PHYSICAL PROPERTIES ILLUSTRATED

Extreme Fiber Stress in Bending - *F_b* (Fig. 1) When loads are applied, structural members bend, producing tension in the fibers along the faces farthest from the applied load and compression in the fibers along the face nearest to the applied load. These induced stresses in the fibers are designated as “extreme fiber stress in bending” (F_b).

Single Member F_b design values are used in design where the strength of an individual piece, such as a beam, may be solely responsible for carrying a specific design load.

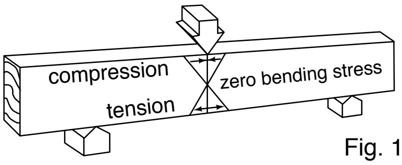

Fig. 1

Repetitive Member F_b design values are used in design when three or more load sharing members, such as joists, rafters, or studs, are spaced no more than 24" apart and are joined by flooring, sheathing or other load-distributing elements. Repetitive members are also used where pieces are adjacent, such as decking.

Fiber Stress in Tension - *F_t* (Fig. 2)
Tensile stresses are similar to compression parallel to grain in that they act across the full cross section and tend to stretch the piece. Length does not affect tensile stresses.

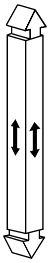
Fig. 2

Horizontal Shear - *F_v* (Fig. 3) Horizontal shear stresses tend to slide fibers over each other horizontally. Most predominate in short, heavily loaded deep beams. Increasing beam cross section decreases shear stresses.

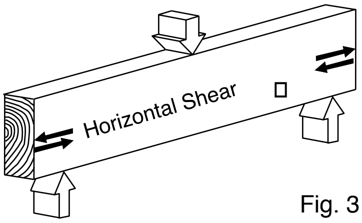

Fig. 3

Compression Perpendicular to Grain - *$F_{c\perp}$* (Fig. 4)
Where a joist, beam or similar piece of lumber bears on supports, the load tends to compress the fibers. It is necessary that the bearing area be sufficient to prevent side-grain crushing.

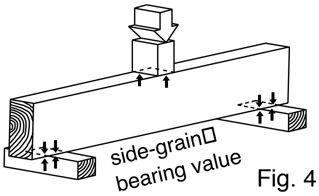

Fig. 4

Compression Parallel to Grain - *F_c* (Fig. 5)
In many parts of a structure, stress grades are used where the loads are supported on the ends of the pieces. Such uses are as studs, posts, columns and struts. The internal stress induced by this kind of loading is the same across the whole cross section and the fibers are uniformly stressed parallel to and along the full length of the piece.

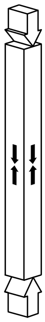
Fig. 5

Modulus of Elasticity - *E* (Fig. 6)
The modulus of elasticity is a ratio of the amount a material will deflect in proportion to an applied load.

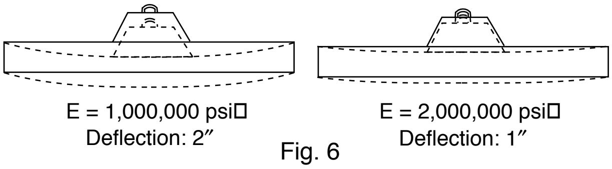

Fig. 6