Movement Control - An introduction

All buildings and building components move during their lifetime. The movement considered here is not the serious, structurally damaging kind, but the sort usually caused by changes in temperature or moisture which can lead to cracks which are unsightly and which may let in water.

Causes of movement

Movement in masonry can be attributed to variations in the environmental conditions and include:

- Changes in the moisture content of the blockwork.
- Changes in temperature.
- Movement of the adjoining structure.
- Chemical changes such as carbonation.
- Movement between dissimilar materials.

The types of movement will often act in combination to supplement or oppose one another. It is for this reason that it is very difficult to predict the amount of movement that is likely to occur in a given situation. Nevertheless, designers should try to anticipate the type and extent of movement and the effect it is likely to have on the building.

Generally, concrete masonry will contract as it dries to equilibrium moisture content. Conversely, clay masonry expands as the masonry matures and absorbs water.

Design for movement

Suitable precautions to control movement in masonry will include:

- Introduction of movement joints at suitable spacings.
- Use of localised bed joint reinforcement to areas of raised stress, e.g. above and below openings.
- Avoidance of over strong mortar.
- Protection of blocks and partially complete construction from the adverse effects of weather.

Figure 2.1 - Movement joint to internal wall

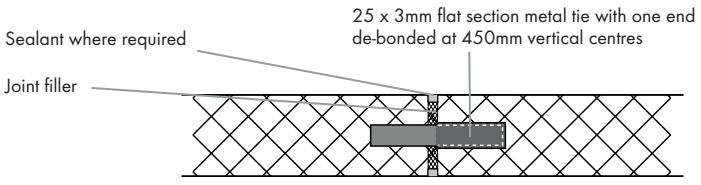
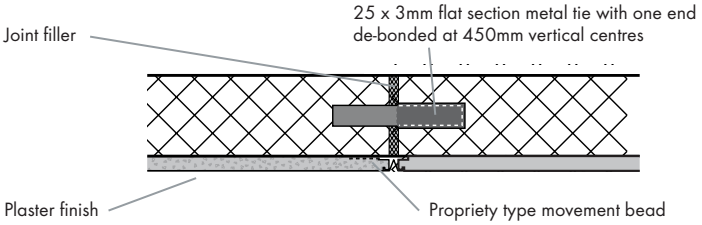


Figure 2.2 - Movement joint to an internal wall with a plaster finish



Movement joints

Movement joints are vertical separations built into the blockwork and positioned at locations where excessive stress can be predicted to occur. Typical vertical movement joint detail are shown in Figs. 2.1 and 2.2.

Movement joints can be detailed to accentuate or subdue their appearance. This is usually achieved by specifying a matching or contrasting sealant. In the example below, the movement joint in the blockwork above the porch is subdued by using a sealant that matches the colour of the render.

Generally movement joints are of 10mm width to co-ordinate with the standard block module. The joint is filled with a pre-compressed filler such as a polyethylene strip and, for fair face work, sealed with a suitable mastic. Where required, the joint material may need to achieve a specified fire resistance period, and there are many products available, such as flexible intumescent seals, to achieve this. Movement joints should be made continuous through any applied rigid finishes such as plaster or rendering.

Horizontal movement joints may need to be considered in very tall walls.

Horizontal joints are usually required when design codes recommended limiting the uninterrupted height of walls. BS 5628-1 recommends that the outer leaf should be supported at intervals not exceeding 9m or every third storey, whichever is less. However, the outer may be uninterrupted for its full height in buildings not exceeding four storeys or 12m in height, whichever is less.

Horizontal movement joints are normally formed in conjunction with a masonry support system.

Movement Control

Positioning of movement joints

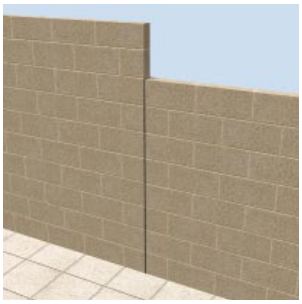
As a guide, movement joints should be spaced at approximately 6.0m intervals. However, for Lignacrete dense blocks, movement joint spacings can be extended to 7.0 - 7.5m.

Movement joint spacings should be halved within 3.0 to 3.5m of a bonded corner/return/pier.

Special attention should be provided to panels whose length typically exceeds its height by a ratio of 3:1. This aspect ratio is often exceeded below a long window. The additional risk of movement can be controlled by introducing more frequent movement joints and/or including bed joint reinforcement.

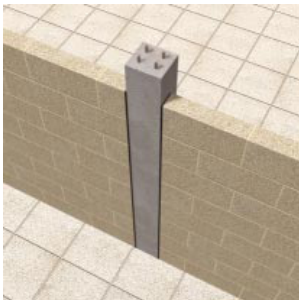
Movement joints should also be considered at the following locations:

- At a change in wall height or wall width.

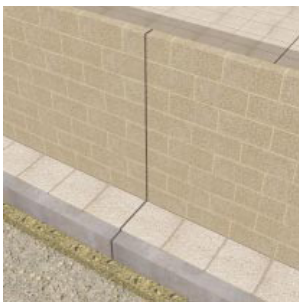


- Changes in loading conditions.

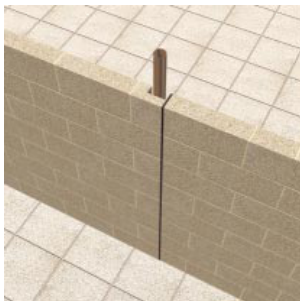
- At abutments with concrete columns or steel stanchions.



- At expansion joints in floors, or a expansion joint through the building.



- At deep chases or recesses.



- Junctions with dissimilar materials.

The spacing of movement joints can be increased by introducing ladder type bed joint reinforcement as advised in the table below. Bed joint reinforcement will not eliminate completely the risk of cracking, but should limit the extent so that only micro cracks will occur which will not affect the structural integrity of the walls.

Table 2.1 - Use of bed joint reinforcement to extend movement joint spacings.

		Continuous ladder type bed joint reinforcement at the following vertical centres		
	Unreinforced wall	675mm	450mm	215mm
Movement joint intervals	6.0m	9.0m	11.00m	13.0m

Where stack bonded masonry is specified, bed joint reinforcement should be installed at 225mm vertical spacings and movement joints should be spaced at approximately 6m intervals.

Bed joint reinforcement

Bed joint reinforcement can be used to assist in controlling movement in masonry, and can be considered for the following applications.

- Above and below openings.
- Differential movement control.
- To increase the frequency of movement joints beyond that for unreinforced walls.

The use of bed joint reinforcement above and below openings can be very effective in controlling movement to these areas of raised stress. Typically, two courses of reinforcement should be installed immediately above/below the openings and extend at least 600mm beyond the sides of the openings.

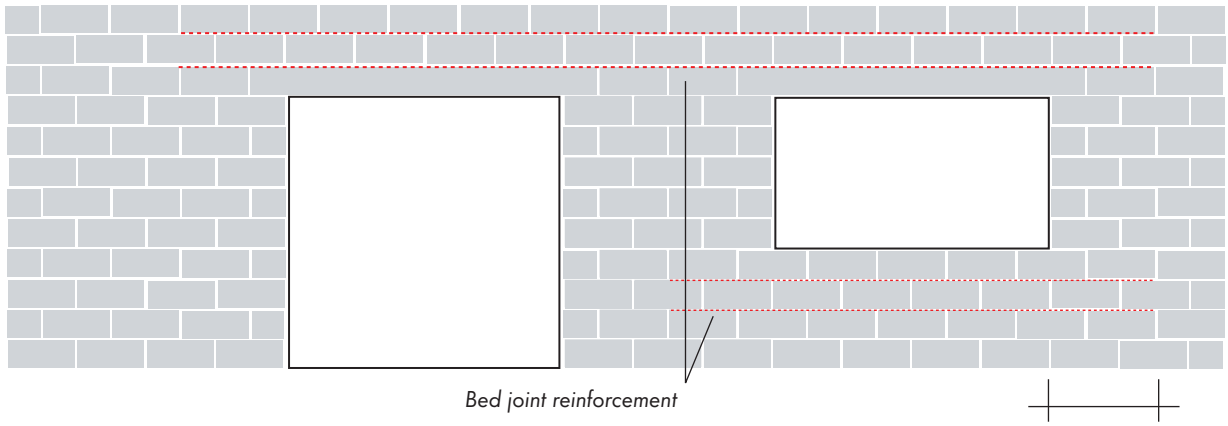


Figure 2.3 - Bed joint reinforcement at openings

Brick and Concrete Blockwork bonding

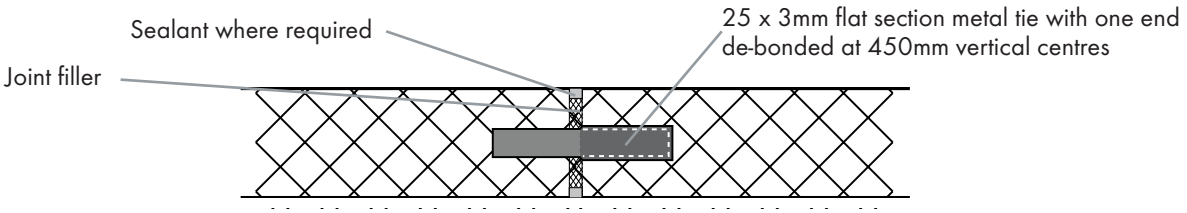
Sometimes concrete blockwork walls will incorporate feature band courses of dissimilar materials e.g. clay bricks. In such cases, measures should be taken to accommodate the differential movement that is likely to occur.

It is usually impractical to introduce slip planes between two dissimilar masonry materials. Instead, bed joint reinforcement should be used to tie the different materials together – see Figure 2.4. This has the effect of reinforcing the interface, which is normally sufficient to control the stresses attributed by differential movement.

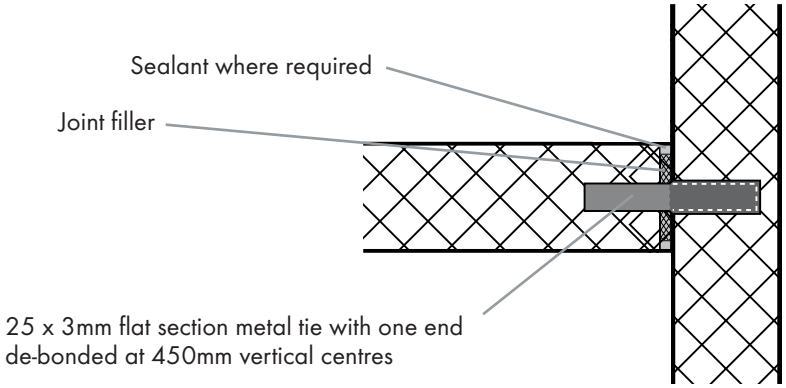
Vertical movement joints should be built-in at the normal recommended spacings e.g. 6.0m centres.

Figure 2.4 - Bed joint reinforced used to control movement between different walling materials.

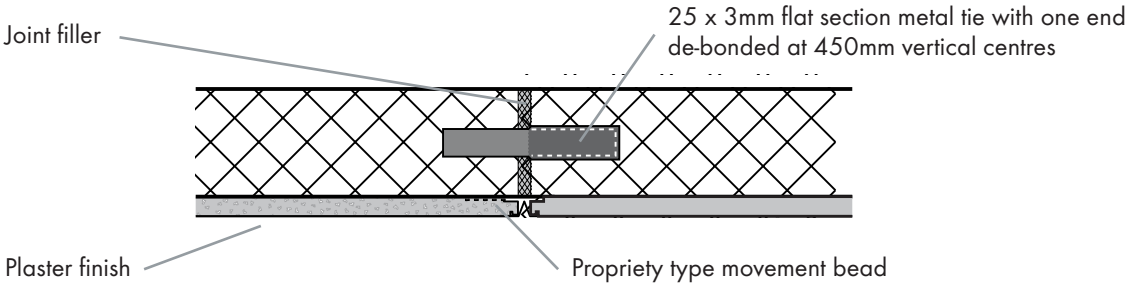
Movement joint to internal wall



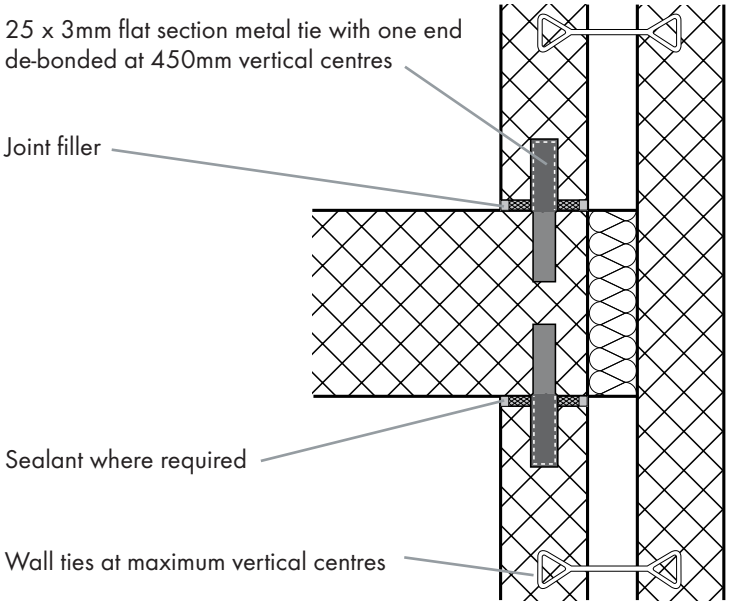
Movement joint to an internal wall



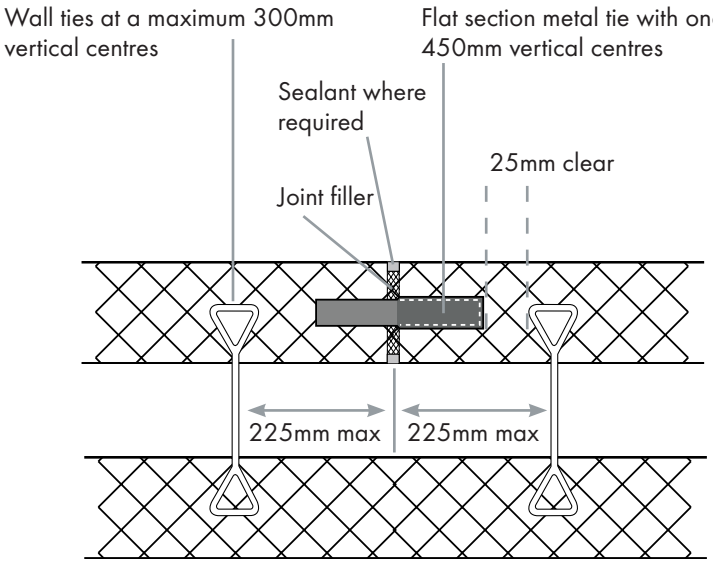
Movement joint to an internal wall with a plaster finish



Movement joint to an internal wall junction with a separating wall

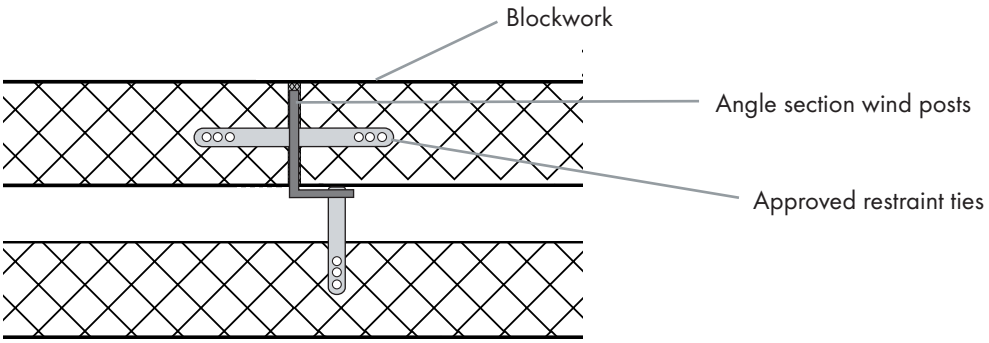


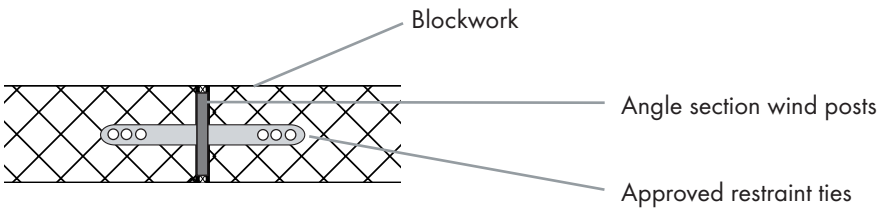
Movement joint inner leaf of external cavity wall



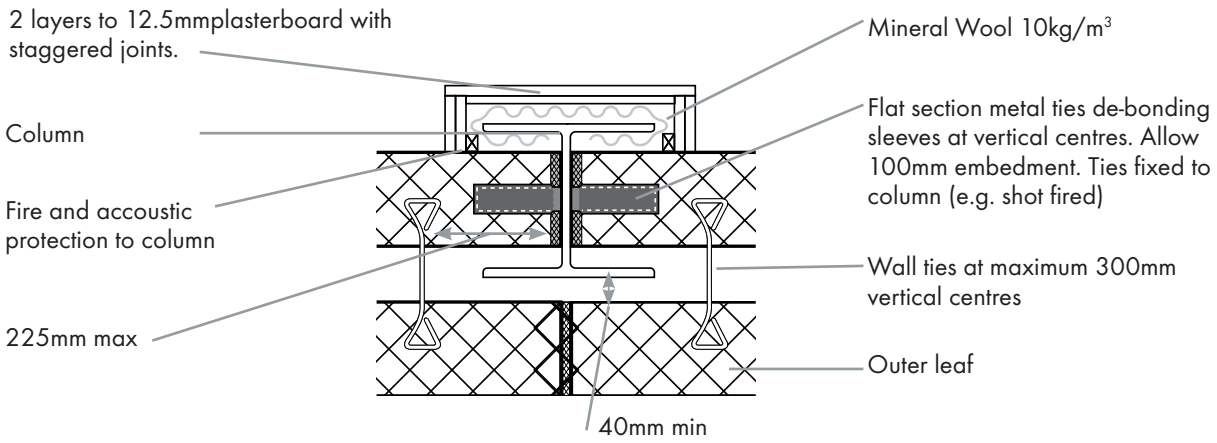
Windposts

Windposts can be used to divide blockwork into suitable panel sizes to suit the anticipated design wind loading. They can also be used to provide lateral edge restraint to internal walls where no other type of vertical support is available. Wind posts are available in various profiles to suit loadings, cavity width etc. Leading manufacturers of windposts can provide a windpost design service.

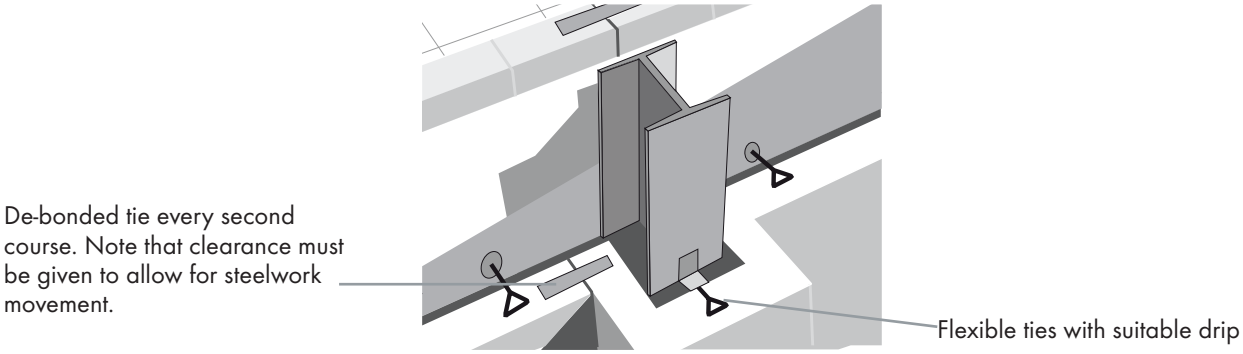




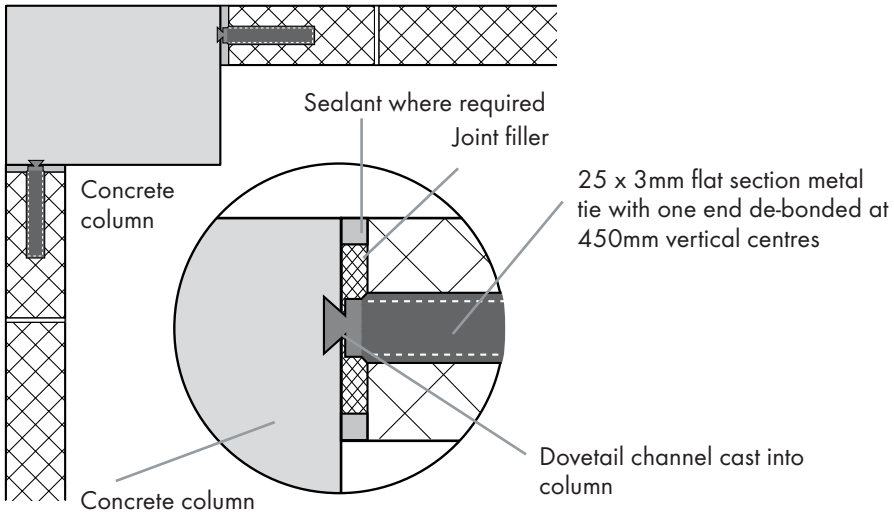
Movement joint to blockwork at steel column in cavity wall



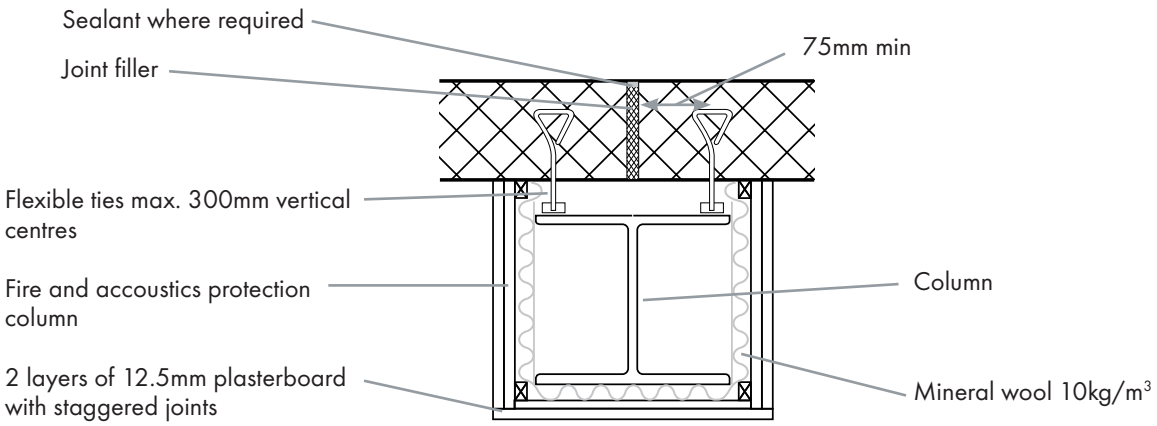
Movement joint to blockwork at steel column in blockwork encasing column



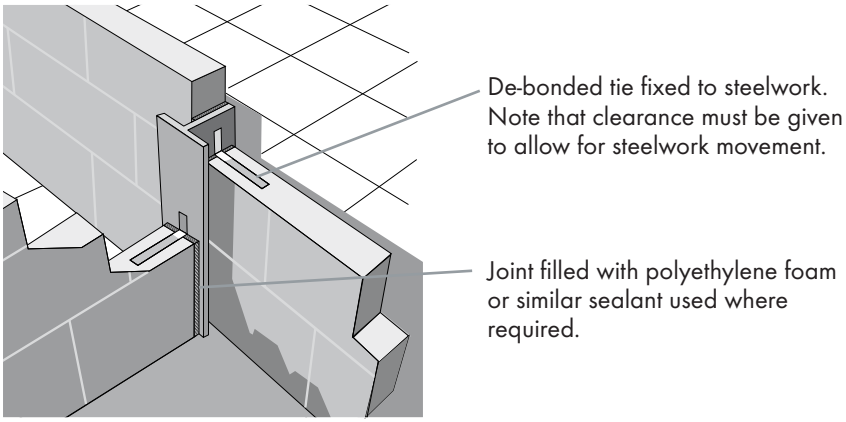
Movement joint at concrete column



Movement joint to blockwork at internal steel column



Internal blockwork butting steel frame



Typical head restraint to internal wall