### Table 4C  Reference Design Values for Mechanically Graded Dimension Lumber (2"-4" thick)\(^1,2,3\) (Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.)

**USE WITH TABLE 4C ADJUSTMENT FACTORS**

<table>
<thead>
<tr>
<th>Commercial grade</th>
<th>Size classification</th>
<th>Design values in pounds per square inch (psi)</th>
<th>Grading Rules Agency</th>
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</thead>
<tbody>
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<td></td>
<td>Bending (F_b)</td>
<td>Tension parallel to grain (F_t)</td>
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(Continued on following page)
**Table 4C**

Reference Design Values for Mechanically Graded Dimension Lumber (2"-4" thick)¹,²,³

(Cont.)

Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.

**USE WITH TABLE 4C ADJUSTMENT FACTORS**

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<th>Design values in pounds per square inch (psi)</th>
<th>Grading Rules Agency</th>
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<td>(F_t)</td>
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(Continued on following page)
### Table 4C

**Reference Design Values for Mechanically Graded Dimension Lumber (2"-4" thick)**

*(Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.)*

<table>
<thead>
<tr>
<th>Commercial grade</th>
<th>Size classification</th>
<th>Design values in pounds per square inch (psi)</th>
<th>Grading Rules Agency</th>
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</thead>
<tbody>
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<td>Bending</td>
<td>Tension parallel to grain</td>
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<td>F_b</td>
<td>F_t</td>
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**Table 4C Footnotes**

1. **LUMBER DIMENSIONS.** Tabulated design values are applicable to lumber that will be used under dry conditions such as in most covered structures. For 2" to 4" thick lumber the DRY dressed sizes shall be used (see Table 1A) regardless of the moisture content at the time of manufacture or use. In calculating design values, the natural gain in strength and stiffness that occurs as lumber dries has been taken into consideration as well as the reduction in size that occurs when unseasoned lumber shrinks. The gain in load carrying capacity due to increased strength and stiffness resulting from drying more than offsets the design effect of size reductions due to shrinkage.
2. **SPECIFIC GRAVITY, G, SHEAR PARALLEL TO GRAIN, Fv, AND COMPRESSION PERPENDICULAR TO GRAIN, Fc.** Values for specific gravity, G, shear parallel to grain, Fv, and compression perpendicular to grain, Fc, are provided below for MSR and MEL lumber. For species or species groups not shown below, the G, Fv and Fc values for visually graded lumber may be used. Higher G values may be claimed when (a) specifically assigned by the rules writing agency or (b) when qualified by test, quality controlled for G and provided for on the grade stamp. When a different G value is provided on the grade stamp, higher Fv and Fc design values may be calculated in accordance with the grading rule requirements.

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<th>Species</th>
<th>Modulus of Elasticity E (x10^6) psi</th>
<th>Specific Gravity G</th>
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<th>Grade values in psi</th>
<th>Grading Rules Agency</th>
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<td>Compression perpendicular to grain</td>
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<td>690</td>
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<td>Hem-Fir (N)</td>
<td>1.0 and higher</td>
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<td>145</td>
<td>405</td>
<td>NLGA</td>
</tr>
<tr>
<td>Southern Pine</td>
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<td>0.55</td>
<td>175</td>
<td>565</td>
<td>SPIIB</td>
</tr>
<tr>
<td></td>
<td>1.8</td>
<td>0.57</td>
<td>190</td>
<td>805</td>
<td>SPIIB</td>
</tr>
<tr>
<td>Spruce-Pine-Fir</td>
<td>1.2 and higher</td>
<td>0.42</td>
<td>135</td>
<td>425</td>
<td>NLGA</td>
</tr>
<tr>
<td></td>
<td>1.8 to 1.9</td>
<td>0.46</td>
<td>160</td>
<td>525</td>
<td>NLGA</td>
</tr>
<tr>
<td></td>
<td>2.0 and higher</td>
<td>0.50</td>
<td>170</td>
<td>615</td>
<td>NLGA</td>
</tr>
<tr>
<td>Spruce-Pine-Fir (S)</td>
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<td>0.36</td>
<td>135</td>
<td>335</td>
<td>NELMA, NSLB, WCLIB, WWPA</td>
</tr>
<tr>
<td></td>
<td>1.2 to 1.9</td>
<td>0.42</td>
<td>150</td>
<td>465</td>
<td>NELMA, NSLB</td>
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<tr>
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<td>1.8 to 1.9</td>
<td>0.46</td>
<td>160</td>
<td>555</td>
<td>WWPA</td>
</tr>
<tr>
<td>Western Cedars</td>
<td>1.0 and higher</td>
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<td>155</td>
<td>425</td>
<td>WCLIB, WWPA</td>
</tr>
<tr>
<td>Western Woods</td>
<td>1.0 and higher</td>
<td>0.36</td>
<td>135</td>
<td>335</td>
<td>WCLIB, WWPA</td>
</tr>
<tr>
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<td>* 1.8E southern pine marked with a specific gravity of 0.55 on the grade stamp has a shear parallel to grain, Fv, of 175 psi and compression perpendicular to grain, Fc, of 565 psi.</td>
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</table>

3. **MODULUS OF ELASTICITY, E, AND TENSION PARALLEL TO GRAIN, Ft.** For any given bending design value, Fb, the modulus of elasticity, E, and tension parallel to grain, Ft, design value may vary depending upon species, timber source or other variables. The “E” and “Ft” values included in the “Fb-E” grade designations in Table 4C are those usually associated with each “Fb” level. Grade stamps may show higher or lower values if machine rating indicates the assignment is appropriate. Where the “E” or “Ft” values shown on a grade stamp differ from Table 4C values associated with the “Fb” on the grade stamp, the values on the stamp shall be used in design, and the “Fc” value associated with the “Fb” value in Table 4C shall be used.

4. **COMPRESSION PARALLEL TO GRAIN, Fc.** This grade requires “Fc” qualification and quality control.