

MOVEMENT JOINTS IN MASONRY CONSTRUCTION

Cracking in buildings is a significant concern to warranty providers as, even if the cracks do not arise from structural movement, a claim can still be made on the policy for the damage arising. Additionally there is a risk that such cracks may have a negative impact on the integrity of the waterproof envelope.

Movement joints are used to eliminate or control cracking within the fabric. The joints are located in strategic positions and allow slight, predetermined movement without subsequent cracking to the masonry.

Spacing, design and location of movement joints depends principally on the dimensions and shape of the wall in question, detailing techniques and the complexity of the structure. The joints should be located at junctions which may be vulnerable to cracking.

The position of movement joints will be strongly influenced by structural and architectural considerations but the following may prove useful as an indication of where control joints may be necessary.

The main reasons for movement in masonry are loading and the effects of moisture, thermal and chemical actions (e.g. sulphate attack (a salt of sulphuric acid)).

In the past masonry structures were built with flexible (lime) mortars which were able to accommodate some movement without causing cracking. Modern buildings are more brittle due to widespread use of high-bond (cement) mortars, they have a smaller thermal mass (reduced wall thickness) and so tend to be more vulnerable to thermal movement and high insulation standards isolate the outer leaf, increasing the risk of differential thermal movement.

For these reasons it is necessary to control movement by introducing joints in the construction.

Movement, other than structural, occurs due to moisture content and/or thermal expansion/contraction.

Movement due to moisture:

- Clay products exhibit long term expansion
- Concrete products exhibit long term shrinkage
- Calcium silicate brickwork also exhibits long term shrinkage
- Natural stone tends to be more stable from the effects of moisture, although sandstone will exhibit small shrinkage

Thermal movement:

Most masonry is subject to thermal expansion and contraction, which will combine with the movements associated with moisture.

- The orientation of the wall is important and will affect the magnitude of the problem, as south and west-facing walls will experience greater heat gain and rain is predominantly driven from the west.
- Dark materials absorb and radiate considerably more heat than light coloured masonry.

- Insulation, particularly full fill, provides more thermal isolation of the outer skin thus increasing differential thermal movement between the two leaves.
- Mixing shrinkable concrete products with expanding clay products can increase problems.
- Features such as columns, corners, steps and staggers and changes in the thickness of a wall can increase the concentration of stress and the likelihood of cracking.
- Long slender panels and panels with openings will present greater problems than more 'square' panels with no openings.

Consideration needs to be given to whether the movement joint needs to cope with repeated reversible movement or single unidirectional movement.

For clay brickwork a global expansion figure for both moisture and thermal movements may be taken as 1mm/m. The maximum length of wall should be no more than 15m without a joint. The joint therefore should be 15mm wide plus an allowance for the compressible filler, of say 30% of the joint, which results in a 20mm joint needing to be formed. The filler should be flexible cellular polyethylene, cellular polyurethane foam or foam rubber, all of which will compress easily.

For concrete block work, joints should be 10mm at 6m centres. The filler can be hemp, fibreboard or cork – these materials should not be used in clay brickwork as they do not compress easily.

In calcium silicate bricks the joint should be 10mm at 7.5m to 9m centres. The filler can be hemp, fibreboard or cork.

In stone the joints should be 10mm at 15m centres plus an allowance for the filler. The filler can be hemp, fibreboard or cork.

NB The spacing of the first movement joint from a return should not be more than half of the above dimensions.

All the above dimensions are for unreinforced masonry. Bed joint reinforcement can be used to resist movement in accordance with design by an Engineer.

Wall ties should be provided either side of any movement joint at approximately 225mm vertical centres, and max 150mm from the joint.

Further guidance is available from the Technical Services Department of LABC New Home Warranties (technicalservices@labcnhw.co.uk) and from BS 5628: Part 3: 2005: Code of practice for use of masonry

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