

Safety Engineering Tables

shear, and bearing, as specified by the N L M A , are given in Table 47-C Allowable unit stresses for timber columns are as follows

1 Short Columns The safe load, in pounds per square inch of net cross-sectional area, for columns and other members stressed in compression parallel to the grain, with a ratio of unsupported length to least dimension (l/d) not exceeding eleven (short columns) shall not exceed the allowable unit compression stress (c) parallel to grain for short columns, i e ,

$$\frac{P}{A} = c$$

2 Intermediate Columns For columns with a ratio of unsupported length to least dimension greater than eleven but less than K (intermediate columns), the following formula shall be used until the reduction in allowable stress equals one-third the stress permitted for short columns

$$\frac{P}{A} = c \left[1 - \frac{1}{3} \left(\frac{l}{Kd} \right) \right]$$

3 Long Columns For columns with a ratio of unsupported length to least dimension greater than K (long columns), the safe load shall be determined by the following formula

$$\frac{P}{A} = \frac{\pi^2 E}{36(l/d)^2} = \frac{0.274E}{(l/d)^2}$$

4 Notation

P = total load, in pounds

A = area, in square inches of net cross section

P/A = the working stress or maximum load per square inch

c = allowable unit stress in compression parallel to grain for short columns

l = unsupported length of column, in inches

d = least dimension of column, in inches

E = modulus of elasticity

$$K = \frac{\pi}{2} \sqrt{\frac{E}{6c}}, \text{ at which } \frac{P}{A} = \frac{2c}{3}$$

5 The safe load on a column of round cross section shall not exceed that permitted for a square column of the same cross-sectional area

6 Columns shall be limited in maximum length to $l/d = 50$