2.2 Design for compression by <u>refined calculation</u>:

When designing walls for compression by refined calculation it is necessary fist to calculate the eccentricity of the design compression load applied to the top of the wall. It is permissible to use simplified methods to calculate the effective eccentricity which is then used to calculate the design bending moment, however the bending moment may also be calculated using moment distribution methods.

The simplified method of calculating the effective eccentricity is outlined on the following page. When using this method it is permissible to assume that the effective eccentricity at the base of the wall is zero as indicated in the diagram.

For other configurations of applied load refer to the Code for calculation of effective eccentricity.

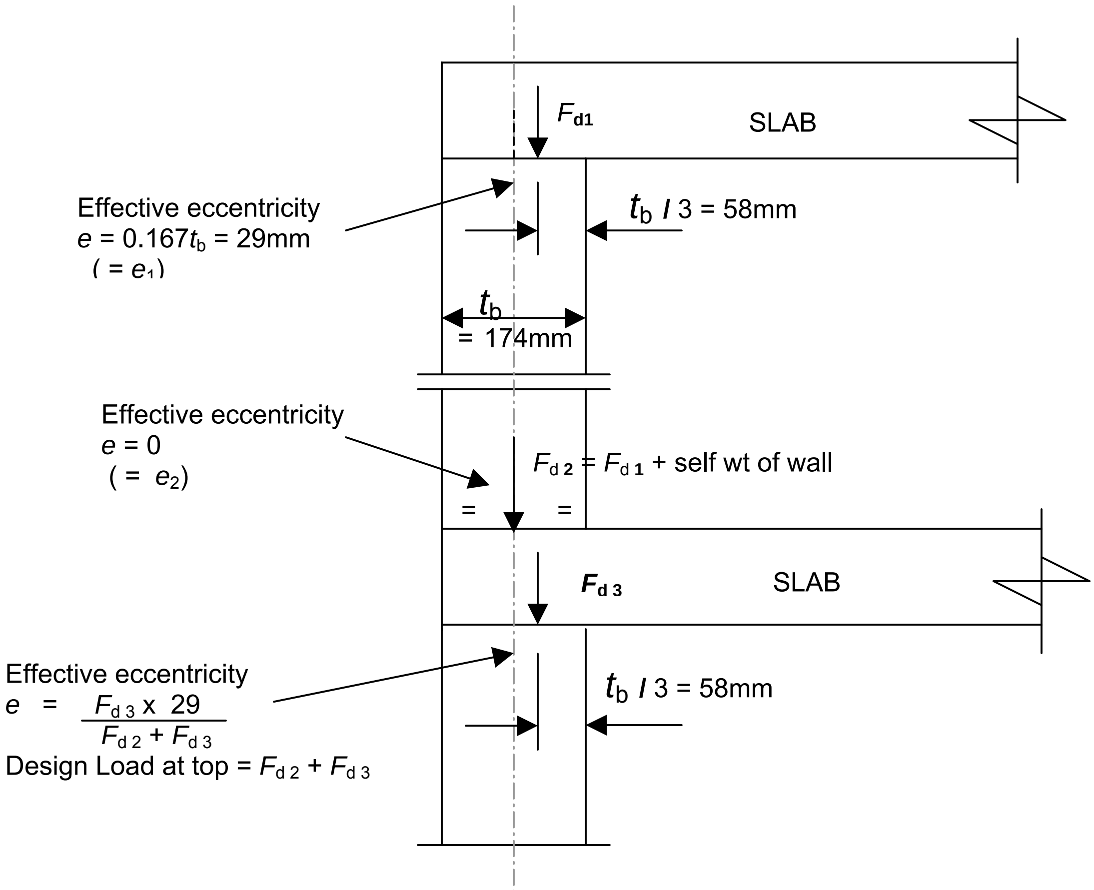
After calculating the effective eccentricity, it may then be necessary to determine if the design of the wall can be based on the length rather than the height of the panel. Walls may be very tall but if they are adequately restrained laterally by fully tied intersecting walls at relatively close centres then they are much stiffer than unrestrained walls of the same height and the compression load capacity may be based on the effective length of the wall panel rather than the effective height. Table 2-1 can be used to readily determine whether length can be used when determining the load capacity of a wall panel.

Effective eccentricity when designing for compression:

It is necessary to take into account the relative stiffnesses of interconnected structural members (walls, slabs, piers etc) and their interaction. A3700 states **this requirement is deemed to be satisfied if**:

- The effective eccentricity is calculated assuming the load transmitted to a wall by a single floor or roof acts at ⅓ rd of the bearing depth from the loaded face of the wall.
- Where a floor or roof is continuous over the wall, each side of the floor or roof shall be taken as being individually supported on ½ the total bearing area.
- The resulting eccentricity *e* at any level shall be calculated on the assumption that the total vertical load on the wall above the plane under consideration is axial immediately above the joint under consideration.

Examples of how to calculate the effective eccentricity using the deemed to be satisfied provisions of AS 3700 Clause 7.3.4.4:

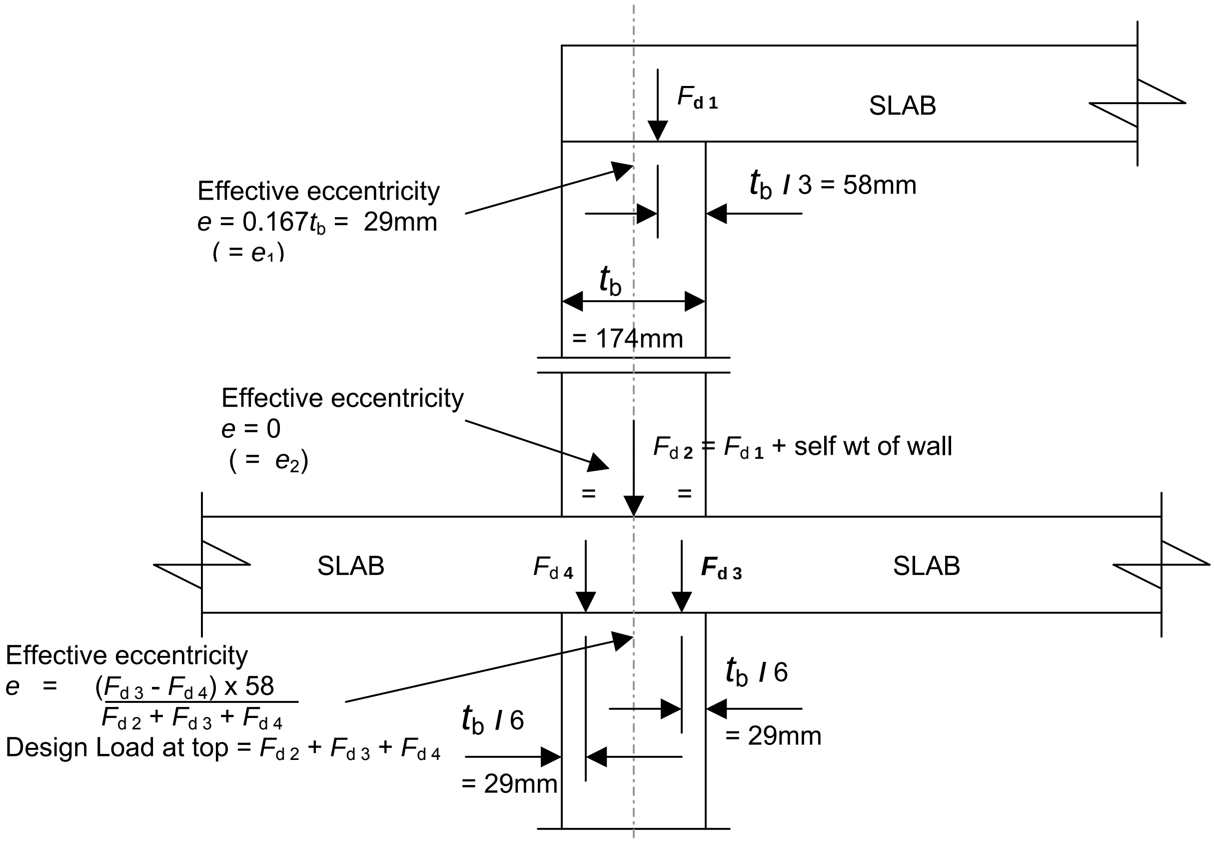


Alternatively, for walls with a minimum compressive stress above the joint of 0.25MPa or with reinforcement that can resist the design moment, a rigid frame analysis may be used.

Note that when using the tables for maximum design load in compression:

e_1 = the larger eccentricity at either top of bottom of the wall or pier.

e_2 = the smaller eccentricity at the opposite end to e_1, this being –ve when the eccentricities are on opposite sides of the of the member.



Alternatively, for walls with a minimum compressive stress above the joint of 0.25MPa or with reinforcement that can resist the design moment, a rigid frame analysis may be used.

Note that when using the tables for maximum design load in compression:

e_1 = the larger eccentricity at either top of bottom of the wall or pier.

e_2 = the smaller eccentricity at the opposite end to e_1, this being –ve when the eccentricities are on opposite sides of the of the member.

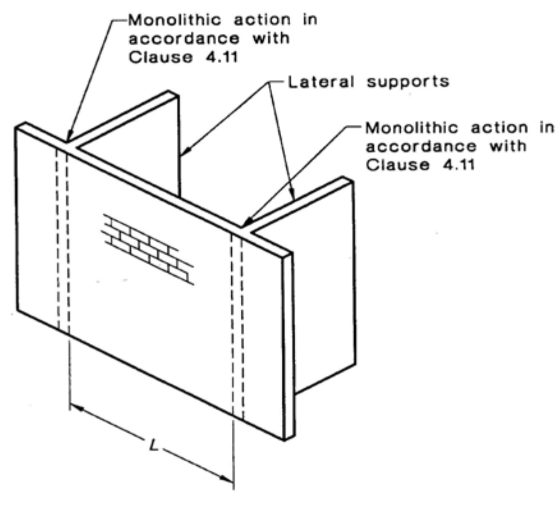
Design for compression governed by wall length:

Use Table 1-2.2 to determine if it is applicable to use *L* rather than *H* to determine the compression load capacity of a wall.

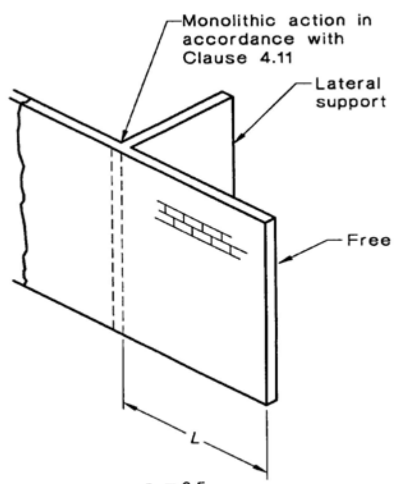
Table 1-2.2:

a_v	a_h	*L* can be used to determine the design slenderness ratio and hence the axial load capacity of the wall if:
0.75	1.0	$L < 1.53H$
0.75	2.5	$L < 0.61H$
0.85	1.0	$L < 1.73H$
0.85	2.5	$L < 0.69H$
1.0	1.0	$L < 2.04H$
1.0	2.5	$L < 0.82H$
1.5	1.0	$L < 3.06H$
1.5	2.5	$L < 1.22H$
2.5	1.0	$L < 5.10H$
2.5	2.5	$L < 2.04H$

Value of a_h:



$a_h = 1.0$



$a_h = 2.5$

Value of a_v:

a_v = 0.75 if the wall is laterally supported and partially rotationally restrained at both top and bottom
a_v = 0.85 if the wall is laterally supported at top and bottom and partially rotationally restrained at one of them
a_v = 1.0 if the wall is laterally supported at both top and bottom a_v = 1.5 when the wall is not laterally supported along its top edge.
a_v = 1.5 if the wall is laterally supported and partially rotationally restrained at the bottom and partially laterally supported at the top
a_v = 2.5 if the wall is free standing (no lateral support at the top)