# Nordic Cross-Laminated Timber

CHECKLIST: **Nordic X-Lam**

To verify that the CLT Selection Tables are appropriate for the structure being designed, the following questions should be asked (the appropriate modification factor is given in brackets):

1. Is load duration "standard" ($K_D$)?
$K_D$ is a load duration factor. The tables are based on a standard term load ($K_D$ = 1,0), which includes the effects of dead loads plus live loads due to use and occupancy, and snow loads. For other durations of load, the tabulated values $w_{FR}$ shall be multiplied by the appropriate factor permitted by the code.

2. Is the service condition "dry" ($K_S$)?
$K_S$ is a service condition factor. The tables are limited to dry service conditions ($K_{Sb}$ = $K_{SE}$ = 1,0).

3. Is the material free of incising and/or strength-reducing chemicals ($K_T$)?
$K_T$ is a treatment factor. The tables are based on untreated lumber ($K_T$ = 1,0).

4. Is L/240 based on total load or L/360 based on live load, the applicable deflection limitation ($K_\Delta$)?
$K_\Delta$ is a deflection factor. The tables are based on a deflection limit of span/240 under specified total load or span/360 under specified live load. For other deflection limits, multiply the $w_{\Delta R}$ values by the following:

| Table L/240, TL | Table L/360, LL |
|---|---|
| KΔ = 1,33 for span/180 | KΔ = 2,00 for span/180 |
| = 0,80 for span/300 | = 1,50 for span/240 |
| = 0,67 for span/360 | = 1,20 for span/300 |

5. The effect of floor vibrations can be controlled by respecting the following limits:

| | Thickness (mm) | | |
|---|---|---|---|
| | 105-3s | 175-5s | 245-7s |
| Span (m) | 3,727 | 5,181 | 6,462 |
| Ratio L/d | 33,9 | 28,2 | 25,0 |

However, it should be noted that the criteria has been established for bare floors only. For other applications, contact Nordic.
*(Ref.: Vibration performance of cross-laminated timber floors, FPInnovations CLT Handbook, Chapter 7)*

6. Should creep effects be considered?
A 25% reduction in shear stiffness has been used when checking the elastic deflection limit and a 50% reduction in shear stiffness for the permanent deformation limit in order to account for the deformations caused by shear perpendicular to grain (rolling shear).

7. Is the loading uniform?

Note: The tables are based on standard depths for industrial grade and for bending about the longitudinal axis of the panel. Consult Nordic for other options.

If the answer to any of those questions in no, consult Nordic. Otherwise, the CLT Selection Tables may be used directly. The selection tables provide the maximum factored uniform total load, $w_{FR}$, and the maximum uniform specified total or live load, $w_R$, that may be applied to a panel to ensure that the design criteria are met. The pannels weight is not considered and shall be included in the total load calculation. Occasionally, panels may have to be designed for concentrated loads or other non-uniform loading (for example as defined in article 4.1.6.10, NBCC). In these cases refer to CSA O86 Standard or Nordic.

## CLT Selection Tables (L/240, TL)

## Nordic X-Lam

S-P-F

**$W_{FR}$** **Maximum factored uniform total load $W_{FR}$ (kPa)**

| Span | Simple Span | | | Multiple Span | | |
|---|---|---|---|---|---|---|
| (m) | 105-3s | 175-5s | 245-7s | 105-3s | 175-5s | 245-7s |
| 3,0 | 21,0 | | | 16,8 | | |
| 3,2 | 19,6 | | | 15,7 | | |
| 3,4 | 18,5 | | | 14,8 | | |
| 3,6 | 17,5 | 29,1 | | 14,0 | | |
| 3,8 | 16,5 | 27,6 | | 13,2 | 22,1 | |
| 4,0 | 15,7 | 26,2 | | 12,6 | 21,0 | |
| 4,2 | 15,0 | 24,9 | | 12,0 | 20,0 | |
| 4,4 | 14,3 | 23,8 | | 11,4 | 19,1 | |
| 4,6 | 13,7 | 22,8 | | 10,9 | 18,2 | |
| 4,8 | 13,1 | 21,8 | 30,6 | 10,5 | 17,5 | |
| 5,0 | | 21,0 | 29,3 | 10,1 | 16,8 | |
| 5,2 | | 20,1 | 28,2 | 9,7 | 16,1 | 22,6 |
| 5,4 | | 19,4 | 27,2 | | 15,5 | 21,7 |
| 5,6 | | 18,7 | 26,2 | | 15,0 | 21,0 |
| 5,8 | | 18,1 | 25,3 | | 14,5 | 20,2 |
| 6,0 | | 17,5 | 24,4 | | 14,0 | 19,6 |
| 6,2 | | 16,9 | 23,7 | | 13,5 | 18,9 |
| 6,4 | | 16,4 | 22,9 | | 13,1 | 18,3 |
| 6,6 | | 15,9 | 22,2 | | 12,7 | 17,8 |
| 6,8 | | 15,4 | 21,6 | | 12,3 | 17,3 |

**$W_{\Delta R}$** **Maximum specified (service) uniform <u>total load</u> for L/240 deflection $W_{\Delta R}$ (kPa)**

| Span | Simple Span | | | Multiple Span | | |
|---|---|---|---|---|---|---|
| (m) | 105-3s | 175-5s | 245-7s | 105-3s | 175-5s | 245-7s |
| 3,0 | 9,28 | | | 11,1 | | |
| 3,2 | 7,91 | | | 9,56 | | |
| 3,4 | 6,79 | | | 8,27 | | |
| 3,6 | 5,86 | 18,8 | | 7,19 | | |
| 3,8 | 5,09 | 16,5 | | 6,28 | 19,6 | |
| 4,0 | 4,45 | 14,6 | | 5,51 | 17,5 | |
| 4,2 | 3,91 | 13,0 | | 4,86 | 15,6 | |
| 4,4 | 3,45 | 11,6 | | 4,31 | 14,0 | |
| 4,6 | 3,06 | 10,3 | | 3,83 | 12,6 | |
| 4,8 | 2,72 | 9,28 | 20,0 | 3,42 | 11,3 | |
| 5,0 | | 8,36 | 18,2 | 3,07 | 10,2 | |
| 5,2 | | 7,55 | 16,5 | 2,76 | 9,29 | 19,8 |
| 5,4 | | 6,83 | 15,1 | | 8,45 | 18,1 |
| 5,6 | | 6,21 | 13,8 | | 7,70 | 16,6 |
| 5,8 | | 5,65 | 12,6 | | 7,03 | 15,3 |
| 6,0 | | 5,16 | 11,6 | | 6,44 | 14,1 |
| 6,2 | | 4,72 | 10,7 | | 5,91 | 13,0 |
| 6,4 | | 4,33 | 9,82 | | 5,44 | 12,0 |
| 6,6 | | 3,98 | 9,06 | | 5,01 | 11,1 |
| 6,8 | | 3,67 | 8,38 | | 4,63 | 10,3 |

Note: A complete design shall include the verification of the bearing resistance, and a consideration for the effect of vibrations when applicable. A 50% reduction in shear stiffness has been used in order to account for the deformations caused by rolling shear.

# CLT Selection Tables (L/360, LL)

## Nordic X-Lam

S-P-F

### $W_{FR}$ Maximum factored uniform total load $W_{FR}$ (kPa)

| Span | Simple Span | | | Multiple Span | | |
|---|---|---|---|---|---|---|
| (m) | 105-3s | 175-5s | 245-7s | 105-3s | 175-5s | 245-7s |
| 3,0 | 21,0 | | | 16,8 | | |
| 3,2 | 19,6 | | | 15,7 | | |
| 3,4 | 18,5 | | | 14,8 | | |
| 3,6 | 17,5 | 29,1 | | 14,0 | | |
| 3,8 | 16,5 | 27,6 | | 13,2 | 22,1 | |
| 4,0 | 15,7 | 26,2 | | 12,6 | 21,0 | |
| 4,2 | 15,0 | 24,9 | | 12,0 | 20,0 | |
| 4,4 | 14,3 | 23,8 | | 11,4 | 19,1 | |
| 4,6 | 13,7 | 22,8 | | 10,9 | 18,2 | |
| 4,8 | 13,1 | 21,8 | 30,6 | 10,5 | 17,5 | |
| 5,0 | | 21,0 | 29,3 | 10,1 | 16,8 | |
| 5,2 | | 20,1 | 28,2 | 9,7 | 16,1 | 22,6 |
| 5,4 | | 19,4 | 27,2 | | 15,5 | 21,7 |
| 5,6 | | 18,7 | 26,2 | | 15,0 | 21,0 |
| 5,8 | | 18,1 | 25,3 | | 14,5 | 20,2 |
| 6,0 | | 17,5 | 24,4 | | 14,0 | 19,6 |
| 6,2 | | 16,9 | 23,7 | | 13,5 | 18,9 |
| 6,4 | | 16,4 | 22,9 | | 13,1 | 18,3 |
| 6,6 | | 15,9 | 22,2 | | 12,7 | 17,8 |
| 6,8 | | 15,4 | 21,6 | | 12,3 | 17,3 |

### $W_{\Delta R}$ Maximum specified (service) uniform live load for L/360 deflection $W_{\Delta R}$ (kPa)

| Span | Simple Span | | | Multiple Span | | |
|---|---|---|---|---|---|---|
| (m) | 105-3s | 175-5s | 245-7s | 105-3s | 175-5s | 245-7s |
| 3,0 | 6,81 | | | 8,37 | | |
| 3,2 | 5,75 | | | 7,11 | | |
| 3,4 | 4,90 | | | 6,09 | | |
| 3,6 | 4,20 | 14,1 | | 5,25 | | |
| 3,8 | 3,63 | 12,3 | | 4,55 | 15,0 | |
| 4,0 | 3,15 | 10,8 | | 3,97 | 13,2 | |
| 4,2 | 2,75 | 9,51 | | 3,48 | 11,7 | |
| 4,4 | 2,42 | 8,42 | | 3,07 | 10,4 | |
| 4,6 | 2,14 | 7,48 | | 2,72 | 9,29 | |
| 4,8 | 1,90 | 6,68 | 14,9 | 2,42 | 8,32 | |
| 5,0 | | 5,98 | 13,5 | 2,16 | 7,48 | |
| 5,2 | | 5,38 | 12,2 | 1,94 | 6,75 | 14,9 |
| 5,4 | | 4,85 | 11,0 | | 6,10 | 13,6 |
| 5,6 | | 4,39 | 10,0 | | 5,54 | 12,4 |
| 5,8 | | 3,98 | 9,15 | | 5,04 | 11,3 |
| 6,0 | | 3,63 | 8,36 | | 4,59 | 10,4 |
| 6,2 | | 3,31 | 7,66 | | 4,20 | 9,54 |
| 6,4 | | 3,03 | 7,03 | | 3,85 | 8,79 |
| 6,6 | | 2,78 | 6,46 | | 3,54 | 8,10 |
| 6,8 | | 2,55 | 5,96 | | 3,26 | 7,49 |

Note: A complete design shall include the verification of the bearing resistance, and a consideration for the effect of vibrations when applicable. A 25% reduction in shear stiffness has been used in order to account for the deformations caused by rolling shear.