CSE recommends that the advice on this page is viewed as part of a **whole-house approach** to retrofitting your home. There may be other measures you need to look at before considering this one.

Internal solid wall insulation

Insulating solid (non cavity) walls will keep your home warmer and greatly reduce your heating bills.

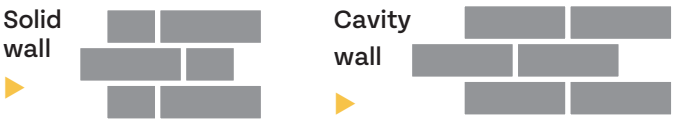
Solid walls can be insulated internally (from the inside) and externally (from the outside) – both are significant undertakings in terms of cost and disruption. This leaflet looks at internal solid wall insulation.

Internal solid wall insulation may be suitable for homes made from brick, stone or concrete, and works by adding a layer of thermal material to the existing inside wall. Although insulation will reduce the size of your room, it'll be warmer, so you'll be comfortable and enjoy the space more.

Internal solid wall insulation is particularly appropriate where you need to maintain the external appearance of the building, such as a heritage site.

How do I know if my home has solid walls?

If your home is made of brick, and the bricks have an alternating long-short-long pattern, then the walls are likely to be solid. If you can see only the long edge of the bricks, then it's almost certainly a cavity wall.



If the bricks aren't visible, then measuring the thickness of the wall will help. A solid brick wall is usually between 220-260mm thick, a cavity wall between 270-300mm and a solid stone wall as much as 500mm thick. The age of your home is also a good indicator; if it was built before the late 1920s it is likely to have solid walls.

Types of internal solid wall insulation

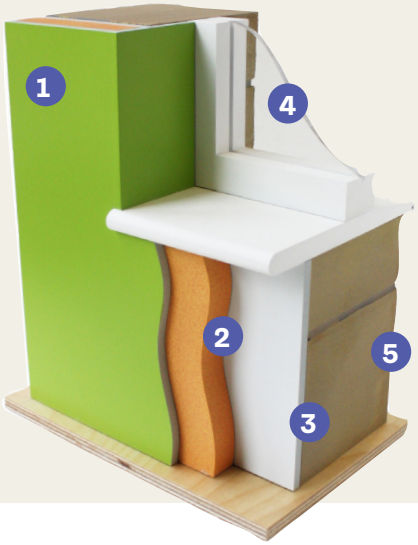
There are ways to insulate a solid walled building from within:

1) Rigid insulation boards

These come in a variety of materials and thicknesses, which have different energy saving properties. Some types have pre-attached plasterboard which makes the installation process more straightforward.

Cut-away model of internal solid wall insulation

1. **Surface coating.** This is the new plasterwork that covers the insulation layer, painted green in this example.
2. **Insulation.** This is the layer that prevents warmth escaping through the outside walls of the house.
3. **Internal wall.** This is the old internal plaster,now covered by the new insulation board and plasterwork.
4. **Windows.** Ideally, the insulation board is fitted to the inside of the window recess to prevent cold patches developing where condensation forms. But, as in this example, this is not always possible.
5. **External wall.** From the outside your property will look exactly the same.



2) Stud frames with infill
Here, wooden or metal stud frames are fixed to the walls, insulation is fitted between them and plasterboard laid over the top. Various insulation materials can be used including mineral wool or sheeps wool, wood fibre or hemp. The battens can hold more weight than boards on their own, so you can attach heavier items such as bookcases or kitchen cupboards to them. Walls that are rough and uneven – such as those found in some stone properties – can be made smooth and even in this way.

3) Flexible thermal lining
This comes in rolls like thick wallpaper, and is glued to the wall with a special adhesive. It doesn't provide the same level of insulation, but can be installed by a competent DIYer. Most flexible linings are less than 10mm thick so can be a good option for small rooms.

4) Insulated plaster
This is a mix of plaster and insulating material, such as cork. Trowelled or sprayed on, it is a good option for uneven walls and can help achieve good levels of airtightness.

Managing moisture

Most solid walls are vapour permeable, which means that moisture can pass through them. Therefore you need to make sure that by adding insulation you don't create an impermeable barrier that will cause condensation to form and get stuck between the insulation and the wall.

For this reason, you should use vapour permeable insulation materials and finishes which won't stop moisture moving between the inside and outside. Materials like wood fibre allow vapour to pass through it, preventing moisture from getting trapped inside the wall which can lead to damp, mould and damage to the building. Lime-based plasters will also hold and release moisture which helps to balance moisture levels in a home. There is no point using a vapour permeable insulation material if a non-vapour permeable plaster, like gypsum, is used over the top.

An alternative is to use less vapour permeable materials to create a continuous vapour barrier between the insulation and your walls. However, this needs to be designed and installed very carefully and should be done by a specialist installer; it will also most likely require an upgrade to the existing ventilation system to effectively manage moisture in the home.

Average cost and savings

Internal solid wall insulation costs around £12,000 for an average 3-bedroom semi, depending on the number of rooms being renovated and the type of insulation used. It's generally less expensive than external solid wall insulation because of the lower cost of materials and labour.

If this home used gas heating, the savings would be in the region of around £330 a year on heating bills. A detached house could save around £550 per year.*

Disruption

- **Rooms may not be usable while work is ongoing. You might need to remove furniture and kitchen units temporarily.**
- **Anything attached to the walls being insulated needs to be removed. This includes radiators, skirting boards, windowsills and plug sockets.**
- **Pipe work and wiring may need to be re-laid.**
- **The works will produce dust and could be noisy.**
- **A skip may be required, and contractors will require water and power and the use of a toilet.**
- **The newly insulated walls and adjacent surfaces will need to be re-decorated when the work has finished.**

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* Figures from Energy Saving Trust.