

Energy Efficiency: Wall Insulation

Wall Insulation

Insulating walls can be an effective way of improving the thermal efficiency of a building. However, the technical difficulties can be complex, particularly when it concerns traditional materials and construction. The results can also be unsatisfactory in aesthetic terms. This guidance seeks to identify the types of wall construction that are common in the Suburb, how they may be insulated and the technical and aesthetic difficulties which arise from these methods.

Prior to insulating any walls, it is important that the construction of the building is carefully assessed and understood. Many firms are offering quick and easy solutions for wall insulation but it is imperative that the long-term consequences are understood first. A thorough survey of the building should always be undertaken by a qualified, approved and impartial installer or surveyor.

Throughout the Suburb, there is a mix of both cavity and solid wall construction and some properties may have both types within one building. It may not, therefore, be immediately obvious what type of wall construction has been used. Brick bond alone cannot identify the construction of the wall, although can be a helpful indicator. Weep holes and cavity trays can also be useful signs of cavity construction. In addition, a survey can help identify which walls in a building will most benefit from insulating; in many cases it may not be cost effective to insulate every wall of a property. For example, insulating largely glazed external walls which have less brickwork would be technically difficult and is unlikely to be cost effective.

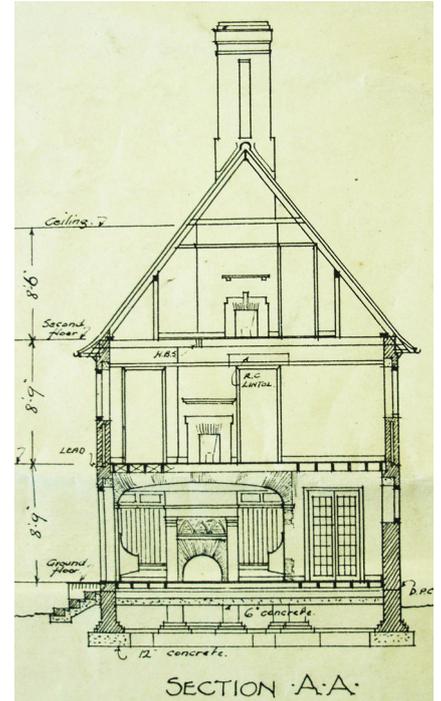
Solid Walls

Traditional solid walls were designed to be constructed using permeable materials, such as lime based mortars and renders. These soft materials allow for the evaporation of moisture to pass readily through the body of a wall and to escape without damaging the fabric of the building. This process helps control any penetrating rainwater, rising ground moisture and water generated by humans inside the building.

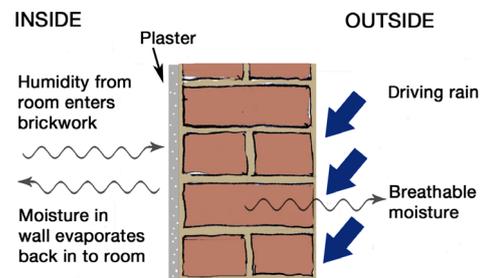
When it comes to insulating solid walls, it is crucial that a method is used which is suitable for these permeable characteristics. Preventing this process can result in the trapping of moisture within the fabric of the building and subsequent decay to the brickwork. The insulation of solid walls should be detailed to ensure that the breathing performance of the building is not disrupted.

Cavity Walls

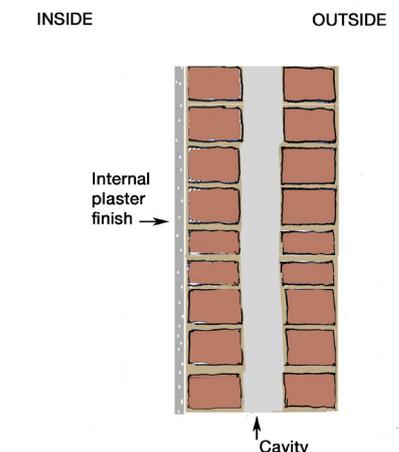
Cavity walls are constructed from two leaves of brick (an inner and outer wall) which are separated by a continuous airspace (the cavity). The two leaves are tied together for structural stability. The cavity is designed to prevent damp from passing from the outside to inside wall and to allow for the evaporation of any moisture which passes through the external leaf. Although normally associated with post- 1930 Suburb houses, some earlier properties are also of cavity construction.



▲ Original drawing of a Suburb property showing solid wall construction on the ground floor as well as cavity construction on the first floor



▲ Solid wall construction.



▲ Cavity wall construction.

External Insulation

Both cavity and solid walls can be insulated on the exterior surface by affixing an insulation layer to the outer wall, covered by a protective render or cladding.

There are some technical problems that can arise from externally insulating properties. For example, additional insulation on the external wall can prevent moisture from evaporating properly, which is likely to result in dampness. Any insulating system needs to allow for the movement of moisture through the wall but resist absorbing rainwater from the other direction. This can be a complex process.

Furthermore, most houses in the Suburb are part of a wider group of buildings, harmoniously designed so as 'the part should not spoil the whole'. Adding external insulation will change the texture and appearance of a single property and therefore disturb the harmonious aesthetic of the group. Rendering or cladding original brickwork or roughcast will result in a loss of high quality building details and craftsmanship. External insulation can also require extensive remodelling of roof eaves, rainwater goods and window and door reveals, which can significantly impact on the character of a building.

For these reasons, external insulation will not normally be acceptable in the Suburb. It may be possible in some cases on detached buildings (such as garages), which are not visually part of a group.

Internal Insulation

Insulation boards can also be directly affixed to internal walls. In many cases, particularly solid wall construction, this is the preferred method of wall insulation. However, all homeowners should be aware of the technical risks involved and how these can be avoided.

With less heat penetrating the external wall from the inside, the outer mass will be colder in temperature. This may result in dampness, frost damage and spalling brickwork. Furthermore, in solid wall construction, any rainwater that penetrates the brickwork can become trapped behind impermeable insulation, such as foam board (as illustrated). This build-up of water in the fabric of the building can cause dampness and decay in areas that are not visible and difficult to access. It is therefore imperative that breathable insulation is used, such as wood fibreboard, to enable any moisture to evaporate.

Internal insulation can also result in a loss of original detailing, such as corncicing, skirtings or architraves. It may be more appropriate to insulate individual rooms which have less features, as opposed to the entire property.

Internal insulation may be the best option for improving the thermal performance of Freehold properties which are not listed, in rooms where there are few original features. Owners of Leasehold properties may need to obtain Trust consent before insulating internally.

Cavity Insulation

Retrospective cavity fill has become an increasingly widespread method for improving thermal efficiency and is often considered the least visually intrusive method for wall insulation. However, it is important to be aware of the technical problems that can arise, as well as the effect it can have on the external appearance of the building.

Cavity insulation involves injecting or blowing insulating material into the airspace dividing the two leaves. The most common materials are polystyrene bead, mineral wool and foam. In this instance, only modern, impervious materials should be used. This will ensure that any moisture that penetrates the outer leaf drains out the bottom of the cavity.

There are some technical concerns relating to retrospective cavity insulation. First and foremost, poor workmanship can lead to air pockets forming in the insulation material, which will allow moisture to penetrate through to the inner leaf and heightens the possibility of black mould forming on the internal face. Furthermore, there are some concerns that the temperature of the outer leaf could decrease to such a point that the exposure of the outer



▲ Decorative finishes, such as this pargetting, will be lost if external insulation is affixed to the outside wall.



▲ External insulation has been affixed to this building in Vienna, resulting in a loss of ornate corncicing and detailed window reveals.



▲ It can be difficult to retain interesting detailing such as this panellled architrave if internal installation is installed.

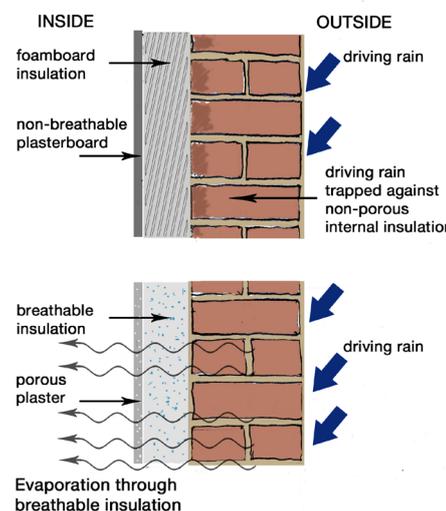
wall to freeze-thaw cycles can cause damage to the fabric of the building, such as spalling brickwork. This can be exacerbated by imporous and hard mortars.

It is also important to be aware of the external manifestation that may result from cavity insulation, for which Trust consent must be obtained. The process involves drilling holes, about 22mm in diameter, both horizontally and vertically across the external wall, one metre apart. Poorly located holes in the wall with unsightly mortar blemishes will not be acceptable. A preferred method may be to remove whole bricks and then replace once the insulation has been installed. If new bricks are required, samples must be approved by the Trust before being installed.

If the technical complications of cavity insulation can be overcome then it can, in aesthetic terms, be the preferred method of wall insulation in this type of construction.

These Design Guidance Leaflets are published by the Hampstead Garden Suburb Trust and are intended to give general background information and advice to residents, contractors, architects, and others commissioned to design new work, alterations or extensions in the Suburb. They are not intended to be a substitute for employing proper professional advice, and they assume that the reader will have the necessary technical background and practical experience.

There is a wide variety of types of building in the Suburb and it is impossible to lay down a series of rules which will be applicable in all cases. Therefore the advice and hints which are given in this paper must be applied in a sensitive and thoughtful way. It will be possible to find an exception to almost every rule and statement. All those with a specific interest should look around at the existing building or at others by the same architect. They should remember that alterations may have taken place since the building was built, and should not be misled into copying something which is not original.



▲ If wind driven rain penetrates the wall it can become trapped behind impermeable insulation, causing dampness within the mass of the building.



▲ Cavity insulation has been successfully installed in this property, without compromising the visual appearance.

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