Insulating solid floors

Many properties in Barningham have stone or concrete floors. In most older properties floors are not insulated and, it can be one of the factors that makes a house feel cold. So, what can be done?

❖ In general – above or below?

- Many houses have solid concrete floors, rather than suspended wooden boards fixed to joists. Solid floors are made of a single cast concrete slab, with the internal floor finish on top. In modern properties the slab will include some insulation but in older properties the floor will not be insulated, so it could feel cold.
- The amount of heat lost through solid floors is limited, as heat rises – see Factsheet No. 1, *What Makes a Home Warm?* Heat loss may be less than through a poorly insulated ceiling, but a large area of cold floor can reduce thermal comfort and lead to condensation issues.
- The financial return from insulating a solid floor will not be as great as insulating your loft or adopting other energy efficiency measures.
- There are two ways to internally insulate a solid floor:
  - on top of the existing slab, or
  - by upgrading the slab by digging out and replacing. This is more expensive, very disruptive and normally only considered if you are doing a full refurbishment.
- If you decide to have the insulation above the slab, the room tends to heat up quickly, but because there is not much 'thermal mass' in the floor, it won't retain much warmth overnight.
- If the insulation is below the slab, it can take longer to warm up but stays warmer for longer. [If you have a south facing conservatory or sun-room, this can be a very good feature in heat-waves, as it helps prevent overheating as well].
- Another option to consider is to add some external insulation.

❖ Insulating on top of the existing floor

- This is the easiest way to insulate a solid floor. The usual method is:
  - level the existing floor surface
  - lay tightly packed rigid insulation panels (ideally 75mm depth)
  - place a floor deck on top. See figures below.

The Rural Community Energy Fund

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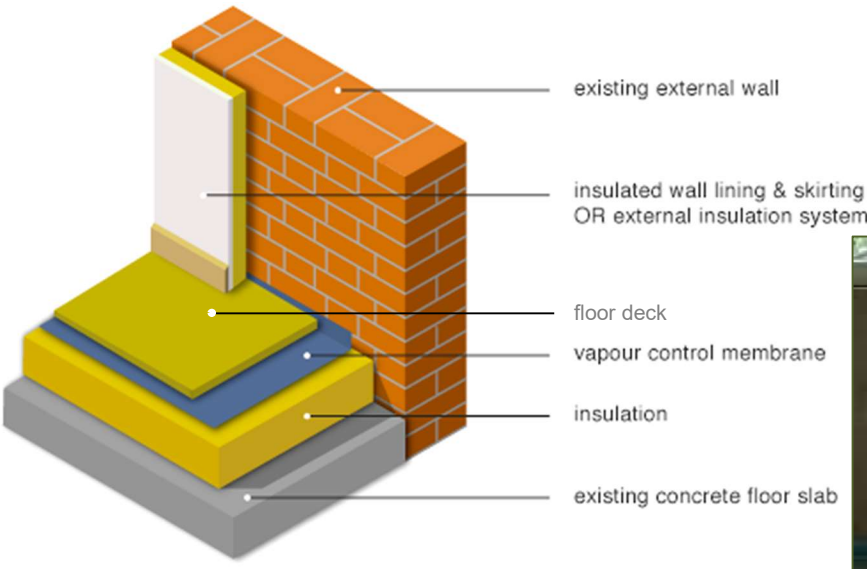
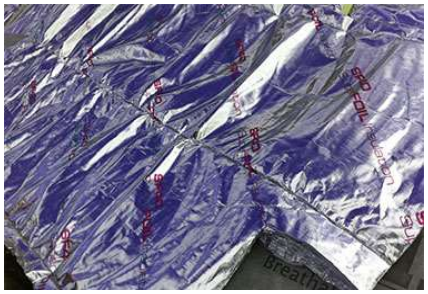


Images courtesy of http://www.greenspec.co.uk/building-design/ground-floor-insulation/

- It is important to include a vapour proof membrane (vpm) **on the warm side** (e.g., the top) of the insulation to prevent condensation, although many insulation products include an integral membrane.
- Potential problems:
  - You will need to remove skirting boards and radiators
  - It will reduce the height of doorways and may introduce steps and changes in levels.
  - Sometime, doors are not high enough to allow for this without breaching Building Regulations, in which case this option may not be feasible.
- If you are struggling for headroom, there may be thinner insulation alternatives that take up less space. Products like Palziv or Superfoil give reasonable insulation but are only a few millimeters thick, meaning they could go straight onto an existing floor with carpets or laminate board overlay.

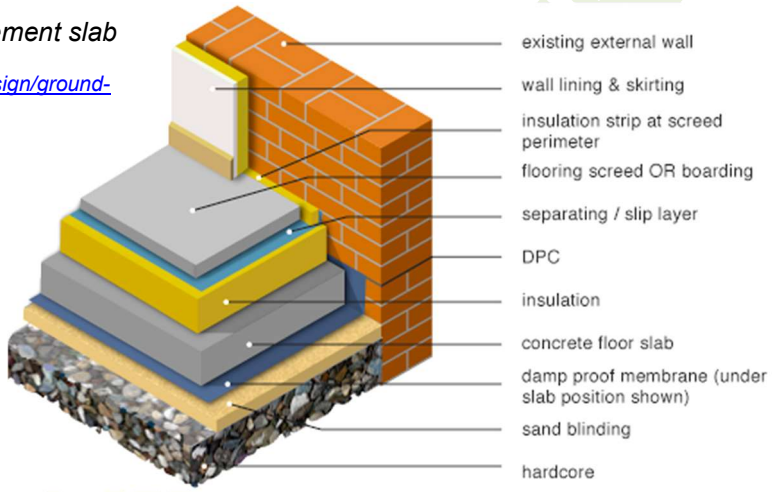


Examples of thin flexible insulation products: 6mm Palziv & Superfoil UF
Images courtesy of http://www.palziv.com/Thermal_insulation.html and http://www.superfoil.co.uk/

❖ Replacing the slab

- This involves digging out the entire slab and replacing it with an insulated floor.
- This approach will guarantee the best results:
  - it will not affect room or door heights
  - also you can consider adding under floor heating.
- However, it is expensive and very disruptive. It is normally only done as part of extensive refurbishment works and you wouldn't normally think of doing this just for energy efficiency improvements.

General specification for replacement slab
Image courtesy of:
http://www.greenspec.co.uk/building-design/ground-floor-insulation/



❖ Insulating externally

- Uninsulated solid floor slabs in solid wall properties can be particularly prone to cold and condensation along the external walls. This is due to lateral heat loss from the floor slab through the wall.
- One experimental option that is cheaper and may be less disruptive than internal refurbishment is to add a layer of horizontal insulation externally.
- In modern properties with a solid floor slab, a strip of vertical perimeter insulation is inserted between the edge of the floor slab and the interior of the wall (as shown above). In old houses this is absent, and heat can escape laterally from the floor slab out through the wall.
- Placing horizontal rigid insulation boards externally, in a strip around the property, is likely to increase the ground temperature at the wall foot and thereby increase the internal floor slab temperature, particularly around the colder room edges.
- This technique is standard in some Scandinavian countries, where building regulations require a 1-1.5m strip of expanded polystyrene (EPS) to be laid horizontally along the external wall boundary.

- The external insulation is installed in addition to internal floor insulation. Its primary purpose is to protect against penetrating frost heave affecting the building foundations. However, it also provides additional thermal protection for the internal floor slab edges.
- In the UK, this approach is little researched and there is no formal guidance. However, a recent experiment by the Fact Sheet author found that adding horizontal EPS insulation along an external wall increased the internal floor slab winter temperature by 4.1°C, a significant amount, and sufficient to solve a persistent condensation problem.
- Please note that this is experimental data only, so definitive guidance cannot be provided, but this option can be discussed further with TEC Ltd via the email link below.

❖ Final considerations

- If you are considering doing any of these improvements you may need Building Regulations approval.
- The methods highlighted above are technically difficult and generally need to be done by fully qualified builders.
- With the possible exception of using thin film insulation on an existing floor slab, they are generally not recommended for DIY application.

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