

Reference design values are for normal load duration under the moisture service conditions specified. Because the strength of wood varies with conditions under which it is used, reference design values should only be applied in conjunction with appropriate design and service recommendations from the *National Design Specification® (NDS®) for Wood Construction* published by the American Wood Council. The latest connection design information is also provided in the *NDS*.

Reference design values (F_b , F_t , F_v , $F_{c\perp}$, F_c , E , E_{min}) in Tables 1 thru 3 shall be multiplied by all applicable adjustment factors to determine adjusted design values (F_b' , F_t' , F_v' , $F_{c\perp}'$, F_c' , E' , E_{min}').

Table A-1 is excerpted from the *NDS* and summarizes the applicability of adjustment factors for solid-sawn lumber.

Table A-1 Applicability of Adjustment Factors for Sawn Lumber

Adjusted Design Value	Reference Design Value	ASD only		ASD and LRFD										LRFD only			
		Load Duration Factor	Wet Service Factor	Temperature Factor	Beam Stability Factor	Size Factor	Flat Use Factor	Inclining Factor	Repetitive Member Factor	Column Stability Factor	Buckling Stiffness Factor	Bearing Area Factor	Format Conversion Factor	Resistance Factor	Time Effect Factor		
$F_b' = F_b * C_D * C_M * C_t * C_L * C_F * C_{fu} * C_i * C_T$	F_b	C_D	C_M	C_t	C_L	C_F	C_{fu}	C_i	C_T						K_F	ϕ	λ
$F_t' = F_t * C_D * C_M * C_t * C_F * C_i$	F_t	C_D	C_M	C_t		C_F		C_i							K_F	ϕ	λ
$F_v' = F_v * C_D * C_M * C_t * C_i$	F_v	C_D	C_M	C_t				C_i							K_F	ϕ	λ
$F_c' = F_c * C_D * C_M * C_t * C_F * C_P * C_i$	F_c	C_D	C_M	C_t		C_F		C_i		C_P					K_F	ϕ	λ
$F_{c\perp}' = F_{c\perp} * C_M * C_t * C_b$	$F_{c\perp}$		C_M	C_t				C_i			C_b				K_F	ϕ	λ
$E' = E * C_M * C_t * C_i$	E		C_M	C_t				C_i									
$E_{min}' = E_{min} * C_M * C_t * C_i$	E_{min}		C_M	C_t				C_i			C_T				K_F	ϕ	λ

ASD – Allowable Stress Design; LRFD – Load and Resistance Factor Design

Tables A-2 thru A-4 highlight the most common adjustment factors as they apply to Southern Pine. In addition, Table 1 and 3 footnotes provide information about the Size Factor, C_F . For complete information on adjustment factors, see the *NDS*.

Table A-2 Wet Service Factor, C_M

Applies to all values

For lumber 2" to 4" thick

When dimension lumber is used under conditions where the moisture content of the wood in service will exceed 19% for an extended time period, reference design values shall be multiplied by the appropriate wet service factors to the right.

F_b	F_t	F_v	$F_{c\perp}$	F_c	E	E_{min}
0.85 ¹	1.0	0.97	0.67	0.8 ²	0.9	0.9
(1) When $F_b \leq 1150$ psi, $C_M = 1.0$			(2) When $F_c \leq 750$ psi, $C_M = 1.0$			

Table A-3 Load Duration Factor, C_D

Applies to F_b , F_t , F_v , and F_c values

For all solid wood products – Allowable Stress Design Only

Does not apply to $F_{c\perp}$, E , and E_{min} values

Wood has the property of carrying substantially greater maximum loads for short durations than for long durations of loading. Reference design values apply to normal load duration, meaning a load that fully stresses a member to its allowable design value by the application of the full design load for a cumulative duration of approximately ten years. When the cumulative duration of the full maximum load does not exceed the specified time period, all reference design values (except $F_{c\perp}$, E , and E_{min}) shall be multiplied by the appropriate load duration factor. Frequently used load duration factors are provided to the right.

Load Duration (Typical Design Loads)	C_D
Permanent (dead load)	0.9
Ten years (occupancy live load)	1.0
Two months (snow load)	1.15
Seven days (construction load)	1.25
Ten minutes (wind/earthquake load)	1.6
Impact ¹ (impact load)	2.0

(1) Load duration factors greater than 1.6 shall not apply to structural members pressure treated with waterborne preservatives, or fire-retardant chemicals. The impact load duration factor shall not apply to connections.

Table A-4 Flat Use Factor, C_{fu}

Applies to F_b values only

For lumber 2" to 4" thick

Reference bending design values, F_b , are based on edgewise use (load applied to narrow face). When dimension lumber is used flatwise (load applied to wide face), F_b shall also be multiplied by the flat use factors to the right.

Width (depth)	Flat Use Factors, C_{fu}	
	Thickness (breadth) 2" & 3"	4"
2" & 3"	1.0	–
4"	1.1	1.0
5"	1.1	1.05
6"	1.15	1.05
8"	1.15	1.05
10" & wider	1.2	1.1