Accommodation of Movement

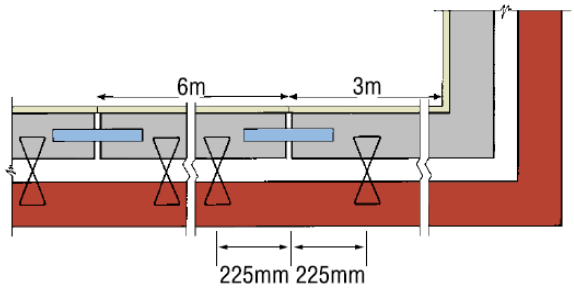
TSD 02

The risk of cracking in walls due to drying shrinkage and/or thermal movement can never be totally eliminated from any type of masonry and provisions such as movement joints and bed joint reinforcement (BJR) only act to reduce the risk of cracking. Similarly, when they are not used, the risk increases.
For all masonry work movement joints and/or BJR may need to be provided. These should be incorporated at the design stage and although PD 6697 (Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2) states that movement joints are not normally provided in internal walls of low rise housing (unless significantly long runs of wall are involved), the risk of cracking does however increase where:

- wall panels are shallow (length exceeds three times the height),
- lengths approach or exceed 6m,
- the ends of the wall are bonded-in,
- the mortar is over strong, or
- the work gets over-wet during construction.

General considerations

In the design of walls, movement should be accommodated by following the recommendations of BS EN 1996-2 and PD 6697, which can be summarised as follows.
With the exception of solid external walls or outer leaves, movement joints are not normally provided in dry-lined constructions as any cracking caused by drying shrinkage is not normally of any structural significance and will not be visible. However, where wall lengths exceed 6m, the following should be considered.
H+H aircrete block walls in excess of 6m should be designed as a series of panels separated by movement joints at maximum 6m centres. Alternatively, the wall panel can be reinforced either negating the need for or increasing the distance between Movement Joints. Where the masonry is continuous at an internal or external corner, the first joint from the corner should be positioned within 3m of the corner.



Other areas needing particular attention are:

- Openings, or changes of wall height, thickness or direction.
- Shallow walls (where the length of a panel exceeds three times its height).
- Normally dissimilar materials should not be bonded together but should be separated by forming a vertical movement joint or by incorporating a horizontal slip plane.

Additionally, the following points of good practice should always be observed.

1. Overstrong mortars should be avoided. Generally, a Class M4 (Designation (iii)) mix, (1:1:6 cement:lime:sand) is the strongest that should be used above DPC.
2. All blocks (as with other materials) should be protected, i.e. the normal good practice of
    i. covering the tops of partly-built walls:
    ii. at the end of the day's work;
    iii. during wet weather;
    iv. once the wall has been completed but before the shell is weather-tight, thus preventing saturation of the wall. This will ensure minimal drying out movement.
3. Use of bed joint reinforcement above and below openings (see section on bed joint reinforcement below).

Location of movement joints

Where movement joints are required they are best positioned:

- At intersecting walls and columns.
- At changes of wall height or thickness, or where chases occur.
- To coincide with movement joints in adjacent elements of structure (floor or roof).
- At junctions of dissimilar materials.
- Where architectural or structural features create a 'weak' section ie. at a junction with a structural column.

Note: Movement joints are not normally required below DPC level.

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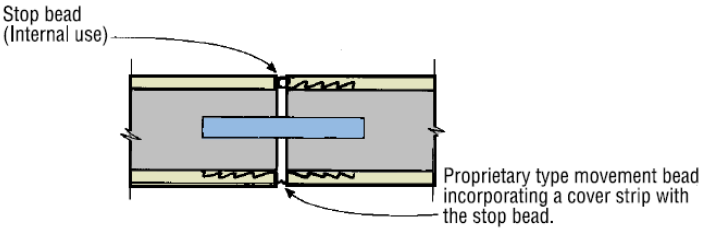
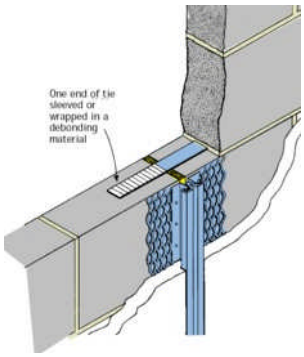
Construction of movement joints

Straight, un-bonded vertical joints are the most common type of movement joint, and can be formed by butting the H+H aircrete blocks against both sides of a strip of rigid or flexible filler (such as polyethylene foam). A flexible sealant may be applied as required to maintain air tightness.

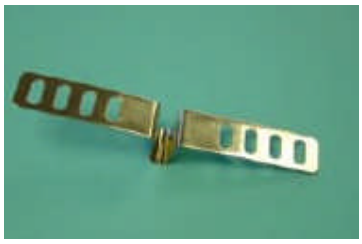
Movement joints should normally be continuous through all surface finishes. Stop beads can be used to end the finish at either one or both edges of the joint. Alternatively, a proprietary type of cover strip can be used, or an architrave can be pinned to one edge of the joint.



Where design stability considerations require continuity across the joint, proprietary movement ties should be set in vertical centres not exceeding 450mm. These should be set parallel to the plane of the wall. For traditional mortar joints proprietary types of slip-ties with one end sleeved are available. Wall ties or ties with anchored ends, for example fish-tail ties, should not be used since this would result in bonding of the joint, which would prevent accommodation of movement.

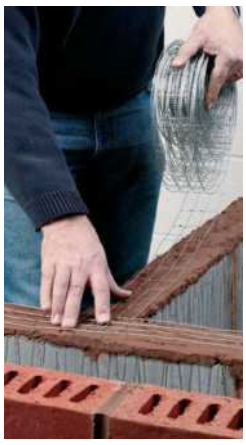


Movement ties for thin joint blockwork are made with bends which are designed to fit into a 10mm wide movement joint and flex to allow for movement.

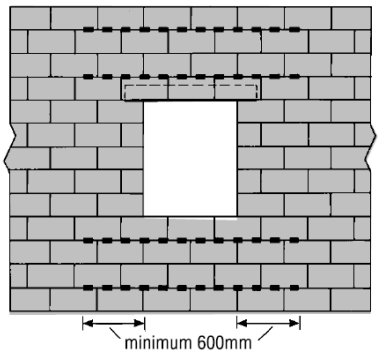


Bed joint reinforcement

The use of bed joint reinforcement can reduce the risk of cracking caused by a concentration of stresses. Its use can also be extended so that where a movement joint would otherwise be advisable, but not desirable, eg where aesthetic or practical reasons do not allow, the wall panel may be reinforced through its length. This applies particularly to separating walls which should not contain a movement joint. For specific advice contact our Technical Department.



Reinforcement laid in horizontal bed joints is particularly appropriate for areas of high stress, for example at openings and under concentrated imposed loads. Any such reinforcement should be of adequate length to distribute stresses to nearby movement joints or into adjacent areas of blockwork, extending, for example, at least 600mm into the adjacent blockwork each side of an opening.



Where a wall is supported by a floor, which itself may be subject to deflection, the first two courses of the wall should be reinforced.

In all cases, masonry-grade reinforcement should be used (plastering grade types are not suitable) and it should be installed in accordance with the manufacturers recommendations.

In recognition of the fact that Thin Joint mortar is stronger than a traditional 1:1:6 (or its equivalent) mix, our recommendations for Thin Joint constructions is that bed joint reinforcement be generally included in every second course.

Wall junctions

Normally walls should be bonded at returns and junctions unless a movement joint is required. However, where a section of wall has to be constructed after other work has been completed, the bonding can be replaced by a straight joint provided ties are built-in across the joint. This method of jointing is also preferable to bonding in situations where differential movement is likely to occur, for example, where sections of wall are constructed on different foundations.

Dissimilar materials

Where H+H aircrete blocks abut other materials (e.g. brickwork, steel etc.), differential movement can occur. Where dissimilar materials bear onto H+H aircrete blocks (e.g. cast in-situ concrete slabs, precast concrete beams or floor units, and lintels), the use of a separating layer or 'slip plane' at the bearing or bed joint reinforcement should be considered.

Slip plane

A slip plane is a sliding joint (a typical example would be a smooth DPC type material or building grade polythene) used to separate parts of the structure having different movement.

For example, the combined effects of drying shrinkage and the thermal movement of a concrete roof slab cast directly onto a block wall could cause cracking in the upper courses of the wall. The use of a slip plane between the top of the wall and the slab would help to prevent this. The most common use for slip planes is under the bearings of long lintels, precast concrete beams and in-situ concrete slabs.

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