

Castle Rock Edinvar

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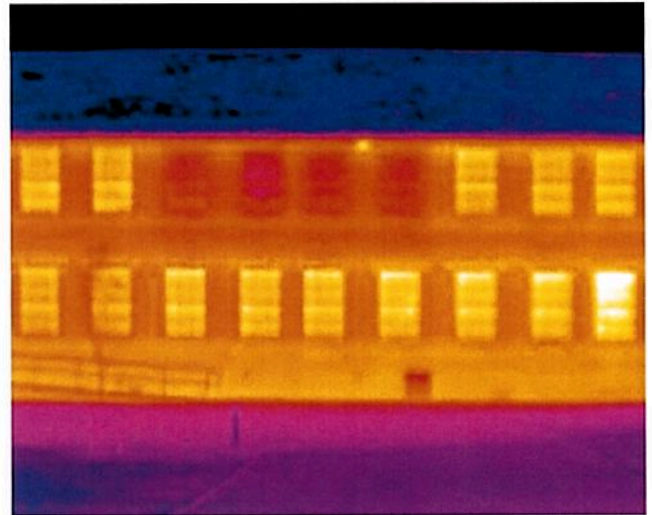
Scottish Energy Centre joined CastleRock Edinvar whilst undertaking a feasibility study investigating the fabric improvements that can be achieved through by retrofitting envelope improvement system into a 1930's office space.

The building; originally a primary school was converted to business and mixed use office. CastleRock Edinvar, the landlords of the facility were investing in the retrofitting and refurbishment of the building with intention on applying the thermal enhancement strategy to similar buildings.

To quantify the step-changes in thermal improvement of the building, building performance evaluation was conducted investigating the thermal transmittance values (U-Values) of the existing building fabric compared to a portion of the building where the envelop improvement system was applied.

Through the use of side-by-side comparative data analysis, two rooms in the building were monitored and surveyed for existing and enhanced levels of fabric thermal performance. The results from the in-situ U-value measurements identified that the range of insulation and fabric upgrade work introduced into a test room improved that room's ability to further resist the flow of heat lost through the fabric compared to the neighbouring room of similar dimensions and heating profile.

Thermograms identified visual improvements and highlight areas that would need thorough attention and care when rolling the system out in a wider capacity.



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In-situ measurement results

Building element	Control room (Existing fabric) U-value (W/m <sup>2</sup> K)	Enhanced room (Refurbished fabric) U-value (W/m <sup>2</sup> K)
Glazing	5.2	0.6
Wall: above ceiling tiles window header	0.43	0.24
Wall: below window	0.36	0.12
Wall b: top of wall below ceiling tiles	1.11	0.53

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## Glazing enhancements

The windows in the South facing facade tested in the study are single glazed timber sash and case window (Plate 1) these are representative of all the windows along the listed front facade. During the refurbishment the windows in the test room were thermal enhanced with the installation of toughened low-e double secondary glazing unit in an openable uPVC frame with trickle vent added to the four windows. The secondary glazing unit called Thermal Shield developed by Adam Dudley Architects of Edinburgh, is installed internally with approx. 100mm gap between glazing units and the existing window. Additionally a novel radiant heat barrier window blind installed between glazing units (Plate 2).



Plate 1 [Left]. Plate 2 [Right]

## Wall: thermal enhancements above ceiling tiles window header

Heat flow mats were applied to the area above the suspended ceiling and between each of the windows. The elemental build-up of the existing structure consists 500mm precast concrete lintel, 75mm unventilated air gap, 50mm mineral wool insulation, 12.5mm plasterboard on 50mm metal framing. During the refurbishment stage 75mm hemp insulation added to air gap between concrete lintel and mineral wool (see Plate 3).

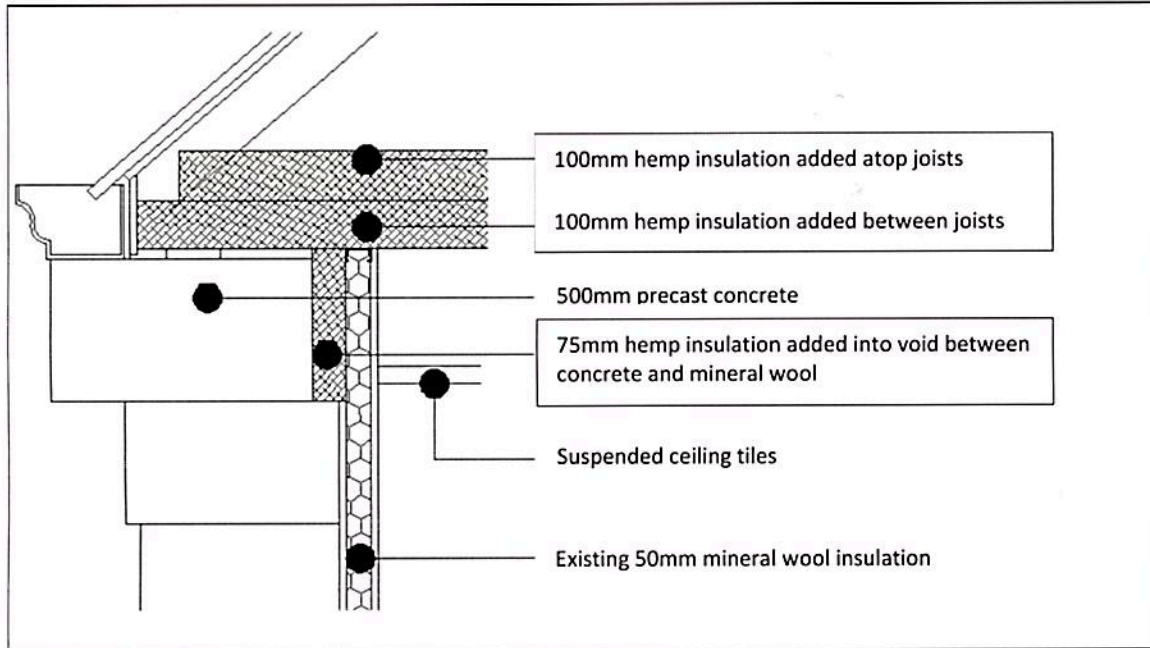


Plate 3. Materials added during 2012 refurbishment highlighted in black outline

### Wall: thermal enhancements below window

The area below the windows on the South facing façade is built-up of 25mm roughcast external render, 230mm solid brickwork, 50mm mineral wool insulation, 170mm unventilated air gap, 12.5mm plasterboard internal lining. The refurbishment work included 170mm of bead insulation blown into the gap between mineral wool and plasterboard (Plate 4).

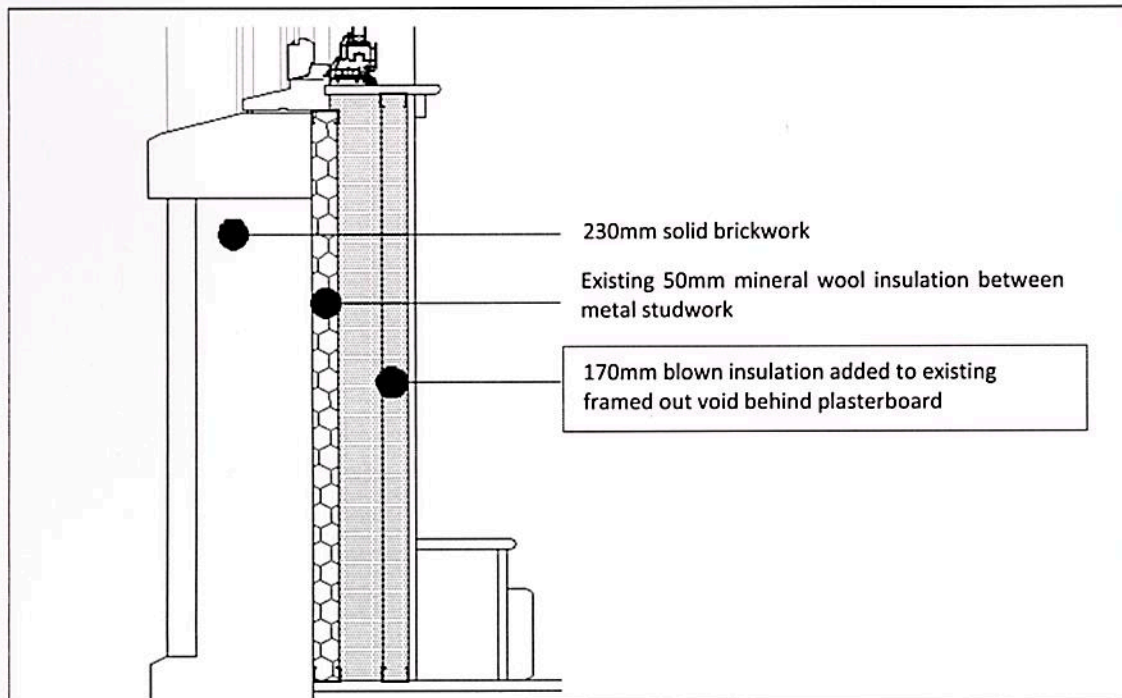


Plate 4: Materials added during 2012 refurbishment highlighted in black outline



## Wall: thermal enhancement top of wall b

A small portion of the North facing wall in the main offices is a non-list cavity wall with the upper portion being an external wall. This upper external wall consists of 25mm roughcast external render, 90mm solid brickwork, 110mm cavity, 110mm brick, 50mm unventilated air gap, 50mm metal stud framing finished internally with 12.5mm plasterboard. During refurbishment 110mm blown bead insulation was pumped into the cavity between the brick leaf (Plate 5). Further to this hemp insulation was installed to the cavity behind the plasterboard and to the overhead joists to form a continuous insulating layer in an attempt to mitigate cold bridging.

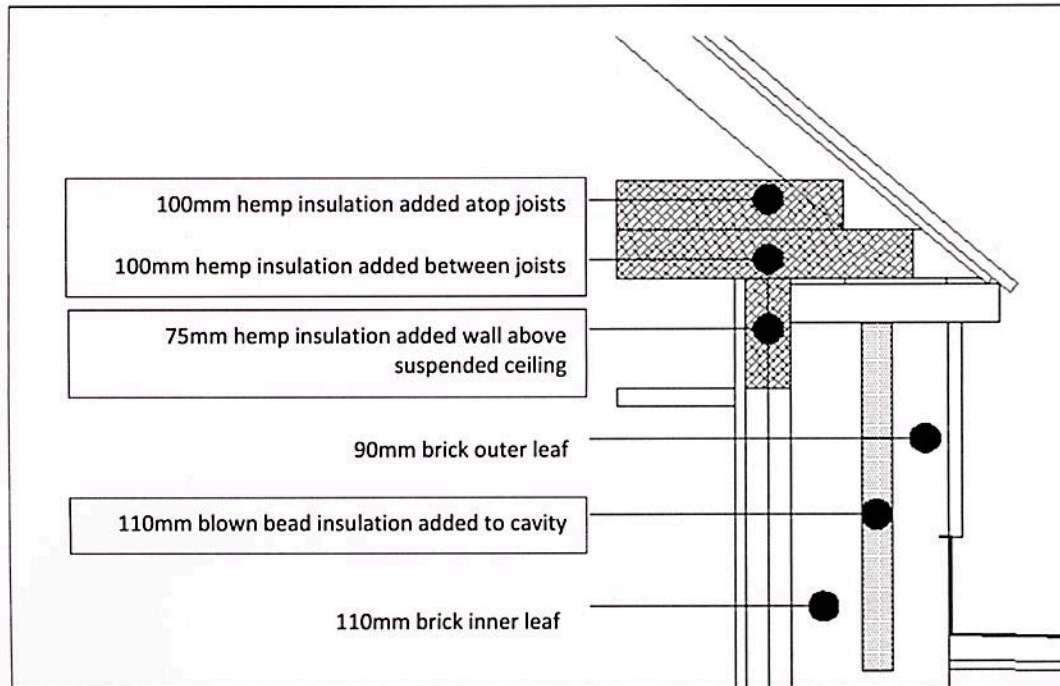


Plate 5: Materials added during 2012 refurbishment highlighted in black outline