

CURRENT CODE PROVISIONS FOR COMPRESSION MEMBERS- EFFECTIVE LENGTH, SLENDERNESS RATIO

SLENDERNESS RATIO

The slenderness ratio is the ratio of the effective length of the column to the least radius of gyration. We define the effective length as the length of an equivalent column made of the same materials with the same capacity of loading, but with hinged ends. Similarly we consider the the radius of gyration to be where the lowest moment of inertia is. It evaluates the resistance of RC (Reinforced Concrete) column to crushing or buckling. Short and long columns concerning their radius are susceptible to crushing while thinner columns concerning their radius are susceptible to buckling. Engineers calculates the radius of gyration by dividing the effective length of the column over its minimum radius of gyration.

EFFECTIVE LENGTH

The value of the effective length factor varies between 0.5 -2.0 and is available in the AISC manual. Its value depends upon the attachment of the column ends to the support. A column supported at both ends follow a sine waveform when it buckles. Therefore the unsupported length is equal to effective length in that case.

A column fixed at both ends develop a half-sine waveform when it buckles. So the effective length factor is equal to 0.5. Perfectly fixed or perfectly hinged support conditions don't exist in real structures. Instead they have a semi-restrained end against rotation by connecting members. In this case for laterally braced columns, K value lies in between 0.5 to 1.0.

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