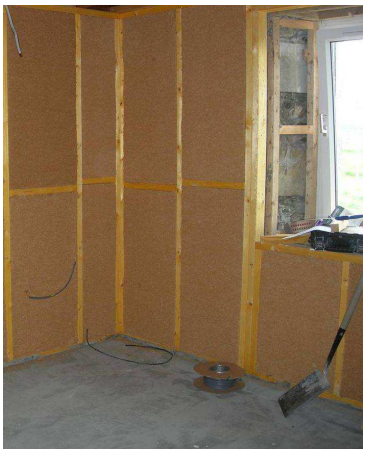


Kildonan

Author: Roger Curtis (HES)

Wood fibre board between frames, calcium silicate board onto masonry

Walls

What is the solution?

This is suitable when there are no internal linings and the walls are masonry. There are two different solutions in this project. Three walls were insulated with wood fibre board between vertical timber battons. The woodfibre board was pressed against the masonry, with a small air gap where the wall was not entirely flat. This was finished with plasterboard and clay paint. The calcium silica board was used on the last wall, which had previously been plastered on the hard. The boards were attached using an adhesive mortar layer and finished with plaster and clay paint.

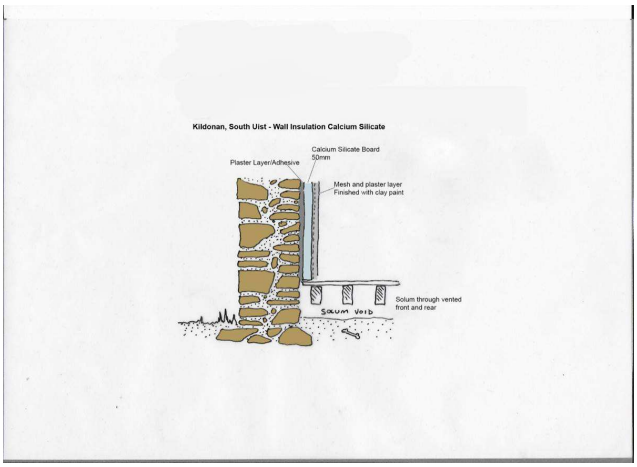
Cross section of the wall build-up, available pictures of the solution:

A finished wall with the wood fibre board insulation © HES

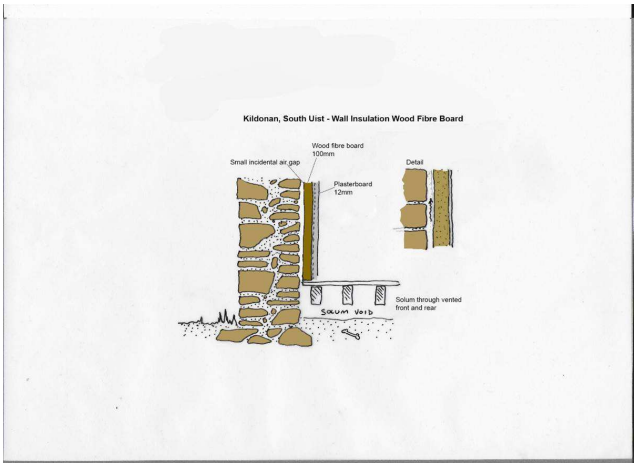
The thickness of the wood fibre insulation against the whinstone wall © HES

The thickness of the calcium silicate board © HES

The almost complete wall insulated with calcium silicate board © HES



Indicative diagramme for the calcium silicate board © HES



Why does the solution work in terms of compatibility with conservation, moisture safety and energy improvement?

This solution was only suitable where there are no historically significant interior decorations on the wall. The materials are vapour and capillary active and allow the moisture transfer through the walls, even without an air gap. The wood fibre insulation has a thickness of 100 mm and improved the U-value from 2,1W/(m^2K) to 0,4 W/(m^2K). Since wood fibre board is not completely vapour open, it is important to consider the impact of driving rain and similar high moisture scenarios. The calcium silicate board has a thickness of 50mm, with a lambda value of 0,059 W/mK and reduced the U-value to 1,0 W/(m^2K).

Description of the context:

This trial was done in a rural cottage at Kildonan on South Uist, built around 1935 out of whinstone rubble and with a cement render. The building had been empty for a while before and during the refurbishment. Due to the impervious building stone and cement render, there was significant moisture build up in the interiors, enabling the insulation materials to be tested in relatively extreme conditions.

Pros and cons of the solution:

This solution provides significant improvements to the walls. The calcium silicate board resulted in a higher u-value, however this insulation material was only half as thick as the wood fibre board resulting in less loss of living space compared to the wood fibre solution. The installation is invasive and does result in some loss of interior space due to the thickness. It also requires the removal of previous wall finishes.

Type of data available (level of information, simulation):

U-value assessment has been done before and after the refurbishment,

showing that the walls have been reduced from 2,1 W/(m^2K) to 0,4 W/(m^2K) where wood fibre board has been used and to 1,0 W/(m^2K) where calcium silicate has been used.

Is there any related publication? If yes, please provide any available link or document for further reading

https://www.hiberatlas.com/smartedit/projects/264/Case Study 6 - Kildonan, South Uist; Upgrades to a 20th C Cottage.pdf
The HES Refurbishment Case Study for the project