

3.2 Reinforcement for Masonry

Introduction

The reinforcement distribution within a masonry wall is determined by specific engineering design requirements of NZS 4230 or by specified requirements of NZS 4229 or NZS 3604. The reinforcement used must comply with steel Class E of AS/NZS 4671.

There are two grades of steel available 300 MPa and 500 MPa. The most common situation is to use 300 plain round bar for all links/ties and to use 500 deformed bars for main steel. Because of the restricted nature of a masonry block cell, the maximum size bar used is restricted to 16 mm.

The lap lengths for splicing two bars are 40 db for 300 MPa steel and 70 db for 500 MPa steel. It should be noted that where horizontal steel is in the top 300 mm of a wall and the grout does not contain an expanding agent there is a 1.3 times penalty on the lap lengths i.e. 52 db and 91 db respectively.

The reinforcement distribution from NZS 4229 is as follows:

(a) **Solid Filled**

Vertical bars D12 at 800 mm centres
Horizontal bars D12 at 1200 mm centres

(b) **Partially Filled**

Vertical bars D12 at 800 mm centres
Horizontal bars D16 at 2800 mm centres

The workmanship and installation of the reinforcement follows the provisions of NZS 4210.

Bending Provisions

The bending provisions of NZS 4210 which are contained in Appendix 2D, set minimum criteria for diameter of bends.

Application	Bar Diameter	Minimum Diameter of Bend	
		Plain	Deformed
Stirrup and Links	6-20	2db	4db
	25-32	3db	6db
Main Steel	6-20	5db	5db
	25-40	6db	6db

Note for masonry construction maximum bar size is 16 mm

Fixing Requirements

Reinforcement must be fixed:

- (i) Within ± 6 mm in the width of the wall or column
- (ii) Within ± 50 mm in the case of the length of the wall or one quarter the length of an individual cell whichever is smaller see Figure 1.

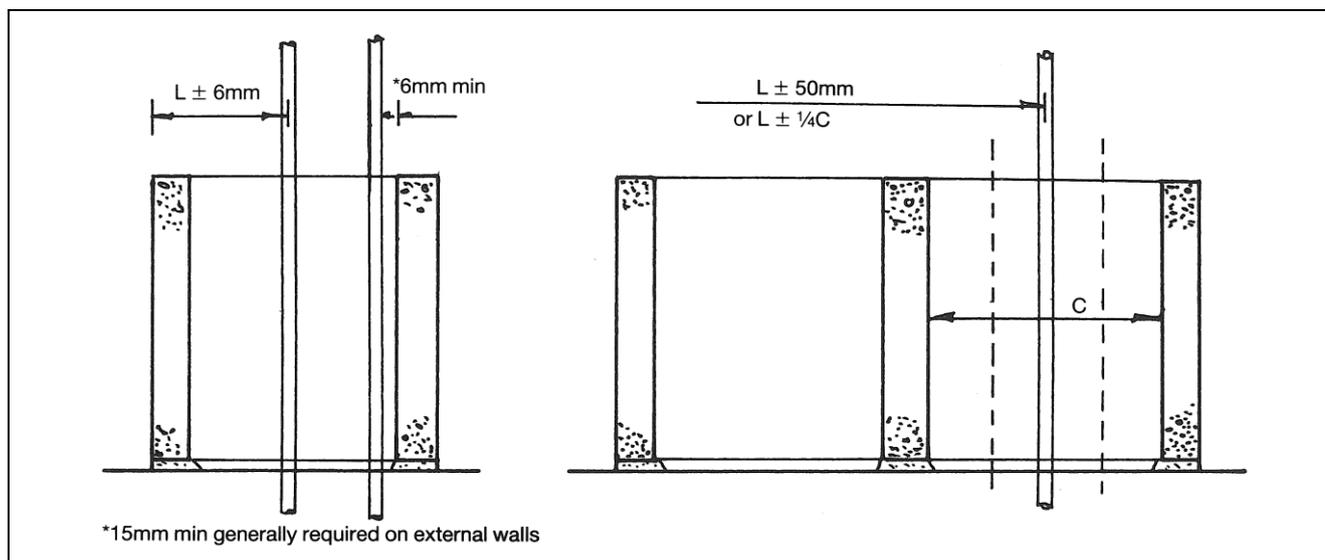


Figure 1: Fixing Tolerances for Reinforcement

In addition reinforcement must be maintained at least 6 mm from the face shell of the block. However where masonry is in an external situation, a higher value of cover to the face shell will be required, i.e. ranging from 15 mm to 30 mm depending on the category of exposure.

In order to ensure that reinforcement remains in position during the grouting operation, the reinforcement must be adequately tied. First to the starter bars and then at intervals in the height see Figure 2.

From Figure 2, it will be seen that the D12 bar does not require tying between the nominal storey lift of 2.4 m. Hence it is unusual to use D10 as vertical steel. The vertical bar is assumed to be in the centre of the cell unless the designer specifies differently. The important construction use, where off setting from the centre line will occur, is retaining walls.

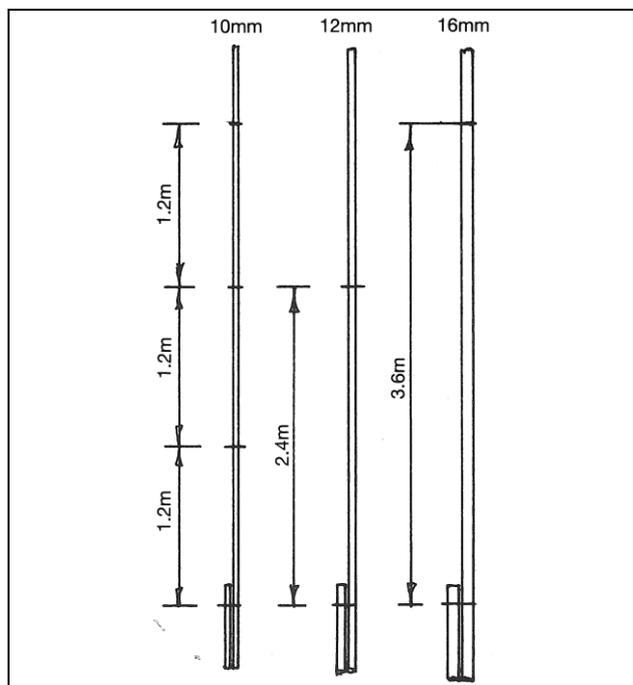


Figure 2: Maximum Spacing of Vertical Bar Fixings

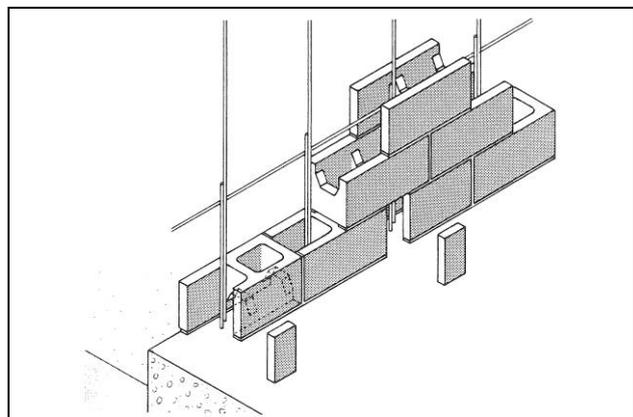


Figure 3: First Course Clean-out Pockets

Fixing Operation

The vertical steel is generally prefixed to starter bars before the laying of blocks start. However in some configurations, steel may have to be fixed after laying. Where this becomes the case, a clean out opening, discussed in Part 3.3, must be provided at each starter bar to allow the vertical bar to be tied to the starter. See Figure 3.

The horizontal steel must be placed as laying work proceeds since apart from the top course there is no way of inserting the steel once the blocklaying work is completed.

It is important to ensure that horizontal trimming bars under openings are correctly fitted as the work proceeds. Typical arrangement for wall detailing and trimming openings are shown in Figures 4 and 5.

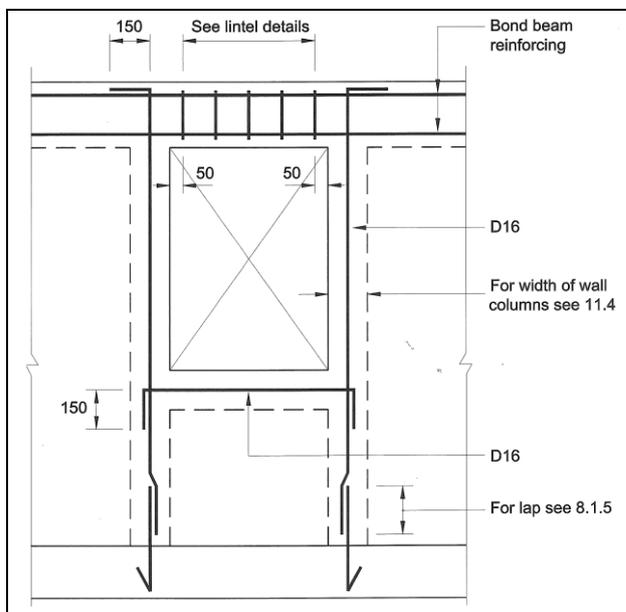


Figure 4: Reinforcement Above and Below Openings (Figure 8.1, NZS 4229)

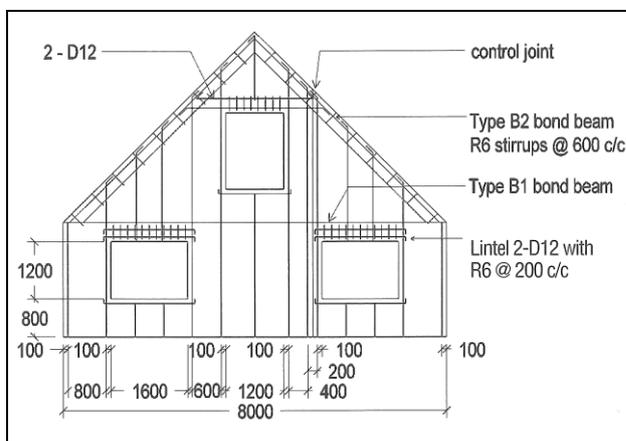


Figure 5: Bond Beam and Lintel Reinforcement for West Wall (Bracing Line B)

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