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RESIDENTIAL JOIST AND RAFTER SPANS – DOUGLAS FIR-LARCH #2

Values are from the 2017 Oregon Residential Specialty Code (2015 IRC). See span tables in the code for additional species, grades and spacing.

Floor Joist Spans

Living areas, live load = 40 psf, L/360

Spacing	Dead Load = 10 psf				Dead Load = 20 psf			
	2x 6	2x 8	2x 10	2x 12	2x 6	2x 8	2x 10	2x 12
12	10'-9"	14'-2"	18'-0"	20'-11"	10'-8"	13'-6"	16'-5"	19'-1"
16	9'-9"	12'-9"	15'-7"	18'-1"	9'-3"	11'-8"	14'-3"	16'-6"
24	8'-3"	10'-5"	12'-9"	14'-9"	7'-6"	9'-6"	11'-8"	13'-6"

Sleeping areas, live load = 30 psf, L/360

Spacing	Dead Load = 10 psf				Dead Load = 20 psf			
	2x 6	2x 8	2x 10	2x 12	2x 6	2x 8	2x 10	2x 12
12	11'-10"	15'-7"	19'-10"	23'-4"	11'-8"	14'-9"	18'-0"	20'-11"
16	10'-9"	14'-2"	17'-5"	20'-3"	10'-1"	12'-9"	15'-7"	18'-1"
24	9'-3"	11'-8"	14'-3"	16'-6"	8'-3"	10'-5"	12'-9"	14'-9"

Rafter Spans (Snow = 30 psf)

Ceiling not attached to rafters, L/180

Spacing	Dead Load = 10 psf					Dead Load = 20 psf				
	2x 4	2x 6	2x 8	2x 10	2x 12	2x 4	2x 6	2x 8	2x 10	2x 12
12	9'-6"	14'-0"	17'-8"	21'-7"	25'-1"	8'-6"	12'-6"	15'-10"	19'-4"	22'-5"
16	8'-3"	12'-1"	15'-4"	18'-9"	21'-8"	7'-5"	10'-10"	13'-8"	16'-9"	19'-5"
24	6'-9"	9'-10"	12'-6"	15'-3"	17'-9"	6'-0"	8'-10"	11'-2"	13'-8"	15'-10"

Ceiling attached to rafters, L/240

Spacing	Dead Load = 10 psf					Dead Load = 20 psf				
	2x 4	2x 6	2x 8	2x 10	2x 12	2x 4	2x 6	2x 8	2x 10	2x 12
12	8'-7"	13'-6"	17'-8"	21'-7"	25'-1"	8'-6"	12'-6"	15'-10"	19'-4"	22'-5"
16	7'-10"	12'-1"	15'-4"	18'-9"	21'-8"	7'-5"	10'-10"	13'-8"	16'-9"	19'-5"
24	6'-9"	9'-10"	12'-6"	15'-3"	17'-9"	6'-0"	8'-10"	11'-2"	13'-8"	15'-10"

Ceiling Joists - Uninhabitable attics

Limited storage (see note)

Live load = 20 psf, dead load = 10 psf, L/240

Spacing	2x 4	2x 6	2x 8	2x 10
12	9'-10"	15'-0"	19'-1"	23'-3"
16	8'-11"	13'-0"	16'-6"	20'-2"
24	7'-3"	10'-8"	13'-6"	16'-5"

Without Storage (see note)

Live load = 10 psf, dead load = 5 psf, L/240

Spacing	2x 4	2x 6	2x 8	2x 10
12	12'-5"	19'-6"	25'-8"	26'-0"
16	11'-3"	17'-8"	23'-4"	26'-0"
24	9'-10"	15'-0"	19'-1"	23'-3"

Note: Uninhabitable attics **without storage** are those where the clear height between joists and rafters is **not more than 42 inches**.

Uninhabitable attics **with limited storage** are those where the clear height between joists and rafters is **42 inches or greater**.

The 20 psf live load need only be applied to those portions of the joists where all the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists are not greater than 2 inches vertical to 12 inches horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth or where additional framing is installed above the insulation to accommodate storage.

The remaining portions of the joists shall be designed for a uniformly distributed concurrent live load of not less than 10 psf.

See other side for rafter-to-joist connection requirements and roof/floor beams.

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RESIDENTIAL JOIST/RAFTER CONNECTIONS AND BEAM SPANS

Rafter/joist connection requirements for 30 psf Snow Load

Number of 16d common nails per heel joint.					
Rafter slope	Rafter spacing	Roof Span			
		12	20	28	36
3:12	12	4	6	8	11
	16	5	8	11	14
	24	7	11	16	21
4:12	12	3	5	6	8
	16	4	6	8	11
	24	5	9	12	16
5:12	12	3	4	5	7
	16	3	5	7	9
	24	4	7	10	13
7:12	12	3	3	4	5
	16	3	4	5	6
	24	3	5	7	9
9:12	12	3	3	3	4
	16	3	3	4	5
	24	3	4	6	7
12:12	12	3	3	3	3
	16	3	3	3	4
	24	3	3	4	6

- a. 10d box nails shall be permitted to be substituted for 16d common nails.
- b. Nailing requirements shall be permitted to be reduced 25 percent if nails are clinched.
- c. Heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.
- d. Where intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements shall be permitted to be reduced proportionally to the reduction in span.
- e. Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.
- f. Where rafter ties are substituted for ceiling joists, the heel joint connection requirement shall be taken as the tabulated heel joint connection requirement for two-thirds of the actual slope.
- g. Applies to roof live load of 20 psf or less.
- h. Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. Where ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the following factors:

HC/HR	Heel joint Adjustment Factor
1/3	1.5
1/4	1.33
1/5	1.25
1/6	1.2
1/10 or less	1.11

HC = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
HR = Height of roof ridge measured vertically above the top of the rafter support walls.

Roof and floor beam allowable loads (PLF)

Member	Span (Feet)							
	4	6	8	10	12	14	16	18
4x 4	460 (385)	199 (127)	113 (57)	60 (30)				
4x 6	960 (825)	427 (371)	240 (224)	154 (1150)	107 (67)			
4x 8	1600 (1485)	744 (647)	449 (364)	268 (263)	186 (153)	137 (96)	105 (64)	
4x 10	2520 (2200)	1080 (890)	628 (546)	402 (349)	279 (317)	205 (200)	157 (134)	124 (94)
4x 12	3000 (3025)	1460 (831)	718 (624)	544 (473)	378 (329)	277 (241)	213 (184)	168 (146)
DBL 2x 4	191 (166)	85 (59)	48 (25)					
DBL 2x 6	300 (261)	183 (159)	103 (90)	66 (49)				
DBL 2x 8	396 (344)	265 (230)	165 (143)	105 (92)	73 (64)			
DBL 2x 10	506 (440)	357 (293)	247 (214)	158 (137)	110 (95)			
DBL 2x 12	614 (534)	409 (356)	307 (267)	212 (184)	147 (128)			

Values are for DFL #2, roof snow load = 25 psf. Numbers in parentheses are allowable loads for floors. Nail DBL 2x headers together with 16d nails at 16 inches o.c. each edge.