	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
	4 × 12	11-5 <u>12-10</u>	9-11 <u>11-1</u>	8-10 <u>10-0</u>	8-1 <u>8-5</u>	7-6 <u>7-2</u>	7-0 <u>6-3</u>	6-7 <u>5-7</u>
	3 – 2 × 6	7-4 <u>6-11</u>	6-8 <u>6-6</u>	6-0 <u>6-1</u>	5-6 <u>5-3</u>	5-1 <u>4-6</u>	4-9 <u>3-11</u>	4-6 <u>3-6</u>
	3 – 2 × 8	9-8 <u>9-8</u>	8-6 <u>8-6</u>	7-7 <u>7-8</u>	6-11 <u>6-11</u>	6-5 <u>5-11</u>	6-0 <u>5-3</u>	5-8 <u>4-8</u>
	3 – 2 × 10	12-0 <u>11-11</u>	10-5 <u>10-4</u>	9-4 <u>9-4</u>	8-6 <u>8-5</u>	7-10 <u>7-7</u>	7-4 <u>6-8</u>	6-11 <u>5-11</u>
	3 – 2 × 12	13-11 <u>13-10</u>	12-1 <u>12-0</u>	10-9 <u>10-10</u>	9-10 <u>9-10</u>	9-1 <u>9-1</u>	8-6 <u>8-1</u>	8-1 <u>7-2</u>

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.

- Ground snow load, live load = ~~40~~–60 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 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.