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TECHNICAL INFORMATION C6

APPLICATION & CONSTRUCTION
RAIN PENETRATION OF BRICKWORK WALLS

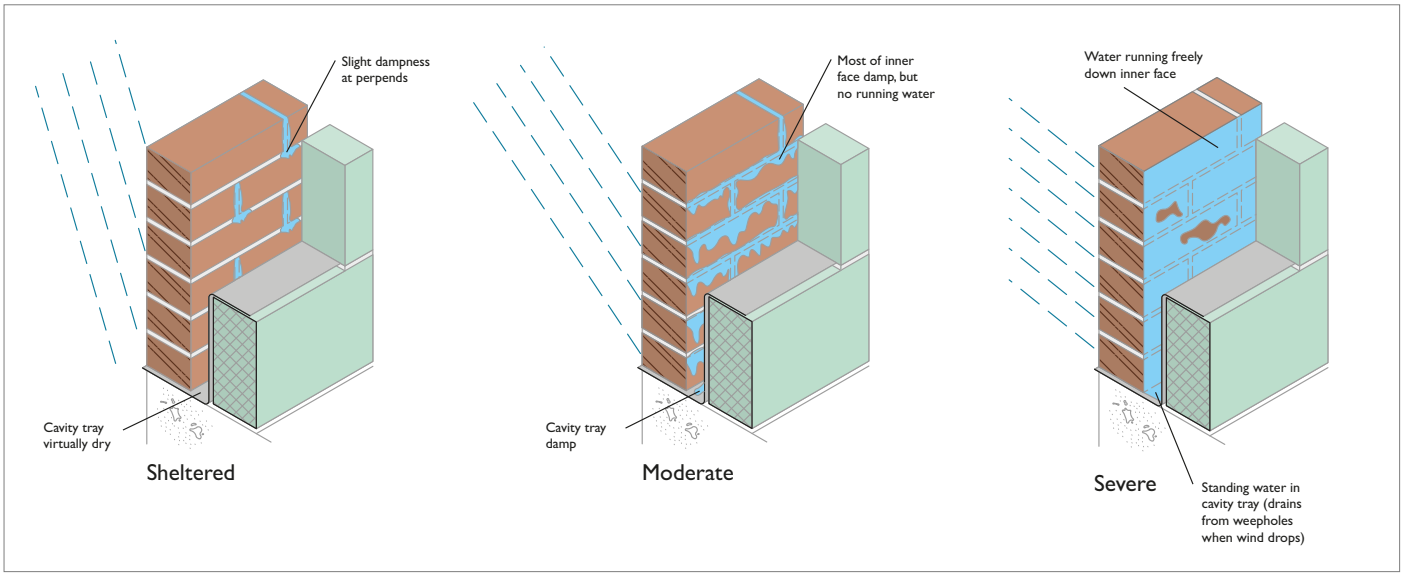
The outer leaf of masonry construction is not watertight!

Since approximately 1930 house construction changed from predominantly solid wall structures to cavity walls. Solid walls, by the nature of masonry, would allow moisture to eventually percolate through and cause dampness especially in areas of the country subject to severe exposure to wind driven rain.

The change to cavity wall construction allowed water, finding its way through the outer leaf, to run freely down the inside of the outer leaf and be re-directed outwards via weep-holes further down the wall.

Many instances of water penetration problems appear after heavy rainfall soon after completion of a dwelling. Often the first thought is that 'the bricks are leaking' and they must be faulty.

RESISTANCE OF OUTER LEAF TO WIND-DRIVEN RAIN



During long periods of wind-driven rainfall, the brickwork becomes saturated directing excess water down the outer face. Mortar, often being more porous than the masonry unit or prone to hairline cracking, will absorb large volumes of water which then enter the cavity.

When it comes to specifying one of the many types of bricks available, NO distinction should be made as to which is best for the purpose of keeping water out because the weakness in a brick wall is the interface between the brick and the mortar joint. For this reason, it is important to ensure that a good quality of workmanship is employed at all times.

THE BOND BETWEEN BRICK AND MORTAR IS VERY IMPORTANT.

Mortar acts as a 'glue' and space filler. It makes up about 17% of the area of the brickwork and careful gauging of the sand/cement is needed. The correct designation of mortar should be specified according to durability requirements and masonry unit being used. If the mix is cement-rich, the structure is less flexible to thermal and moisture movement and cracks can form. Cracks provide a speedy route for water to penetrate into the cavity. This is worsened if the bricks haven't been laid on a full bed of mortar with fully filled perpend joints! Too little cement, however, makes the mortar even more porous.

For further information or advice regarding this topic please contact
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REASONS WHY WATER MAY BRIDGE THE CAVITY

It is likely that water will enter the cavity. This wasn't so much of a problem in earlier years of cavity wall construction, but cavities are now being used as the easiest way to fulfil more stringent insulation regulations and extreme care must be taken during the construction of cavity walling if it is going to be shared with materials that can breach the gap. It could, in effect, act as a bridge for water to cross to the inner leaf.

CAVITY INSULATION

Current Building Regulations demand a cavity at least 50mm wide. If cavity insulation is intended, ideally provision should be made to maintain this as a free space. 'Batts' of insulation material are fixed to the inner leaf and if they come adrift and stick out slightly during construction, any debris falling onto them bridges the cavity creating a path for water to cross.

FULL FILL INJECTED

Install as late in the building programme as possible. Ensure injection at the correct centres. Qualified insulation contractors only should undertake this. It is not known how 'retro-fill' injection systems affect the long term durability of brick or wall-tie components.

FULL FILL FIBRE BATTS

Read the fixing instructions before commencing. Build the outer leaf first and strike joints flush inside the cavity. Batts must be closely butted both vertically and horizontally and at closures. Stagger vertical joints. Batts must be kept free from mortar droppings. Do not push batts into cavities.

WALL TIES

Wall ties are sandwiched within the mortar joints of each leaf and span the cavity to tie the structure together. Without these the walls may buckle in strong wind. If they are placed sloping downwards toward the inner leaf, water passing through the brickwork may travel down them causing damp spots on the inner wall.

Wall tie incorrectly sloping toward inner leaf.

CAVITY TRAYS

Omitting the stop ends to cavity trays or the lack of trays altogether can cause rain penetration problems around openings such as windows, doors and meter cupboards etc. In a very sheltered location the omission of these may never be apparent but they are a regulatory requirement.

MORTAR JOINTS

All joints should be FULLY filled with mortar. Tipping and tailing the cross-joints should be avoided. Recessed joints are not advisable except in very sheltered areas. Mortar should be compacted with a 'jointing' tool before it has completely set.

MASONRY

Masonry should not be allowed to project into the cavity. Half bricks cut on site can project and catch mortar droppings as work progresses above. These droppings can eventually bridge the cavity and allow water to migrate across.

DESIGN FEATURES

Certain design features can test the vulnerability of brickwork to its limit. Large expanses of glass can direct copious amount of water run-off onto the brickwork below. Lack of adequate roof overhangs, faulty guttering, inadequate projecting throated window sill features and poor chimney construction are common faults.

WEEP-HOLES

Blocked weep-holes (openings in the perpends) or none having been incorporated in the first place can cause a build-up of water in the cavity trays over openings. They often get blocked with debris. There are stipulations in the Code of Practice as to how many and where they should be incorporated.

Garages and porches do not have to be built to the same requirements as houses and it is not surprising that after heavy rainfall, puddles appear internally! Rightly or wrongly there is no proviso in the Building Regulations that garages must be built to provide cavity construction, as they are not deemed dwelling areas.

The local Building Authority can advise on wind and rain exposure factors for your area. The design of any structure should involve this. It is widely thought that climate change is already with us and instances of wind driven rain are more prevalent at certain times of year.

PD 6697: Recommendations for the design of masonry structures and BS8000: Workmanship on Building Sites should be adhered to in respect of good building practice. The NHBC Standards provide an easy to read guide to these regulations.

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