

How to implement cavity wall insulation

Buildings tend to lose between 10% and 30% of their heat through the walls. By insulating wall cavities, you can cut your energy use and save money.

For air-conditioned buildings, there's another benefit too. Cavity insulation reduces solar thermal gain during the warmest months of the year and cuts the need for cooling.

The business case

In an office building with 200m² of cavity walls, the cost of installing cavity insulation would be around £900. Assuming a fuel price of 4p/kWh, this could give you savings of around £150 and a payback of your costs in six years.

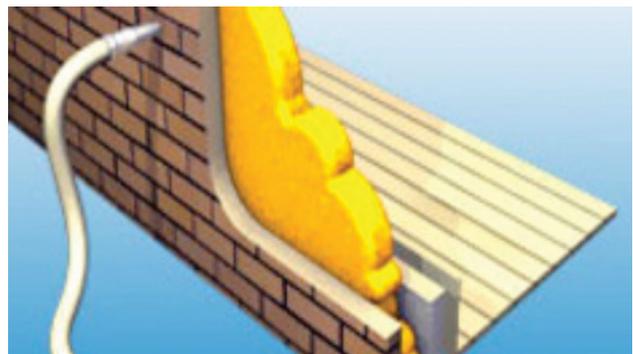
The technology

The standard method is to drill 22mm diameter holes into the outer brickwork at intervals of 1m to 1.5m.

Insulating beads, granules, loose fibre or foam are then blown into the cavity walls.

You won't see the drill holes afterwards as the mortar used to fill them can be matched to the building's existing mortar. All insulating materials must be manufactured and installed according to relevant British Standard Specifications and Codes of Practice, where appropriate. In addition, insulation products should be certified by the British Board of Agreement (BBA) and installed according to strict guidance laid out in the BBA certificates.

Figure 1 An illustration of the insulation process



Applications

Cavity wall insulation can be used in any double-walled or double-skinned building. For the insulation to be effective, though, the cavity between the two walls or skins needs to be at least 50mm deep, and the brickwork must be in good condition.

- Buildings have been constructed with cavity walls since the 1920s. The walls are likely to be solid in any building older than this.
- If the building was built after the mid 1980s, then the cavity is likely to have been insulated during construction.
- In walls suitable for cavity wall insulation, the masonry pattern or bond type is likely to be running bond or one third running bond, where the bricks are all laid side-on.
- If the walls are about 300mm thick, and no less than 260mm thick, then they probably have cavities.

Figure 2 A cavity brick wall – only the sides of the bricks are visible

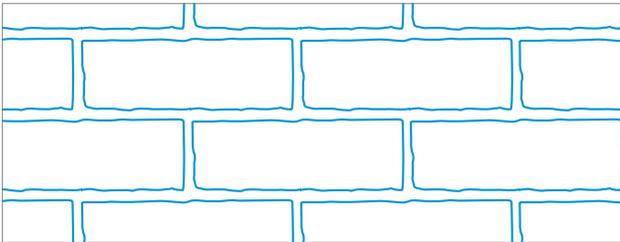
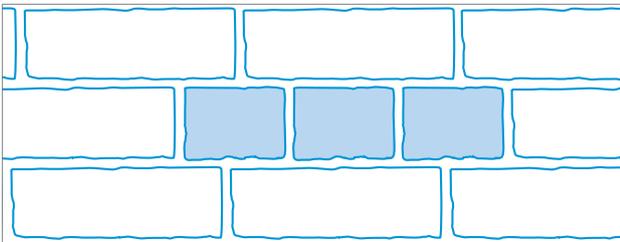


Figure 3 A solid brick wall – some ends of bricks are visible



Specification checklist

- Before any work is carried out, the building needs to be checked to find out whether cavity wall insulation can be installed. The installer will drill a small hole in your external wall and may use a borescope to see inside the cavity.
- A dampness check needs to be carried out to ensure that the damp course level isn't bridged. The installer will assess which type of insulating material is best for the building.
- The quality of pointing and brickwork must be addressed prior to installation to ensure that it is of sufficient quality before the insulation is installed.

Types of cavity wall insulation

There are three commonly used forms of cavity wall insulation; fibre, foam and beads.

Fibre

Mineral wool

The mineral wool used for cavity wall insulation consists of mechanically granulated spun glass or rock wool, treated with a binder or water repellent during manufacture. This form of insulation has been used widely throughout the British Isles since the 1960s and 1970s

and has a proven track record of performance. Mineral wool is suitable for most buildings with standard cavities that have no obstructions.

Cellulose loose fill

This is a fibrous cellulose material created from recycled waste products such as paper and, in particular, newsprint. In cavity wall applications it is blown into cavities dry, but in other insulation applications it can be sprayed wet to maintain some structural integrity. The attraction of the product is its high recycled material content and low embodied energy. However, thermal performance and durability depends on keeping the product free of water and moisture.

Foam

Urea formaldehyde (UF)

UF is injected into the cavity in a wet foam state, 90-95% pre-expanded, and completes its expansion within the cavity, setting to form a rigid insulant. The foam is produced on site using UF resin and a foaming hardener. It sets immediately after injection and dries through the outer fabric of the building and into the atmosphere.

It has sufficient strength and stability to be self supporting in the cavity. UF is water repellent and resistant to attack by rot, fungi and vermin. UF can be suitable for buildings with non-standard cavities.

Polyurethane

Although polyurethane foams offer high levels of thermal performance because of their closed cell content, the over-riding use of these foams over the last 30 years has been to stabilise walls suffering from tie failure. Polyurethane chemistry creates excellent adhesive bonds to most substrates and can be used to provide additional strength to most structures. These foams are also particularly suited to narrow cavities and high rise buildings. They only real limiting factor is the cost per installation, although increasingly the performance gains are seen to justify the additional expenditure.

Bead

Expanded polystyrene beads (EPS)

The polystyrene used for cavity wall insulation is in the form of virgin pre-formed bead which is usually combined with a binding agent or adhesive at the time of injection. Polystyrene beads are produced to a specified size and density which remains unaltered during the installation process. EPS is suitable for most buildings with standard cavities that have no obstructions.

Perlite/Vermiculite

Perlite is an amorphous volcanic glass with a relatively high water content. The beads provide a free flowing product which makes it a good void filler. Its inorganic nature makes it fire resistant and resistant to rot, vermin and insects. In comparison with other insulants, it is slightly less efficient. A sister product is vermiculite which is generally heat treated (exfoliated) to expand it further.

Exfoliated vermiculite therefore tends to be a little more susceptible to moisture ingress.

Each cavity fill material requires slightly different installation methods and has subtle advantages and disadvantages. *Table 1* sets out the different properties of the insulation follows.

Table 1 Comparison of different cavity wall insulants (primary source: DECC CESA EE0211)

	Fibre		Foam		Bead	
	Cellulose	Mineral wool	Polyurethane	Urea Formaldehyde	Perlite/Vermiculite	Expanded Polystyrene
BBA Certificate	Timber-framed buildings only	Yes	Yes	Not clear	No	Yes
CIGA Guarantee	No	Yes	BUFCA Guarantee	Possible	No	Possible
Thermal conductivity (W/mK)	0.040 W/mK	0.040 W/mK	0.022 to 0.028 W/mK Continuous layer avoids thermal bridging	0.040 W/mK	0.045 W/mK	White EPS bead – 0.038 to 0.040 W/mK Carbon (Grey) EPS bead – 0.032 to 0.034 W/mK
Density (kg/m³)		18 to 40kg/m ³ for a range of fibres covering glass wool to rock wool	20-35 kg/m ³	Typically 10 kg/m ³ (dry weight per dry unit volume)		Typically 12kg/m ³ +/- 2kgm ³
Fire		Non combustible Can act as cavity barrier	Combustible but less flammable than EPS	The foam does not burn, but tends to shrivel and char when exposed to fire	Fire resistant	EPS will not prejudice the fire resistance properties of the wall

	Fibre		Foam		Bead	
	Cellulose	Mineral wool	Polyurethane	Urea Formaldehyde	Perlite/ Vermiculite	Expanded Polystyrene
Water	Needs special treatment to be moisture resistant and avoid fungal attack	Resistant to water penetration Some potential to transmit water across the cavity or from below DPC level by capillary action Does not act as a water vapour barrier	Moisture resistant Vapour permeable	Resistant to water penetration Will not transmit water across the cavity or from below DPC level by capillary action Does not act as a water vapour barrier	Moisture resistant	Resistant to water penetration Will not transmit water across the cavity or from below DPC level by capillary action Does not act as a water vapour barrier
Site Preparation		Sleeve ventilation openings		Sleeve ventilation openings A large number of smaller holes in the cavity are required to install UF	Free flowing – fills voids well Must be installed in sealed spaces	Sleeve ventilation openings
Other Pros	High recycled content Low embodied energy Biodegradable		Strong bonding properties, suitable for high rise buildings and narrow cavities	Rot, vermin and fungi resistant	Reclaimable Rot, vermin and insect repellent Non-settling	Recoverable
Other Cons	Low compressive strength Possible formaldehyde from inks	Not recommended above height of 12 metres	Relatively high installation cost Extraction not possible without partial demolition	Potential for formaldehyde emission in poorly formulated systems (BS 5618 applies)		Cavity barrier required at party wall line Not recommended above height of 12 metres

Commissioning checklist

A thorough visual examination is usually enough, but it's a good idea to take a thermal image with a thermal imaging camera before and after the cavity wall insulation is installed to check its effectiveness. This needs to be done during the colder months when the heating is switched on. The before and after images should be taken in similar weather conditions.

Common problems

Some of the potential problems with cavity wall insulation include:

- Getting access to all areas of the external walls.
For example, one of the walls could be the boundary between the building and a neighbour. The contractor may need to climb on to another property's roof to gain access, but the roof may not be safe or strong enough to take weight. In some cases, scaffolding may be needed, which can increase costs considerably.
- The risks of working at heights need to be dealt with properly and thoroughly.
- The walls must be in good condition to withstand the pressure caused by blowing the insulating material into the cavity.
- Wall cavities are an effective way of preventing damp from penetrating. In extreme cases, filling the cavity with insulation could compromise this protection in properties with poor quality cavities. The quality of the cavity will be assessed during the initial survey of the property. You need a specialist survey to confirm your walls are suitable for insulation.
- If mortar of insufficient quality is used to re-fill holes, there may be potential for water to penetrate the cavity.

Finding a supplier

Your installer needs to be:

- approved or registered with a recognised association.
- bound by a code of practice and able to offer a 25-year CIGA guarantee.
- able to show you evidence of previous work and references.
- happy to agree with you in advance the materials to be used.
- able to give you a firm schedule and itemised cost.
- insured against all liabilities.

A registered installer will be a member of one of the following organisations:

The National Insulation Association (NIA)

08451 636363

www.nationalinsulationassociation.org.uk

The Cavity Insulation Guarantee Agency (CIGA)

01525 853300

www.ciga.co.uk

The British Board of Agreement (BBA)

01923 665300

www.bbacerts.co.uk

Other useful contacts for further information include:

Thermal Insulation Manufacturers & Suppliers Association

01420 471624

www.timsa.org.uk

Federation of Master Builders (FMB)

020 7242 7583

www.fmb.org.uk

British Urethane Foam Contractors Association (BUFCA)

www.bufca.co.uk

[T-Zero](http://www.t-zero.co.uk)