Historic England

Energy Efficiency and Historic Buildings

Insulating Solid Walls

This guidance note has been prepared and edited by David Pickles. It forms one of a series of thirteen guidance notes covering the thermal upgrading of building elements such as roofs, walls and floors.

First published by English Heritage March 2012.
This edition (v1.1) published by Historic England April 2016.

Illustrations drawn by Simon Revill.

Our full range of guidance on energy efficiency can be found at:
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Front cover:
It is worth trying to establish the form of construction for the external wall.

Summary

This guidance note provides advice on the principles, risks, materials and methods for insulating solid masonry walls. Traditional solid wall construction is often the most difficult and in many cases the least cost effective part of a building to insulate. However, adding insulation to solid walls can lead to a significant reduction in heat loss but thought and care is needed to make sure the works are appropriate, effective and do not cause long-term problems.

Whether applied externally or internally, this type of work can have a significant impact on the appearance of the building. Wall insulation will also alter the technical performance of the solid wall and can either exacerbate existing moisture-related problems or create new ones. In some cases the technical risks of adding insulation to solid walls will be too great and alternative ways of providing a more cost effective long-term solution to improving energy efficiency may be more appropriate.

External insulation can be particularly difficult to incorporate into some older buildings as costly ancillary adaptations such as changes to the eaves and verges of roofs, drainage pipework, and window and door reveals are often required. As a consequence such works needs a high degree of quality control.

For listed buildings any form of wall insulation is likely to require consent. For many buildings, including those in conservation areas and national parks, external wall insulation will usually require planning permission.

Contents

Introduction

Energy Planning

Before contemplating measures to enhance the thermal performance of a historic building it is important to assess the building and the way it is used in order to understand:

- the heritage values (significance) of the building
- the construction and condition of the building fabric and building services
- the existing hygrothermal behaviour of the building
- the likely effectiveness and value for money of measures to improve energy performance
- the impact of the measures on significance
- the technical risks associated with the measures

This will help to identify the measures best suited to an individual building or household, taking behaviour into consideration as well as the building envelope and services.

Technical Risks

Altering the thermal performance of older buildings is not without risks. The most significant risk is that of creating condensation which can be on the surface of a building component or between layers of the building fabric, which is referred to as 'interstitial condensation'. Condensation can give rise to mould forming and potential health problems for occupants. It can also damage the building fabric through decay. Avoiding the risk of condensation can be complex as a wide range of variables come into play.

Where advice is given in this series of guidance notes on adding insulation into existing permeable construction, we generally consider that insulation which has hygroscopic properties is used as this offers a beneficial 'buffering' effect during fluctuations in temperature and vapour pressure, thus reducing the risk of surface and interstitial condensation occurring. However, high levels of humidity can still pose problems even when the insulation is hygroscopic. Insulation materials with low permeability are not entirely incompatible with older construction but careful thought needs to be given to reducing levels of water vapour moving through such construction either by means of effectively ventilated cavities or through vapour control layers.

The movement of water vapour through parts of the construction is a key issue when considering thermal upgrading, but many other factors need to be considered to arrive at an optimum solution such as heating regimes and the orientation and exposure of the particular building.

< < Contents

More research is needed to help us fully understand the passage of moisture through buildings and how certain forms of construction and materials can mitigate these risks. For older buildings there is no 'one size fits all' solution, each building needs to be considered and an optimum solution devised.

Technical Details

The technical drawings included in this guidance document are diagrammatic only and are used to illustrate general principles. They are not intended to be used as drawings for purposes of construction.

Older buildings need to be evaluated individually to assess the most suitable form of construction based on a wide variety of possible variables.

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1 Issues to Consider Before Adding Wall Insulation

The construction, condition and thermal performance of solid walls needs to be fully understood before adding any insulation or there could be a risk of creating long-term problems. Solid masonry walls have very different physical and performance characteristics to modern cavity walls. A separate guidance note is provided in this series for older buildings with early forms of cavity wall, *Insulating Early Cavity Walls*.

1.1 Construction

The first step should be to identify the materials used for external wall materials and how they have been constructed. Many older buildings may have three or four different types of wall construction, reflecting different stages of development. Construction can vary from single-skin brickwork to stone walls as narrow as 100 mm thick up to rubble-filled walls of a metre or more thickness. Wall materials can include bricks of varying hardness and permeability, dressed stone blocks of varying types, rubble stone, flint and rammed earth. Mortars can also be earth and/or lime based, also with wide variations in permeability and durability.

A single wall will often contain more than one material with quite different performance characteristics. For example, soft porous chalk and hard impervious flint have very different properties but are commonly found in the same wall. The presence of voids, irregular bonding patterns and concealed timbers also add to the complexity of solid wall construction and performance.

Theoretical models and calculations are frequently used to understand and assess the movement of energy and moisture through solid walls, often using quite sophisticated computer programmes. However, the data giving the thermal transmittance and moisture permeability of many traditional materials is simply not available and calculations at present are based upon idealised, homogenous walls. The actual variations within the wall and the influence of other variables, such as the presence of salts, can make such calculations very misleading when applied to many solid walled buildings. If theoretical modelling is used as a basis for the design of thermal upgrading, then accurate data should be used and the performance should be closely monitored after installation for any problems.

Figure 1
The first step should be to identify the external wall materials and their form of construction. Construction can vary from single skin brickwork to rubble filled stone walls of a metre thickness or more. A single wall will often also contain more than one material with quite different performance characteristics.

Traditional breathing performance

Most traditional buildings are made of permeable materials and do not incorporate the barriers to external moisture such as cavities, rain-screens, damp-proof courses, vapour barriers and membranes which are standard in modern construction.
As a result, the permeable fabric in historic structures tends to absorb more moisture, which is then released by internal and external evaporation. When traditional buildings are working as they were designed to, the evaporation will keep dampness levels in the building fabric below the levels at which decay can start to develop. This is often referred to as a 'breathing' building.

If properly maintained a 'breathing' building has definite advantages over a modern impermeable building. Permeable materials such as lime and/or earth based mortars, renders, plasters and limewash act as a buffer for environmental moisture, absorbing it from the air when humidity is high, and releasing it when the air is dry. Modern construction relies on mechanical extraction to remove water vapour formed by the activities of occupants.

As traditional buildings need to 'breathe' the use of vapour barriers and other impermeable materials commonly found in modern buildings must be avoided when making improvements to energy efficiency, as these materials can trap and hold moisture and create problems for the building. The use of modern materials, if essential, needs to be based upon an informed analysis of the full implications of their inclusion in order to minimise the risk of problems arising.

It is also important that buildings are well maintained, otherwise improvements made in energy efficiency will be cancelled out by the problems associated with water ingress and/or excessive draughts.

1.2 Breathing performance

Traditional solid walled buildings are often referred to as 'breathing' structures, meaning that they exchange moisture readily with the indoor and outdoor environment. Where insulation is introduced it is important that this characteristic is taken fully into consideration.

It is important to understand that moisture in solid walls comes from several possible sources:

- **Water from rainfall:** This obviously affects solid walls but not all internal damp is a result of penetrating rain. With the exception of extremely exposed locations such as on the coast or high ground, it is unusual for driving rain to pass through most solid walls in good condition. Normally it will only saturate the outer part of the wall, which will then dry out when the rain stops

- **Rising ground moisture:** This can be present in any solid wall which does not have a physical damp proof course. In such situations the moisture level is generally controlled by the 'breathability' of the material, which limits total moisture by allowing the excess to evaporate harmlessly away

- **Moisture generated in the building:** It is often underestimated how much moisture can be generated by people using a building, simply through breathing but also from cooking and washing. The permeability of external solid walls also significantly helps to buffer and control excess moisture and condensation from these sources

Materials used in repair and maintenance must be selected with care to preserve this permeability. Impermeable materials – such as vapour control layers, cement based renders and pointing and many modern 'plastic' paints and coatings can significantly impair the performance and trap moisture. Often this will also increase problems of damp and associated decay of the building fabric, and possibly create health risks for the occupants.

1.3 Thermal mass

Solid walled buildings, particularly those with thicker walls, have comparatively high thermal capacities so they can absorb heat over time and release it relatively slowly as the surroundings cool down. This is the same principle as a storage heater and can have a significant stabilising effect on the internal environment.

Adding external insulation means little of this heat will be lost to the exterior. This allows a building to maintain a level of warmth over day-night heating and cooling cycles, improving human comfort and potentially reducing overall energy use. Internal insulation, whilst reducing short-term heat losses to the exterior will isolate the internal environment from the benefits of much of this thermal mass.

In summer, when strong sun can cause overheating, the thermal mass of the walls cools the interior by absorbing excess heat during the day and releasing it slowly during the night. This helps reduce the need for air conditioning or mechanical cooling.

1.4 Building context

Location, aspect, and the differing exposure of individual elevations to direct sunlight and wind driven rain have important influences on a building's condition and performance which need to be taken into account when making alterations.

Different parts of a building are affected by very different micro-climates. For example, north facing elevations can be subject to prolonged damp, as they do not receive the benefit of a drying sun and are usually sheltered from drying winds. However, they receive little driving rain from the prevailing south-westerly winds, so conditions are more stable over time. This often means that north-facing walls deteriorate less than south and south-west facing walls which tend to suffer from accelerated rates of decay caused by fluctuations in temperature and regular wetting and drying cycles.

Each building's exposure to the elements is as much influenced by the proximity and position of surrounding buildings and its own projections and extensions as by the exposure of the site.

Figure 2
Hard cement pointing has damaged these soft permeable bricks as moisture has not been able to easily evaporate through the mortar joints.
© Philip White.

Figure 3
A cement render has been added to the stone wall of this church which has caused significant damp problems as the render has altered the permeability of the wall.
© Robert Gowing.

For example, an identical terrace of houses can be affected by quite varying levels of exposure and shelter. Such complex variations in microclimate would ideally need to be taken into account in the design of any scheme for adding insulation.

1.5 Wall condition

If a wall suffers from prolonged damp then a number of problems can occur such as:

- decay in timbers in contact with the masonry
- deterioration of the external fabric of the wall due to freezing and thawing
- movement and crystallisation of salts
- movement of tars and other chemicals through the walls, causing staining at the surface
- growth of mould on the inside surfaces of walls
- corrosion of metallic compounds in contact with, or buried within, the wall

Before making any improvements, it is therefore important to understand how solid walled buildings 'manage' the movement of water, in both vapour and liquid form. This is not only complex in itself, but may also be affected by the presence of soluble salts (see section 1.6).

Most insulation systems are designed and developed solely to limit heat loss and to avoid interstitial condensation from water vapour generated internally. They do not take account of how they affect the movement of moisture and salts already in a traditional wall. So they can easily:

- exacerbate existing problems
- create new problems, such as the displacement of damp and salts and the decay of timbers in contact with the walls
- create health risks for the occupants, for example from mould growth
- be affected by the moisture, reducing their performance and sometimes failing entirely

Where walls have been damp for a long period of time it can take years for them to dry out. The selection and design of insulation must take account of the drying-out process, both before and after installation, and the presence of residual damp and salts.

1.6 Salts

Buildings without a damp-proof course can be prone to damp and salt contamination, particularly at low level, where ground salts are carried in solution. Salts are also commonly found around fireplaces and chimney breasts where they originated as by-products of combustion. They can also originate from a previous use of a building such as from animal excrement and storage of fertilisers in agricultural buildings. Salts may also have been present in the original building materials (stone or aggregate extracted from marine environments) or from the use of chemicals such as caustic soda to remove paint. In some old buildings bricks were under-fired leaving a concentration of salts.

Many of these salts are 'hygroscopic', that is they have an affinity for water and so exacerbate the problems of damp by attracting moisture out of the air leading to the phenomenon of surfaces feeling 'clammy' to the touch. They may also re-crystallise at drying faces with changing moisture levels, and the related expansion within the pores can very effectively turn sound masonry into powder. The interface between existing walls and added insulation can be susceptible to cycles of evaporation, condensation and salt crystallisation. As such locations are hidden from view; major deterioration may have taken place before anybody becomes aware that there is a problem. Unfortunately salts are notoriously difficult to effectively remove from porous building materials such as brickwork, masonry and plasters.

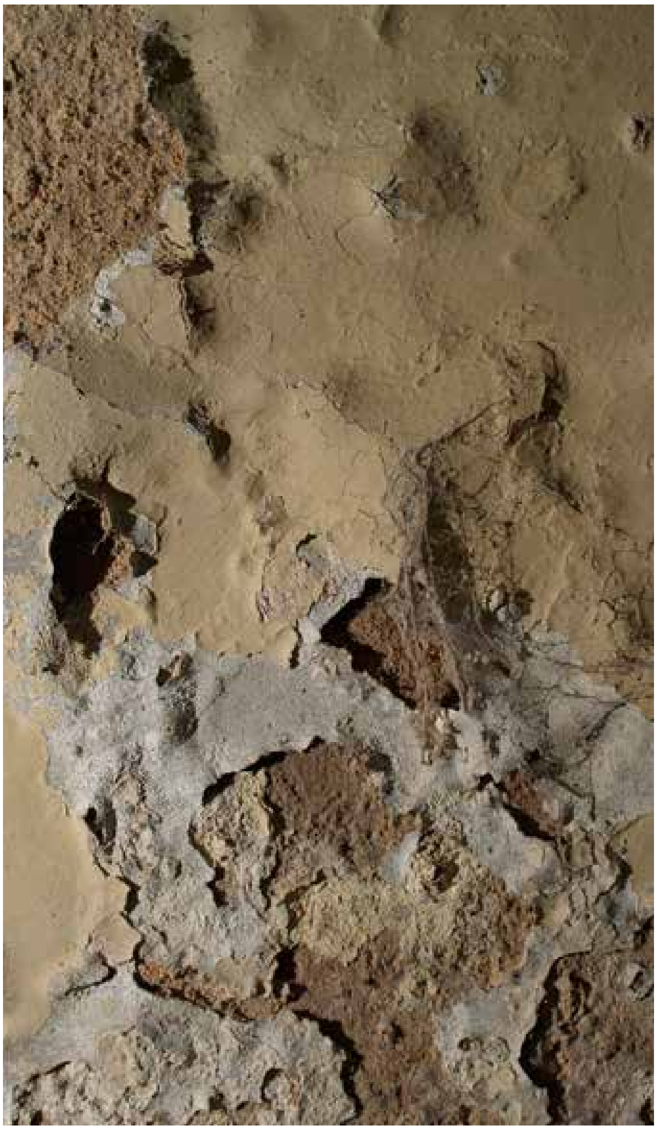


Figure 4
Damp walls can be prone to salt contamination.
© Tobit Curteis Associates.

2 Solid Wall Insulation

Insulation may be added to existing solid walls either externally or internally, but the physical effects on both the building fabric and the internal environment can be very different. This is explored in more detail in the following sections.

2.1 Cost-effectiveness

The necessity to achieve sound detailing to perimeters and openings can significantly add to the initial base cost of both external and internal insulation and may significantly reduce its overall cost-effectiveness as the financial payback is correspondingly long. Full payback periods are typically 30 years or more, but they will inevitably vary depending on particular circumstances.

In the majority of cases it may not be worth considering the insulation of external walls until the full range of easier and more immediately rewarding upgrades have been carried out. These would include actions such as repairing and draught-stripping windows and doors; insulating roofs and suspended ground floors, and upgrading services. Most of these upgrades will also have considerably less impact on the character and significance of historic buildings.

2.2 Impermeable materials

Practical experience of the repair and conservation of historic buildings shows that the introduction of materials and systems that do not maintain permeability can seriously exacerbate existing problems and or create new ones. Examples of impermeable materials and systems which could give rise to problems include:

- closed cell and extruded plastic insulation
- plastic vapour barriers
- cement or acrylic based renders
- cement pointing
- plastic based external wall paints
- vinyl wallpaper

Any of these used on an external wall can trap moisture within the wall and lead to damp and decay, as well as making the walls feel cold and ‘clammy’. Installed on the inside, they may do less damage to the building fabric itself, but will negate its ability to buffer moisture levels in the internal air. Both of these can significantly reduce comfort for people using the building, who tend to try to compensate by turning the heating up, thus wasting energy.

Clearly, if the walls are already damp before installing insulation these effects will be exacerbated. Under these circumstances it is particularly important to allow walls to 'breathe' in order to dry to the outside as effectively as possible. Drying to the inside is significantly less effective, and may be unpleasant for users of the building.

2.3 Thermal bridges

Whenever insulation is added to an existing building there is a danger of creating thermal bridges at critical junctions where full coverage may be interrupted. When wall insulation is added these weak points are typically at window and door reveals, but with internal insulation they may also be formed at the points where the floor structure meets external walls.

Areas left with reduced or no insulation coverage will not only be colder, but will also attract relatively more condensation because the majority of other surfaces are warmer and can no longer share the load. The result can be severe local decay, particularly to timber and finishes. For example, the ends of floor joists embedded in the external walls are at increased risk of decay from condensation.

Great care needs to be taken to ensure adequate detailing around window and door openings to avoid potential thermal bridges, and this can significantly increase the overall cost. The necessary level of detailing can be very difficult to incorporate in certain circumstances such as bay windows or decorative corbelled eaves, in which case, depending on the potential severity of the consequences, it may even be better not to install insulation at all.

3 External Wall Insulation

Most external insulation systems comprise an insulation layer fixed to the outside of the existing wall with a protective render or cladding installed on top to protect the insulation from the weather and possible mechanical damage (impact or abrasion).

3.1 Physical adaptation of the building

The increased depth of wall created by an external render or insulation system will often require adaptation to the roof and wall junctions, around window and door openings and the repositioning of rainwater down-pipes and any services fixed to the outside of the building. These alterations may require scaffolding access and possibly a temporary cover to reduce the risk of water penetration during the work.

3.2 Changes in the appearance and character of a building

External insulation will significantly alter a building's appearance, even if it is already rendered. Even then, decorative architectural features such as cornicing, string courses and window surrounds will also be affected. Even where the elevations are quite plain, simple alterations such as the deepening of window and door reveals and the alteration of the eaves

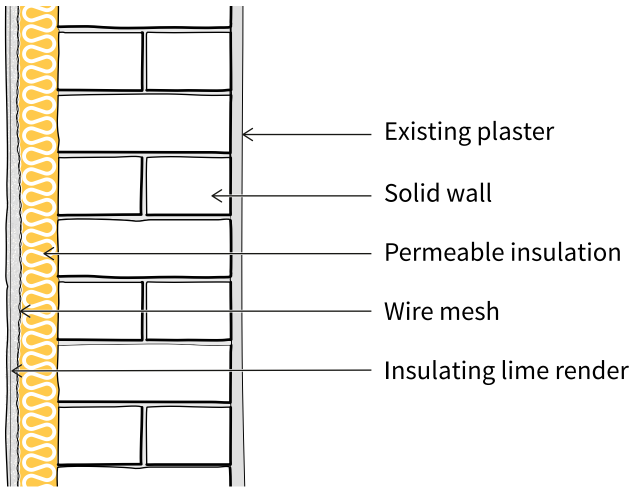


Figure 5: Solid wall - External insulation
This shows a permeable solution with an insulation such as hemp-lime or wood-fibre batts fixed to the masonry and finished with a permeable lime render.

lines can markedly alter a building's appearance. In many cases it will be necessary to actually relocate windows and doors further forward in the overall wall thickness in order to minimise the danger of creating cold bridges at the reveals.

Planning permission will be required for external insulation if the building is listed or in a conservation area. For listed buildings, listed building consent will also be required. Under certain circumstances external wall insulation can be classed as permitted development but the local planning authority should be consulted before any work commences.

3.3 Changes in moisture movement within the wall

It is important that the insulation and protective finish installed externally should have low vapour resistance in order to retain the necessary 'breathability', and allow moisture to evaporate away harmlessly. A useful rule of thumb is that all layers of an insulated solid wall should become progressively more permeable from the interior to the exterior. Whilst it is important to protect external insulation from rain, this should not be done in any way that will trap moisture from within the fabric or from the ground within the solid wall material.

3.4 Materials

For traditional buildings with highly permeable external walls, the need to prevent impermeable layers precludes the use of modern closed-cell foam and other plastic-based insulations, as well as the use of protective finishes which bar moisture vapour movement. As most suitable external insulations will also need to be protected from external rain and from mechanical damage, external insulation should normally be considered as a two-component system where all layers need to work together in harmony.

Useful materials for the external insulation itself include:

- Hemp-lime composites
- Mineral wool
- Wood-fibre panels

All these insulation materials need to be protected from both the weather and mechanical damage, although to differing degrees. Suitable moisture-permeable finishes include:

- Lime renders
- Rain-screen cladding (tile hanging etc) with lapped joints

Materials which can be used as a single coat are available, such as insulating lime renders containing expanded vermiculite, but these tend to give significantly lower insulating values. They can, however, sometimes be applied in circumstances where other types of external insulation would be detrimental to the character of a historic building.

If impermeable 'vapour closed' insulation systems are being used then careful detailing and quality control on site is vital to prevent moisture finding its way between the external wall and the insulation layer. Such systems often depend on mastic sealants which can have a limited lifespan.

4 Internal Wall Insulation

Internal wall insulation is usually applied directly to the inner face of the external wall and then a finish is applied to the room side. Rigid insulation boards can often be fixed directly to the wall face itself, and then the finish applied to conceal them without any additional structure. In its most convenient form, plasterboard can be obtained with a factory-applied insulation backing which can be fixed to the inner face of the wall, often on battens providing a small air gap. Although such systems alone do not offer very great thermal performance they can significantly reduce radiant heat loss and energy use.

For larger thicknesses of insulation, rigid or non-rigid insulating materials can be installed between timber studs or battens fixed to the wall with the new internal finish applied to the timber structure. Occasionally, the structure and insulation may be erected as a separate inner leaf, with a ventilated cavity between the insulation and the original wall. In all cases it is necessary to carefully consider the control of vapour from the warm internal air entering and condensing on the cold side of the insulation, or within vulnerable parts of the external solid wall.

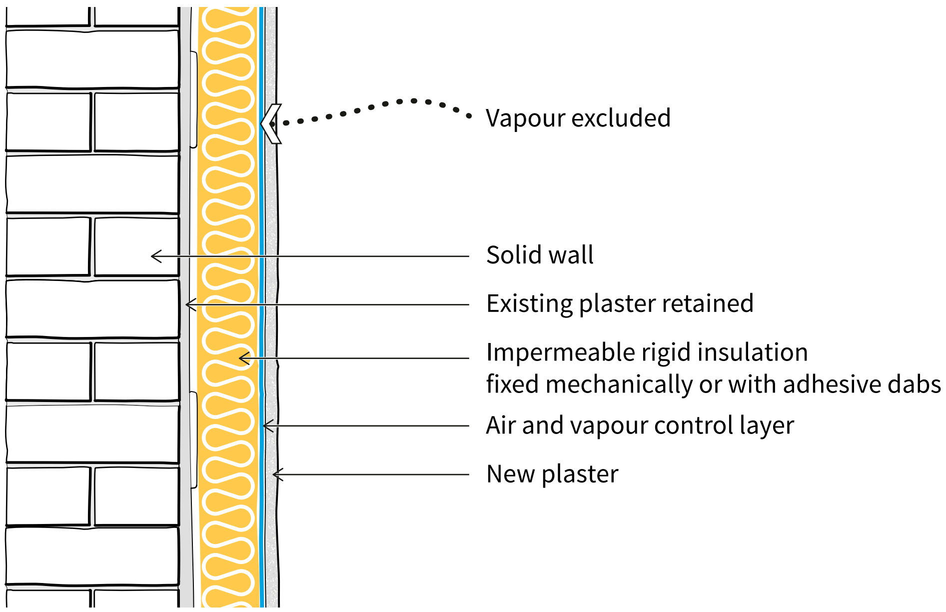


Figure 6: Solid wall – internal insulation
A rigid non-permeable insulation is shown here fixed either with adhesive dabs or mechanically fixed. A vapour control layer is added to the room side face before plastering. Care needs to be taken to make sure this layer is not punctured by fittings or fixtures otherwise water vapour could find its way into the construction and condense on the cold side of the insulation.

4.1 Physical adaptation of the building

As with external insulation, care needs to be taken with the design and installation of internal insulation at critical details in order to avoid cold bridging, particularly at the reveals of windows and doors and wall/floor junctions. It is also often necessary to relocate services (radiators and associated pipe runs, electric power points and light switches) as well as making adjustments to skirting boards and door architraves.

The construction of a separate insulated inner leaf could include ventilation to the cavity. However, there is a risk that there will be insufficient air movement within the cavity and any vents could alter the character or appearance of the building. There is no point in ventilating such a cavity to the inside of the building, as the air movement will simply by-pass the insulation, rendering it ineffective.

Thick, high-performing internal insulation installations will often significantly reduce the floor area of rooms and corridors, sometimes to the extent that they cannot be used as before.

4.2 Changes in the appearance and character of a building

Significant internal features such as plaster cornices, picture rails, skirting boards and door architraves may all be affected by internal wall insulation. They will inevitably be either concealed or disturbed to accommodate the insulation. Although it is normally possible to replicate such details on the inner face of the new insulation, the effect of revised room proportions on the design of adjacent wall finishes needs to be carefully considered at the design stage, as the side walls of an insulated room will become shorter.

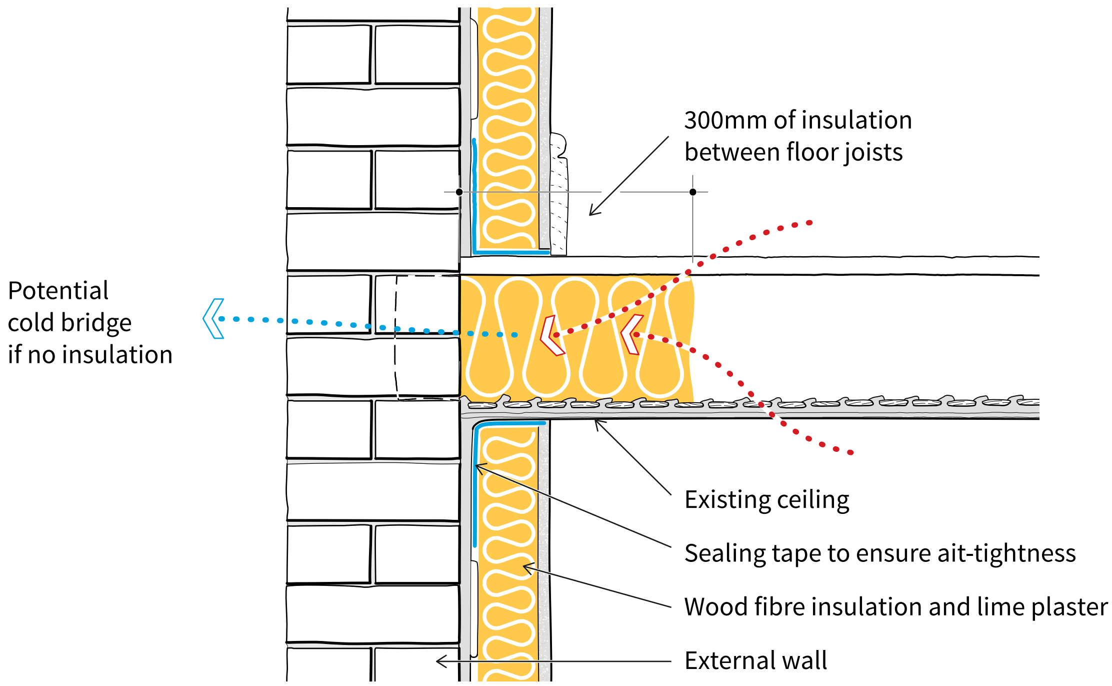
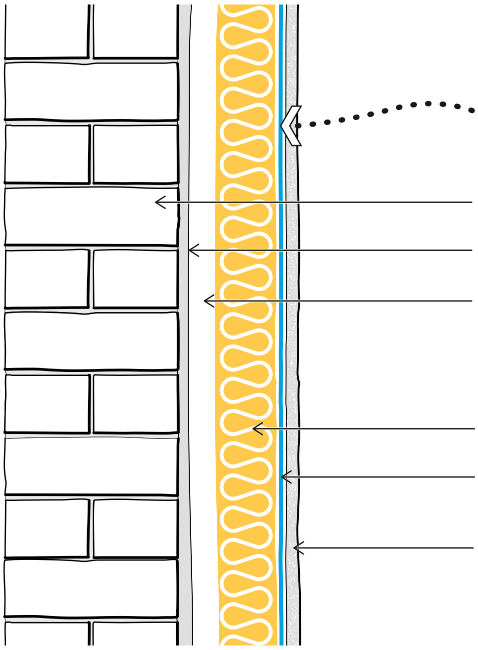


Figure 7: Thermal break at floor junction
To avoid a thermal break at a floor junction insulation should be added within the perimeter of the floor zone. It is also important to seal insulation at junctions with the ceiling to maintain air-tightness.



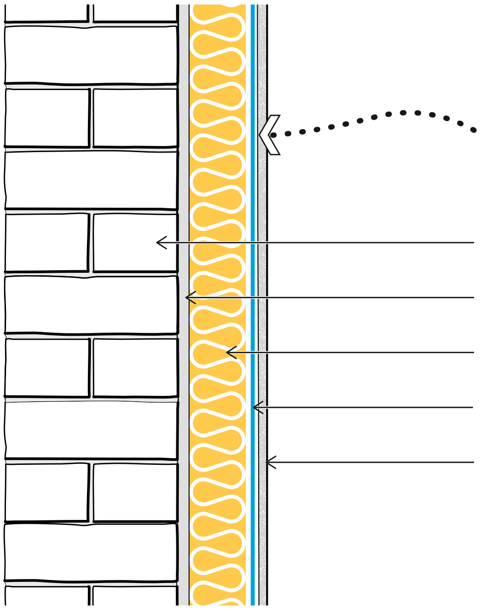


Figure 8 (top): Solid wall – Internal insulation with cavity
The insulation here is kept entirely separate from the external wall by means of a cavity. If impermeable insulation is used then a vapour control layer would still be recommended as the air movement within the cavity might be quite minimal. With this arrangement the benefits of the wall's thermal mass are lost.

Figure 9 (bottom): Solid wall – Internal insulation with timber battens
The use of timber battens can allow other types of insulation to be used other than rigid insulation. In some proprietary systems the battens have insulation bonded to them to minimise cold bridging through the timber. Quilt insulation can be held in place between the battens or materials such as cellulose can fill the cavity. A vapour control layer is shown in this detail as the insulation is non- permeable.

The disturbance to the internal appearance can be compounded by the need to extend insulation back from the external wall onto party walls, other internal walls, floors and ceilings to reduce the risk of thermal bridging.

In listed buildings, consent will be required for any internal alterations that affect the appearance and character, including any materials, details and finishes of historic or architectural interest. In many cases this may make the installation of insulation unacceptable.

4.3 Changes in moisture movement within the wall

In order to prevent condensation occurring on the cold side of internal 'vapour-closed' insulation it is necessary to separate it effectively from the warm moisture-bearing air of the building's interior. This will require the use of an effective vapour control layer. Alternatively, a 'vapour open' permeable system such as wood-fibre can be used where no vapour control layers are needed.

Effective vapour control is very difficult to achieve in practical terms. Air and vapour control layers are positioned on the warm side of the insulation behind the new finish. As a consequence these membranes are easily damaged by building users

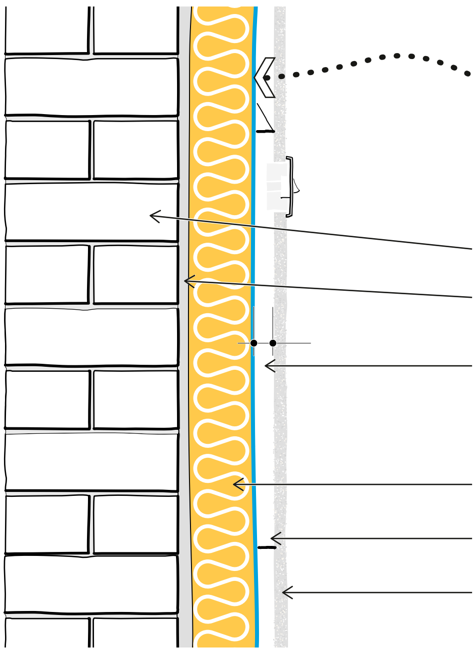


Figure 10: Solid wall – Internal insulation with services zone
An impermeable foil back rigid insulation board is shown here with battens fixed over. These provide a fixing for the plasterboard without puncturing the foil-face as well as providing a services zone.

making fixings in walls or modifying electrical fittings. They can also be punctured during the construction process itself. All penetrations can allow moisture vapour through, which can condense either within or adjacent to the insulation, potentially causing rot and decay in a hidden location. Closed-cell foams are inherently vapour-impermeable, but are vulnerable to vapour penetration at the joints.

Both forms of vapour control are also vulnerable at the perimeter, particularly in a traditional permeable structure, where moisture can by-pass the physical vapour barrier through adjoining walls and floors. However, many of these problems can be overcome by using insulation systems such as wood-fibre that are hygroscopic and 'vapour open'.

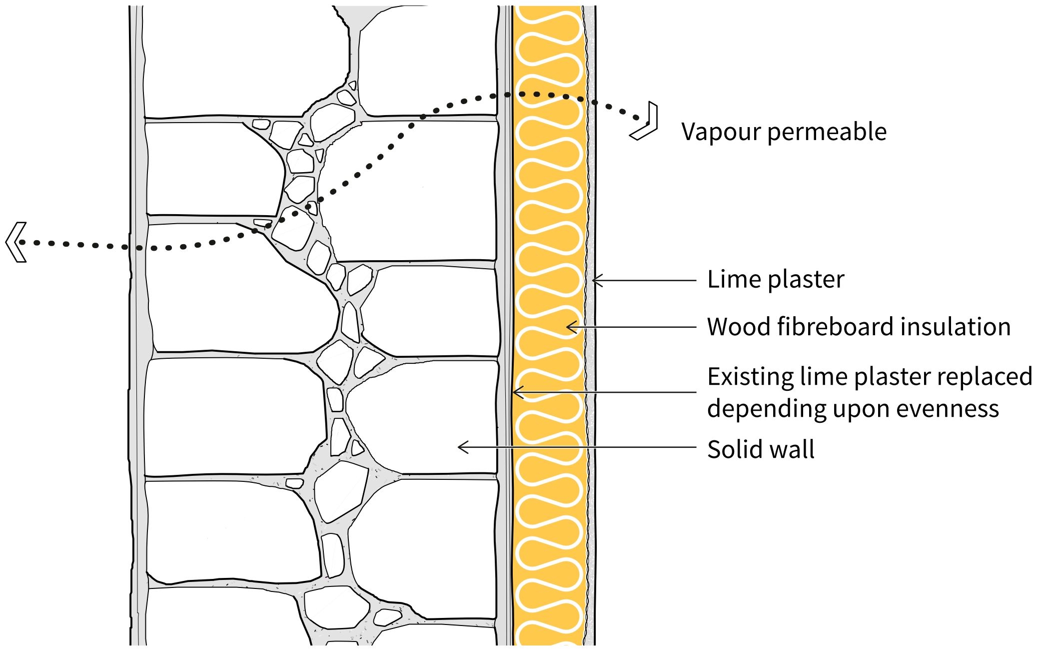


Figure 11: Internal solid wall insulation (with no vapour control layer)
This shows a fully permeable insulation system using wood-fibre board and lime plaster. A new lime plaster may need to be added to the existing wall to provide an even surface if the existing plaster surface is particularly uneven or is made of gypsum.

4.4 Materials

Almost any insulation material available can be used internally, subject to proper control of vapour and careful isolation from sources of any dampness. The full range of possible internal finishes can also be applied, either to copy the original or to introduce a new design.

New insulation products are continually being developed, particularly those that have a very minimal thickness (around 10mm). The benefits of such products to reduce overall energy consumption can be small and relatively expensive. However, what they can do is make a room feel more comfortable by reducing radiant heat loss, raising the surface temperature of the walls and possibly reducing the risk of condensation occurring on the decorated surface.

In all cases, it is important to understand the likely effects of proposals at the design stage in order to avoid damage to both new and valuable historic building fabric.

Figure 12 (top)
Permeable insulation such as this wood-fibre board are compatible with the 'breathable' nature of traditional construction.

Figure 13 (bottom)
Closed cell insulation bonded to plasterboard.

5 Where to Get Advice

This guidance forms part of a series of thirteen documents which are listed below, providing advice on the principles, risks, materials and methods for improving the energy efficiency of various building elements such as roofs, walls and floors in older buildings.

This series forms part of a wider comprehensive suite of guidance providing good practice advice on adaptation to reduce energy use and the application and likely impact of carbon legislation on older buildings.

The complete series of guidance is available to download from the Historic England website: HistoricEngland.org.uk/energyefficiency

Roofs

- *Insulating pitched roofs at rafter level*
- *Insulating pitched roofs at ceiling level*
- *Insulating flat roofs*
- *Insulating thatched roofs*
- *Open fires, chimneys and flues*
- *Insulating dormer windows*

Walls

- *Insulating timber-framed walls*
- *Insulating solid walls*
- *Insulating early cavity walls*

Windows and doors

- *Draught-proofing windows and doors*
- *Secondary glazing for windows*

Floors

- *Insulating suspended timber floors*
- *Insulating solid ground floors*

For information on consents and regulations for energy improvement work see historicengland.org.uk/advice/your-home/saving-energy/consent-regulations/

5.1 Contact Historic England

East Midlands
2nd Floor, Windsor House
Cliftonville
Northampton NN1 5BE
Tel: 01604 735460
Email: eastmidlands@HistoricEngland.org.uk

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HEAG081
Publication date: v1.0 March 2012 © English Heritage
Reissue date: v1.1 April 2016 © Historic England
Design: Gale & Hayes/Historic England

< < Contents