# SECTION 6. SLENDERNESS RATIO

The slenderness ratio of a wall is the ratio of the effective height of the wall to the thickness. It provides a means of measuring the robustness of the wall and it is used in calculations to adjust the load carrying capacity of the wall to account for the possibility of buckling causing a premature mode of failure.

There are two cases to be considered when determining the limiting slenderness ratio of a wall:

a) **Design using Empirical Method**

When designing a wall using the empirical method the limiting slenderness ratio is 30, the slenderness ratio in this case being the effective height divided by the design thickness. When using this method Clause 32.2.4 allows the effective height to be taken as follows:

If a wall is restrained against lateral movement and rotational movement at both ends the effective height is either 0.75 times the clear height or 0.75 times the length between the centres of lateral restraint whichever is the smaller.

If a wall is restrained against lateral movement but not rotational movement at both ends then the effective height is 1.0 times the clear height or 1.0 times the length between the centres of lateral restraint whichever is the smaller.

It is important to note that the empirical design method can only be used for braced walls that are subjected to in-plane vertical loads and for braced walls that are subjected to in-plane vertical loads in addition to in-plane horizontal loads. The empirical design method cannot be used for walls that are subjected to out-of-plane lateral loads, and it cannot be used for walls in unbraced structures.

b) **Design using Compression Member Method**

This method can be used for the design of ***mortarless*** walls that cannot be designed using the empirical design method, however it can also be used in lieu of the empirical design method.

When designing a braced wall as a compression member using Section 25 the limiting slenderness ratio is 60 (refer Clause 25.3.1), or expressed in another way the unsupported height of the wall between end restraints is not to exceed 60 times the design thickness of the wall.

IS 456 Annex E provides guidance on the method of calculating the effective length of a compression member and in particular Table 28 can be used when designing ***mortarless*** walls using Section 25. In Table 28 it is recommended that the effective height of braced walls be taken as follows:

- 0.65 times the clear height when both ends are restrained against rotation,
- 0.80 times the clear height when only one end is restrained against rotation, and
- 1.00 times the clear height when neither end is restrained against rotation.

Table 28 also contains effective height factors for walls in structures that are not braced.

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