Action Surrey
SURREY'S LOW CARBON COMMUNITY

Wall Insulation

Approximately 1/3 of the heat from a home is lost through the walls. Insulating the walls of your house is the equivalent to wrapping it in a thermal blanket. Heat always flows from a warm area to a cooler area and insulation between or on the walls helps slow this transfer of heat from the warm air inside the property to the cooler outside air. There are three types of wall insulation for different wall constructions.

"Approximately 1/3 of the heat from a home is lost through the walls"

Cavity walls

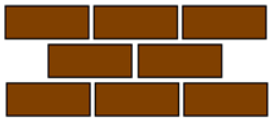
If your house was built from about 1930-40 onwards it will most likely have a cavity – two walls with a gap between them held together with metal wall ties. Cavity wall insulation works by trapping lots of small pockets of air that decrease the transference of heat across the cavity. Cavity wall insulation can decrease a wall's U-Value from 1.5 to 0.5 W/m^{2}K - quite a significant amount in U-value terms (the lower the U-value the more efficient your walls are retaining heat). Cavity wall insulation is commonly made from mineral wool (polystyrene beads and granules and foamed insulates are sometimes used) and is blown into the cavity by drilling small holes through the mortar. This process does not affect the structure of the building or the brick-work as the holes are filled up again. The outside appearance is not noticeably affected.

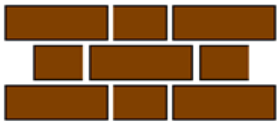
Does my house have cavity walls?

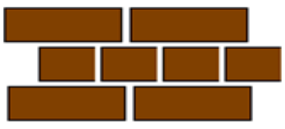
Age of the property

The easiest way of telling if your property has cavity walls is by its age. Properties built pre-1930 usually have solid walls, whereas properties that were built post-1930 usually have cavity walls.

The other way of checking is by looking at the brickwork. There are three main types of brickwork typically found on English houses;


Cavity wall Stretcher bond brickwork


Single wall Flemish bond brickwork


Single wall English bond brickwork

Cavity walls are usually built with Stretcher bond brickwork whilst the other two normally indicate solid walls. If your bricks are covered up you may be able to see their construction from the loft.

Thickness of the walls

Cavity walls tend to be thicker than single walls because of the gap between the two layers of brick. Below is a rough guide on the thickness of the walls and how you can tell whether there is likely to be a cavity.

Outside wall thickness	Cavity walls?
Less than 30cm (11.5 inches)	No
More than 30cm (11.5 inches)	Yes

Checking whether your cavity walls are filled

If possible, you can check whether you have cavity wall insulation by going into your loft and looking between the two leaves of brickwork close to where the roof meets the external wall. In the loft there may also be evidence of cavity wall insulation that has overflowed from when it was inserted. Otherwise there may be some indication in the paperwork you received when you purchased the house as to whether the cavities have been filled. If neither of these options provides the answer, Woking Borough Council may be able to tell you more about the type of house you have and whether it has had its cavities filled. The only way to be 100% sure is to ask an installer to inspect the property.

Oak Tree House Experience

As Oak Tree House was built around 1940-50 and it has cavity walls. These were not filled when we acquired the property. Since having the cavities filled with blown mineral wool we have seen the property wall U-value be reduced from 1.61W/m²K to 0.58W/m²K (without our internal wall insulation being considered, including the internal wall insulation the walls have a U-value of 0.37W/m²K). This

represents quite a significant improvement in the walls' thermal performance and will save approximately **600kg** CO_2 and **£125** every year on gas bills.

Having your cavity walls filled - what to look out for

If you are want to get your cavity walls filled but are unsure about the practice or process, the following section will hopefully answer some of your questions.

Having your cavity walls filled usually takes approximately 2 hours, however this depends on the size of your property and access. Before filling the cavities, the installation company should carry out an inspection of your property. In order to do this the building surveyor may need to come into your home and to check the heating system. The surveyor (or Technician) will need to access all the walls of your property, including joining walls with your neighbours. The surveyor or technician (installation team leader) should carry with them their training card and credentials which you are entitled to request.

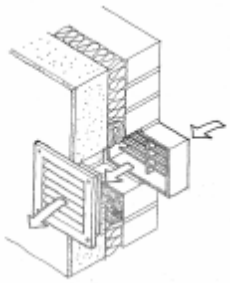
All professional installer firms should be members of CIGA (Cavity Insulation Guarantee Agency) and are able to apply for a CIGA 25 year guarantee for properties with cavity walls. You should ensure that a guarantee is provided by the installation company (they apply for the guarantee from CIGA). This is sent to you in the post for you to retain in case the cavity wall insulation fails. Cavity wall insulation should last for the life of the building and require no maintenance. If you have other concerns about cavity wall insulation you should discuss these with the installation firm or CIGA. Please consult a member of staff for the Oak Tree recommended list of installers.

Checking your cavities are fully filled

In order for cavity wall insulation to be effective it must fill the entire wall and ideally be evenly spread. To check this, the installation company should be

drilling small holes and blowing cavity wall insulation in at regular intervals covering the majority of the wall, from near to the bottom and to the top. Ideally, a diamond formation of entry holes approximately 1.5metres apart should be present.

Ventilation and cavity wall insulation



Ventilation points in your property must be protected when insulating your home. This applies to ventilation points providing combustion air to fuel burning appliances and points that provide ventilation for suspended timber floors. The surveyor will inspect these during their examination and should ensure that air bricks are sleeved to protect them for becoming blocked. This is especially important if the air-bricks are above the damp proof course. If decide to go ahead and fill your cavity walls, after the job is complete, have a look in the air-bricks to check the airway is clear of insulation. If you can see insulation behind the air-brick, under the CIGA 25 year guarantee you are entitled to call the installation company back free of charge.

Image courtesy of CIGA

Cavity Walls & Damp

Filling cavities is an effective way to improve the thermal performance of a building. However, there have been concerns that cavity wall insulation may increase the risk of damp being spread from the outer wall to the inner wall. This problem has received a lot of attention and undergone research. The Energy Saving Trust conducted a study in the 1990s which found that there was no difference in the likelihood of dampness passing between the outer and inner leaves of walls filled or not filled with insulation should they be breached by water[1].

However, it is very important that the cavity be inspected thoroughly before being filled. It is the installation company's responsibility to ensure the cavities are inspected

[1] Building Research Establishment (on behalf of EST)., *Cavity wall insulation in existing dwellings: A guide for specifiers and advisors (2007 edition);* Energy Saving Trust

before being filled. Most installers are trained under the BBA (British Board of Agrément) Certificate Agrément which should provide assurance of a high quality level of work, including a prior wall inspection. Cavities that are poorly constructed or are obstructed (i.e. poor 'pointing' of the brickwork or mortar droppings on wall ties) are more likely to encounter problems and suffer from dampness. If there is an existing problem with a wall such as dampness inside the outer wall, this will need to be remedied before the cavity is filled. This was the conclusion of another study that found the likelihood of dampness occurring is largely to do with the construction of the wall prior to it being filled and the type of fill itself[2]. Blown mineral fibre, the insulation material used by government funded schemes, was found by the Building Research Establishment to be least likely to cause rain penetration compared with the two other most popular materials; urea-formaldehyde foam and expanded polystyrene beads or granules, although granules are considered by some as the preferred option compared with mineral fibre for their thermal property[2].

Geographic location and the aspect (exposure of a wall) of a property also play a part determining the likelihood of an external wall be penetrated by rain. South-westerly facing walls frequently exposed to driving rain are more at risk to dampness penetrating the external wall and potentially causing problems Houses that suffer from this are usually situated in coastal regions or are on high ground.

If you are in any doubt about the condition of your walls a masonry builder should be contacted.

Checking for damp

Cavity wall insulation will not fix damp problems. There are some simple checks that can be done to diagnose damp problems prior to having your cavities filled.

1. If you have condensation on the walls or behind cupboards you need to ensure enough ventilation is flowing behind the unit.

[2]Davies. H., Wilmshurst, G., *Rain penetration problems associated with retrofit cavity wall insulation*, Structural Survey; Vol. 12 No. 2 MCB University Press 1993/4 .

2. If you have damp patches low down on the wall you may have a problem with the damp proof course, obstructions 'bridging' across the cavity or a drainpipe could be leaking and causing water to flow against the wall. You can ask a builder to remove a brick close to the problem area and have a look or ask a surveyor to conduct a boroscope inspection to check for obstructions in the cavity.

Cavity wall insulation causing damp?

In theory cavity wall insulation should actually prevent damp from occurring on inside walls. Cavity wall insulation moves the 'dew point' further away from the inside wall towards the colder outside wall. This means that as the temperature outside falls, inside wall is kept warmer because of the insulation, reducing the risk of condensation settling on the inside wall.

Grants for cavity wall insulation

Cavity wall insulation is free for those over 70 years of age and reduced by 50% for all other home owners. You can call the Woking Energy Advice Line for more information on having cavity wall insulation installed in your home on 0800 783 2503[3].

Solid Wall Insulation

For houses with single walls there is no cavity gap to be filled so insulation must be attached either to the inside of the wall or the outside of the wall. Single walled properties tend to be dated pre 1920s. Internal and external wall insulation tends to be more expensive than cavity wall insulation but the improvements that can be made to a property are noticeable. Insulating single walled properties will improve comfort by regulating room temperatures more consistently, reduce the risk of condensation and damp,

"Insulating single walled properties will improve the comfort of inhabitants by regulating room temperatures more consistently "

[3] It should be noted that polystyrene beads are not covered by government grant schemes

reduce fuel bills and reduce your household's emissions. Whereas unfilled cavity walls are said to loss 35% of a household's heat, an uninsulated solid wall is responsible for up to 45%.

Internal wall insulation

Internal wall insulation is fixed either directly onto the inside walls of the property with plaster dabs (as in Oak Tree House) or onto wooden batons that are fixed to the internal walls providing a 'cavity' between the plaster board and the wall which can be filled with the insulation material of choice. It should be noted that the more fixings that are used, the greater the chance that heat will be lost across these fixings. Insulated dry lining plaster board is a popular internal wall insulating product and is made from phenolic resin (a fossil fuel derivative) but there are other products such as Homatherm Woodflex® which is made out of recycled wood fibre, Warmcel® which is made from recycled newspaper or Foamglas® which is made from 60% recycled glass and Isonat® (a mixture of hemp and recycled cotton). Internal wall insulation is good for listed buildings that are obliged to retain their exterior appearance.

Capital Cost

Internal wall insulation can be expensive to install and can be quite disruptive however there are significant savings to be made from making an investment on upgrading your property's thermal performance. Below are the potential savings that a household can benefit from having insulated their property with internal wall insulation.

Measure	Annual saving per year (£)	CO_2saving per year	Total estimated cost of installation[4]
Internal wall insulation	Around £380	Around 2 tonnes	~£7000

[4] Energy Saving Trust, Solid Wall Insulation Supply Chain Review (May 2009); midpoint cost for a 3-bedroom property.

Oak Tree House Experience

In Oak Tree House we have internal wall insulation on the external walls as well as cavity wall insulation – as an extra measure to reduce heat loss. As we completely renovated the property we took the opportunity to install internal wall insulation on all external walls. This resulted in a U-value of 0.37 W/m²K (including a blown fibre cavity fill). The thermal assessment that was conducted at Oak Tree House confirmed that the walls were performing very well and not leaking any heat. The internal wall insulation is CFC/HCFC free insulated dry lining plaster board made by Kingspan. To have internal wall insulation fitted to all the external walls cost approximately £4000 installed.

External Wall Insulation

If room space is very limited or disrupting the inside of the property is not an option, external wall insulation can be considered. This involves applying a layer of insulation material (sheets of expanded polystyrene foam, rigid urethane insulation or fibreglass) to the outside of the property that is usually between 50 and 150mm in thickness. External wall insulation is more expensive than cavity wall insulation and internal wall insulation but is worth considering if the outside of a house needs to be improved anyway and internal insulation is not feasible. External wall insulation is also one of the most effective ways to insulate a property. It avoids thermal breaks in the walls and other areas in construction that could allow heat to escape. External wall insulation also leaves the bricks on the inside of the property to absorb the heat from the heating system. Brick, concrete and stone are very good at storing heat; they absorb and release heat gradually. This helps keep the house warm, regulate temperature and keep the occupants comfortable. This also applies to the summer months when cooler temperatures are desired.

Below are the potential savings that could be made from installing external wall

insulation and approximate capital cost.

Measure	Annual saving per year (£)	CO_2 saving per year	Total estimated cost of installation[5]
External Wall Insulation	£400	Around 2,1 tonnes	~£12,000

External wall insulation not an option?

If external and internal wall insulation are not feasible options, lots of other cheaper measures should be used in combination. You should ensure that loft insulation is topped up and fitted properly (no gaps or breaks in the insulation and not compressed), draughts are blocked and controllable ventilation installed in warm areas of the house, especially bathrooms and kitchens, pipe-work is lagged, radiator reflector panels are installed, and that radiators are bled and not covered with clothing or hidden behind sofas.. If all insulation options have been exhausted, advanced heating controls should also be installed to maximise the efficiency of the existing heating system. This would include; thermostatic radiator valves to control the temperature of each individual radiator and allow the user to turn off radiators in rooms not in use, and an advanced thermostat to manage heat demand more effectively. Changing your boiler to an A-rated model will not make your house 'warmer' but will bring down your heating bills.
Secondary or double glazing should also be considered although these do require a more substantial investment. Please see the other sections in this pack that detail information on the measures mentioned above.

Grants for solid wall insulation

At present energy companies are subsidising solid wall insulation (under the Carbon Emissions Reduction Target). However, these grants are dependent on where you live in the country and a number of other criteria. For the majority of cases, energy companies (the main supplier of energy efficiency grants) have chosen to subsidise cavity wall insulation, loft insulation and energy efficient light bulbs. This is because these are the cheapest option that get the best energy saving. It is worth keeping an eye on the Energy Saving Trust website for grant offers on solid wall insulation:

[5] Energy Saving Trust, Solid Wall Insulation Supply Chain Review (May 2009); midpoint cost for a 3-bedroom property.

http://www.energysavingtrust.org.uk/Easy-ways-to-stop-wasting-energy/Energy-saving-grants-and-offers/Search-for-grants-and-offers