**Example 1 – How to Read the Table Values**

*Given:* Use Table 1: Floor Joists – 30 psf Live Load, 10 psf Dead Load, 360 Deflection. Table 1 is for all rooms used for sleeping areas and attic floors where the design loads do not exceed 30 psf (pounds per square foot) live load, 10 psf dead load and the live load deflection limit does not exceed the span (in inches) divided by 360.

*Find:* The maximum horizontal span in feet and inches for:
   a) 2x8 Dense Select Structural spaced 16” on-center
   b) 2x10 2400f-2.0E spaced 19.2” on-center
   c) 2x12 M-12 MEL spaced 24” on-center

Also, if each joist sits completely on top of 2x4 stud walls at each end, how long does each joist need to be for the maximum span?

*Solution:* The note in the upper right-hand corner of the table states that maximum spans are given in feet and inches, so the answers can be found listed in the table:
   a) 15’-0”
   b) 18’-3”
   c) 19’-2”

The second part of the note in the upper right-hand corner of the table states the listed maximum spans represent the distance from inside face of bearing to inside face of bearing, also known as the “clear span”. If each end of the joists bears completely on top of a 2x4 stud wall, the overall length of these joists will be the maximum span plus seven inches (i.e., the net width of a 2x4 stud wall is 3-1/2”, times two walls equals 7”). Therefore the overall joist lengths needed are:
   a) 15’0” plus 7” = 15’-7”
   b) 18’-10”
   c) 19’-9”

**Example 2 – Floor Joists for Residential Construction**

*Given:* A 14’ living room with 2x4 bearing walls.

*Find:* The size and spacing of Southern Pine No. 2 floor joists needed.

*Solution:* Use Table 2: Floor Joists – 40 psf Live Load, 10 psf Dead Load, 360 Deflection. Table 2 is for all rooms except those used for sleeping areas and attic floors. The required horizontal span is 14’ – (2 times 3-1/2”) = 13’-5”. Select No. 2 Southern Pine 2x12s spaced 24” on center which can span 13’-6”, or No. 2 Southern Pine 2x10s spaced 16” on center which can span 14’-0”.

**Example 3 – Joists for an Outdoor Deck**

*Given:* A 12’x14’ outdoor deck for a single-family home.

*Find:* Some grades, sizes and spacings of Southern Pine lumber for single spans in either direction.

*Solution:* Use Table 12: Wet-Service Floor Joists – 40 psf Live Load, 10 psf Dead Load, 360 Deflection.

If the joists span the full 14’ direction:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Size</th>
<th>Spacing</th>
<th>Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>2x10</td>
<td>19.2”</td>
<td>14’-8”</td>
</tr>
<tr>
<td>No. 2</td>
<td>2x10</td>
<td>16”</td>
<td>14’-0”</td>
</tr>
<tr>
<td>2400f-2.0E</td>
<td>2x10</td>
<td>24”</td>
<td>14’-11”</td>
</tr>
<tr>
<td>M-14 or M-29</td>
<td>2x10</td>
<td>24”</td>
<td>14’-1”</td>
</tr>
</tbody>
</table>

If the joists span the full 12’ direction:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Size</th>
<th>Spacing</th>
<th>Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>2x8</td>
<td>16”</td>
<td>12’-5”</td>
</tr>
<tr>
<td>No. 2</td>
<td>2x10</td>
<td>19.2”</td>
<td>12’-10”</td>
</tr>
<tr>
<td>1650f-1.5E</td>
<td>2x8</td>
<td>16”</td>
<td>12’-2”</td>
</tr>
<tr>
<td>M-12</td>
<td>2x8</td>
<td>16”</td>
<td>12’-5”</td>
</tr>
</tbody>
</table>

*Note:* Tables 12, 13 and 14 assume the moisture content in use will exceed 19 percent for an extended period of time. When calculating spans for these tables labeled “Wet-Service”, reference design values were reduced by the appropriate wet service factors. Generally, building codes require pressure-treated or naturally durable wood for protection against decay and termites in wet-service applications such as outdoor decks. Building codes also require that fasteners and connectors in contact with pressure-treated wood must be corrosion resistant.

Southern Pine’s ease of treatability has made it the preferred species when pressure treatment with preservatives is required. The unique cellular structure of Southern Pine permits deep penetration of preservatives, rendering the wood useless as a food source for fungi, termites and micro-organisms. Because of its superior treatability, Southern Pine is one of the few wood species that does not require incising. Refer to Pressure-Treated Southern Pine published by the Southern Forest Products Association for more complete information on types of wood preservatives, retention levels required for various products and applications, and recommendations for fasteners and connectors.

*Users of these span tables have the final responsibility for determining if the load and design assumptions represent actual conditions for their specific applications.*
**Example 4 – Floor Joists for an Office**

**Given:** An office floor requiring a horizontal span of 18'-0”.

**Find:** A possible Southern Pine 2x10 floor joist.

**Solution:** Use Table 6: Floor Joists – 50 psf Live Load, 20 psf Dead Load, 360 Deflection. One possible option is 2400f-2.0E MSR Southern Pine 2x10s spaced 12” on center.

**Note:** The spans in this publication were calculated assuming uniformly distributed gravity loads only. The footnote to all tables states that these spans do not include checks for concentrated loads that may be required by building codes for specific occupancy or use categories. For example, the 2012 International Building Code® (IBC®) requires that office floors be designed to support a uniformly distributed live load of 50 psf, or a 2000 lb concentrated load distributed over a 2.5’x2.5’ base area, whichever produces the greater load effects. Also, in office buildings and in other buildings where partition locations are subject to change, a uniformly distributed live load of not less than 15 psf is required for partitions unless the specified live load exceeds 80 psf. Table 6 does not account for either of these load cases so further analysis may be required to determine a final solution.

**Example 5 – Rafters for Residential Construction**

**Given:** A residential roof with a 6 in 12 slope. The roof is to be constructed with a medium roof covering (up to two courses of asphalt shingles, or wood shakes/shingles) and without a drywall ceiling attached to the underside of the rafters. The required horizontal span is 12'-0” and the rafters must support a 50 psf snow load.

**Find:** An acceptable grade, size and on-center spacing for:

- a) Visually graded lumber
- b) Machine Stress Rated (MSR) lumber
- c) The corresponding sloping distance of the rafters based on the required horizontal span.

**Solution:** Use Table 36: Rafters – 50 psf Live Load, 15 psf Dead Load, 180 Deflection, C_D = 1.15 (Snow).

- a) Select No. 1 Southern Pine 2x8s spaced 16” on center which can span 12’-11”.
- b) Select 2400f-2.0E MSR Southern Pine 2x6s spaced 16” on center which can span 12’-3”.
- c) Use the Conversion Diagram for Rafters on page 32. Find the horizontal span of 12’ along the horizontal axis. Follow the vertical line upward to its intersection with the radial line for a 6 in 12 slope. Then follow the arc line upward and to the left to read the sloping distance of approximately 13’-6”.

**Note:** When calculating spans for rafter tables, reference design values were increased by the appropriate load duration factor. The load duration factor, C_D, for snow loads is 1.15.

Generally, a deflection limit of 240 applies to rafters with a drywall ceiling attached to the underside of the rafters (e.g., cathedral ceilings) while a deflection limit of 180 applies to rafters without a drywall ceiling attached to the underside of the rafters. Some building codes also consider the slope of the rafter when determining deflection limits and only allow the use of 180 for rafters with roof slopes greater than 3 in 12 and no ceiling attached.

* Users of these span tables have the final responsibility for determining if the load and design assumptions represent actual conditions for their specific applications.