

# Enhanced U values



## Structures with timber frame construction WITH and WITHOUT a Heat Reflecting Membrane

**Eco-Brite®** is specifically developed to enhance the U-value of ceiling, wall and floor insulation used in sustainable home designs and other small buildings, the system can be conveniently installed on-site prior to fixing the plasterboard or into off-site, factory made timber or steel frame pre-fabricated structures. **Thermo-Foil® ES**, with its higher tear resistance is made for site installation in larger buildings and specific applications. Independent tests have proved the systems offered effectively control (block) over 96% of outgoing or incoming infrared heat provide more controllable and comfortable room temperatures, reducing a buildings energy requirement, thus cutting its carbon footprint. Both systems **ENHANCE** the efficiency of other insulating products included in structures, by also stopping warm or cold air migrating through insulation mats, blocking un-wanted air infiltration and eliminating moisture migration. Cost effective and clean to handle, these tough yet flexible multi-layered Heat Reflecting Membranes supplied by Apollo will greatly improve the U-value of a building's envelope, reducing the energy cost required for heating or cooling by up to 30%.



Eco-Brite being installed in a private home prior to fitting plasterboard



Thermo-Foil ES being installed in an attic room prior to fitting plasterboard



Eco-Brite installed in prefabricated wall panels

To act as a radiant barrier the HRM must be installed facing at least one air space, usually 19 to 25mm. 23mm is preferred as this allows electrical and piped services to be installed in front of the membrane. Most of the heat conducting through the structure and crossing the air space as infrared energy is blocked.

The air within the air space will eventually warm and rise (Convection). However, the warmed air cannot escape as all joints between adjacent HRM sheets and structural components are sealed using the company's heat reflecting (HR) self-adhesive tape.

**In combination with fibre insulation, Apollo HRM's can provide the most cost-efficient insulating method available that meets the requirements of current Building Regulations.**

| Structural element     | Direction of heat flow | Thermal Resistance value m <sup>2</sup> kW |
|------------------------|------------------------|--------------------------------------------|
| Ceiling                | Upwards                | 0.45                                       |
| 45 degree pitched roof | Upwards                | 0.51                                       |
| Wall                   | Horizontal             | 0.67                                       |
| Floor                  | Downward               | 0.80                                       |

Thermal resistance values (R-value) were calculated to BS EN ISO 6946 : 1997 for a mean temperature of 10°C

For the purposes of U-value calculations stated in this document, certified tests of Thermo-Foil and Eco-Brite have established the additional Thermal Resistances (R-values) shown in the table. The R-values have been incorporated into the calculations shown on the enhanced U-value illustrations on the following pages. **U-values highlighted in yellow do not comply with current requirement.**

Thermo-Foil and Eco-Brite Heat Reflecting Membranes (HRMs) are manufactured and distributed worldwide by Apollo Energy Research. They are a further advance where mass production techniques have provided a tough product that feature, tear resistant substrates that can greatly improve the energy efficiency of buildings. Thermo-Foil and Eco-Brite are the only systems of their type certified by the BBA.

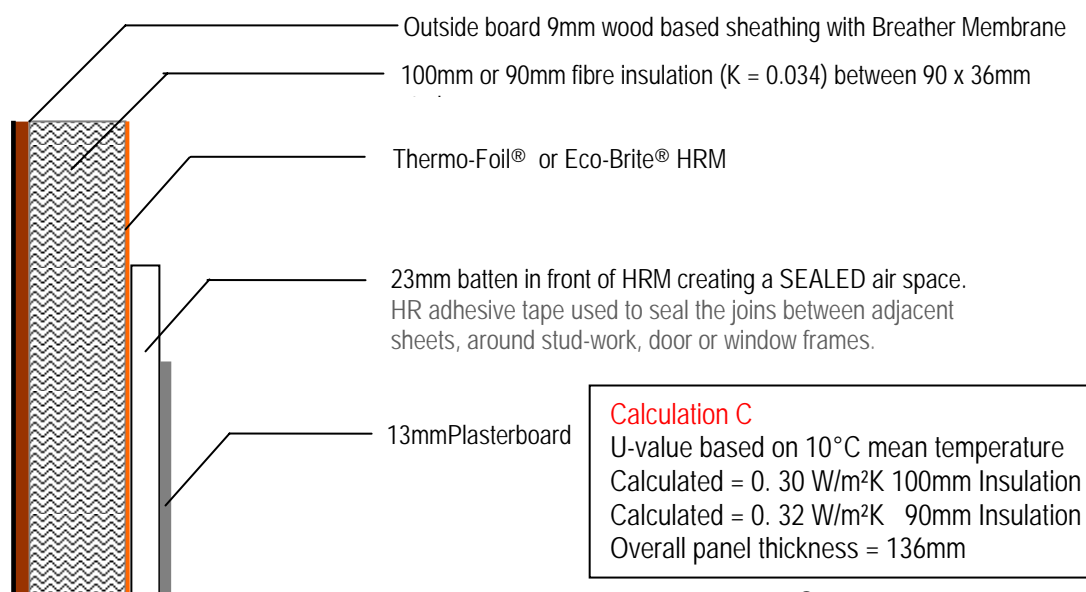
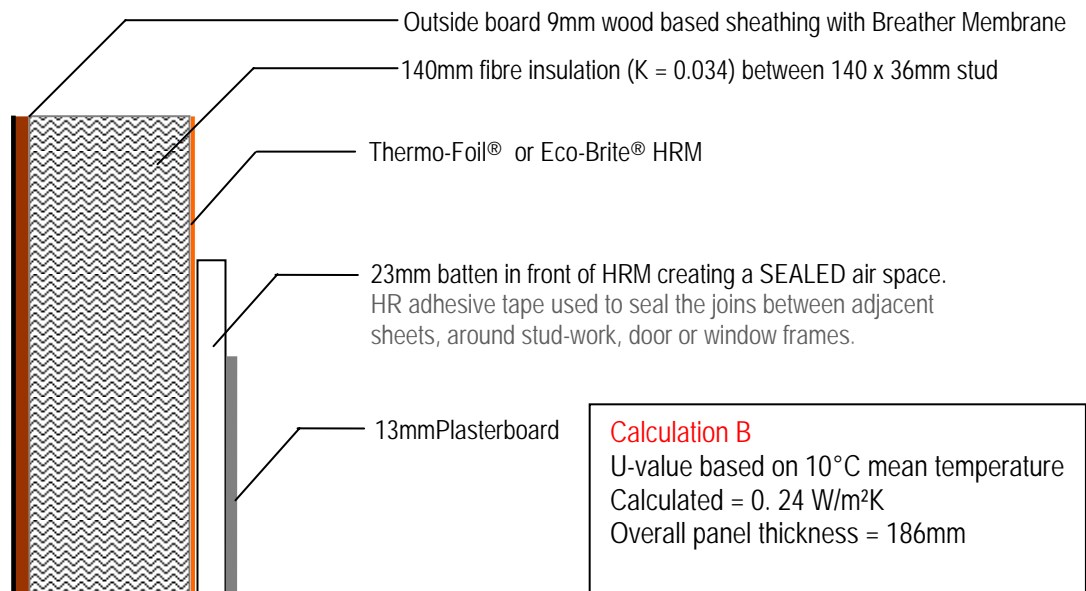
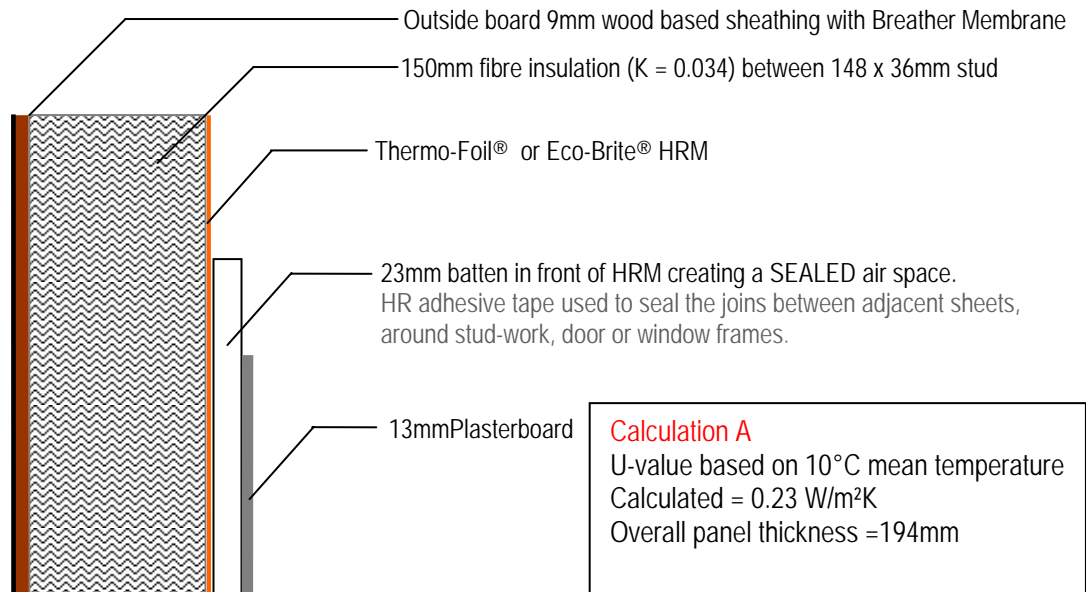
For further technical support and advice please contact: **nationwide build shop limited**



## U values for insulated wall panels

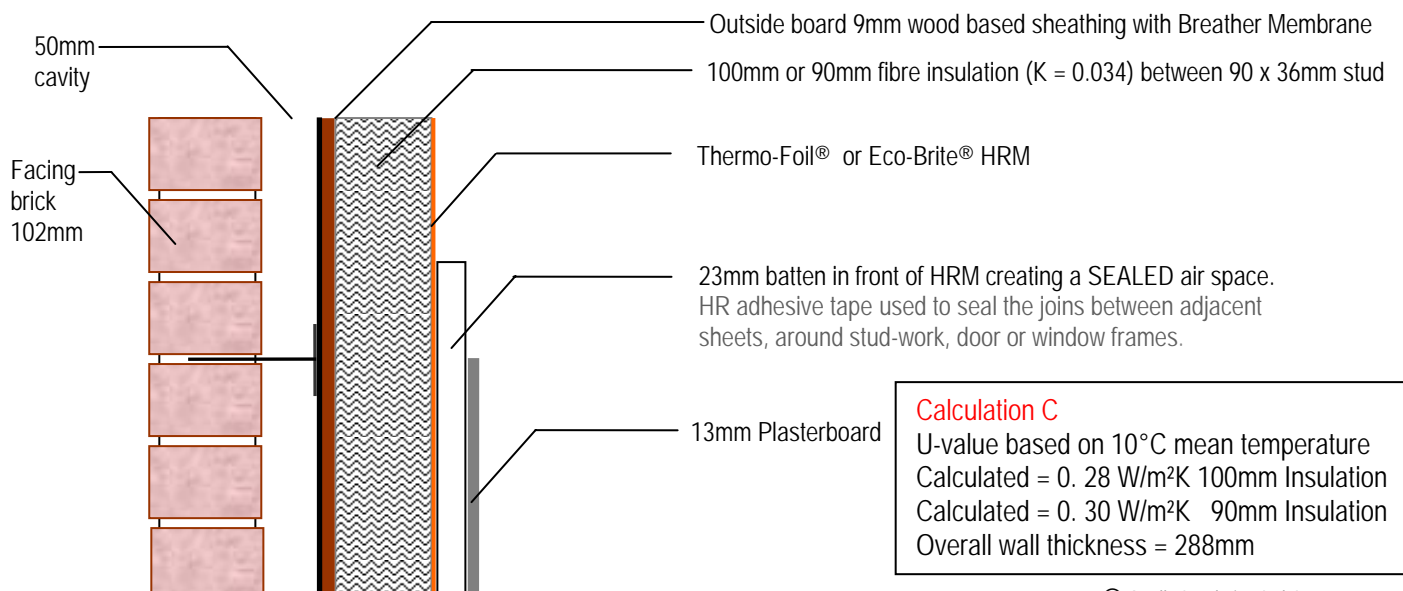
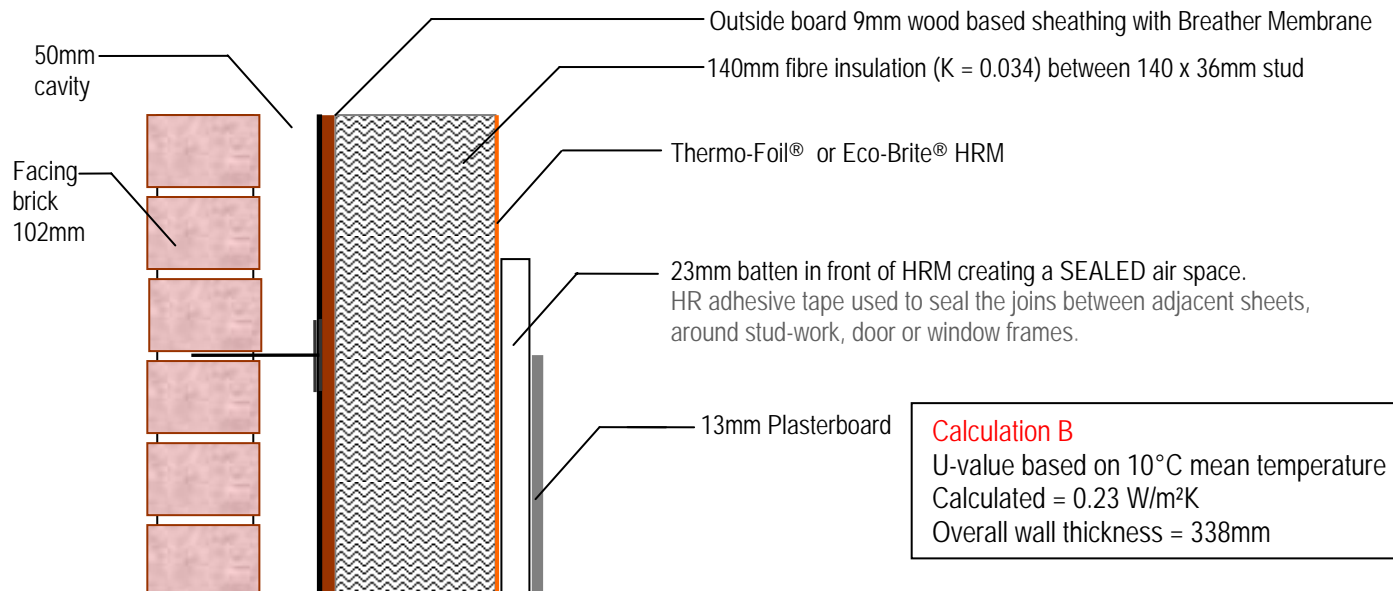
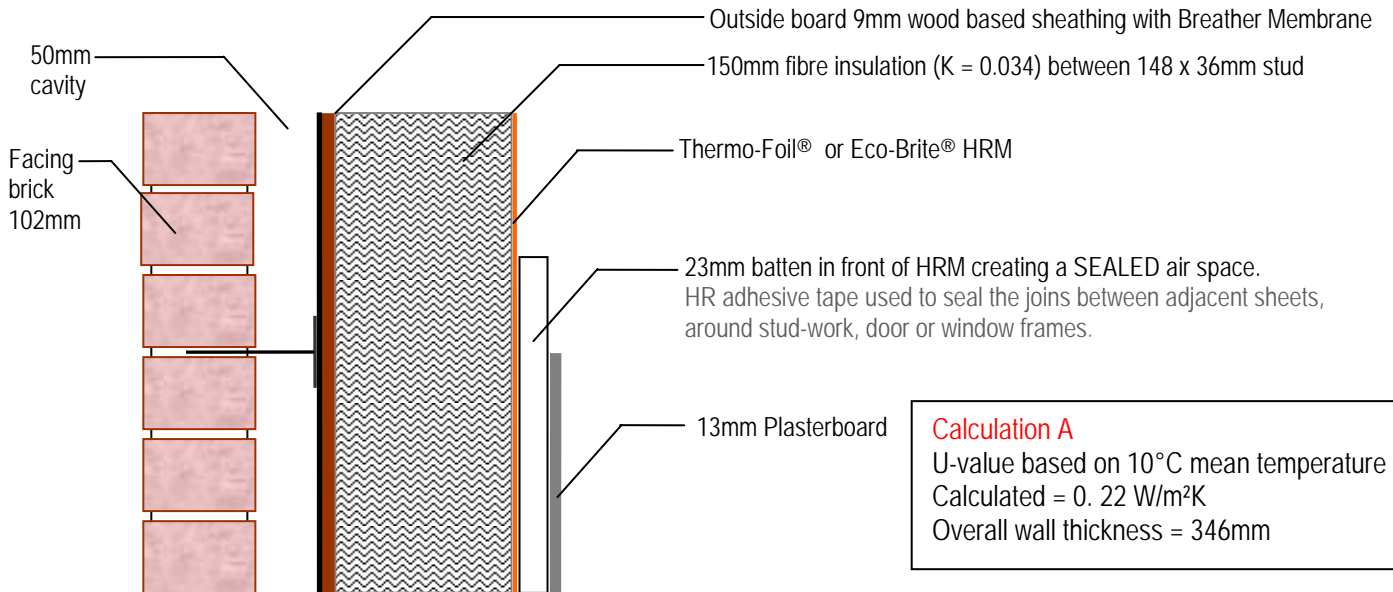
### Thermo-Foil® or Eco-Brite® Heat Reflecting Membrane Systems installed.

NB: Electrical and piped services can be run inside the 23mm airspace.



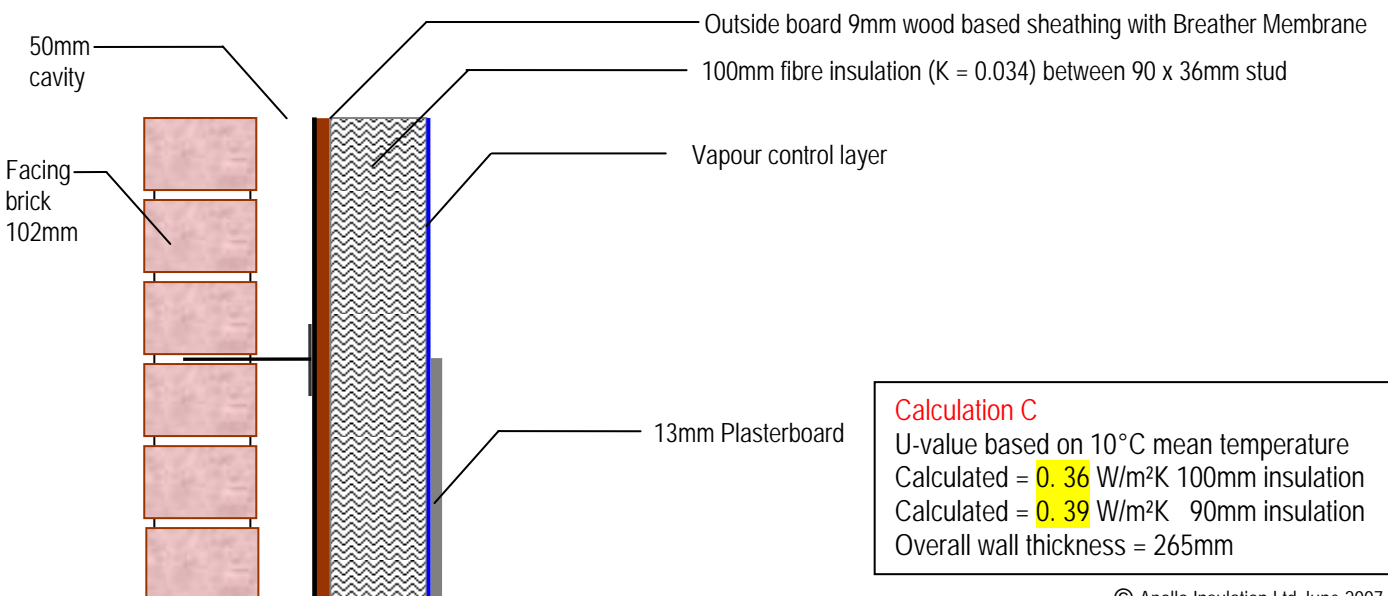
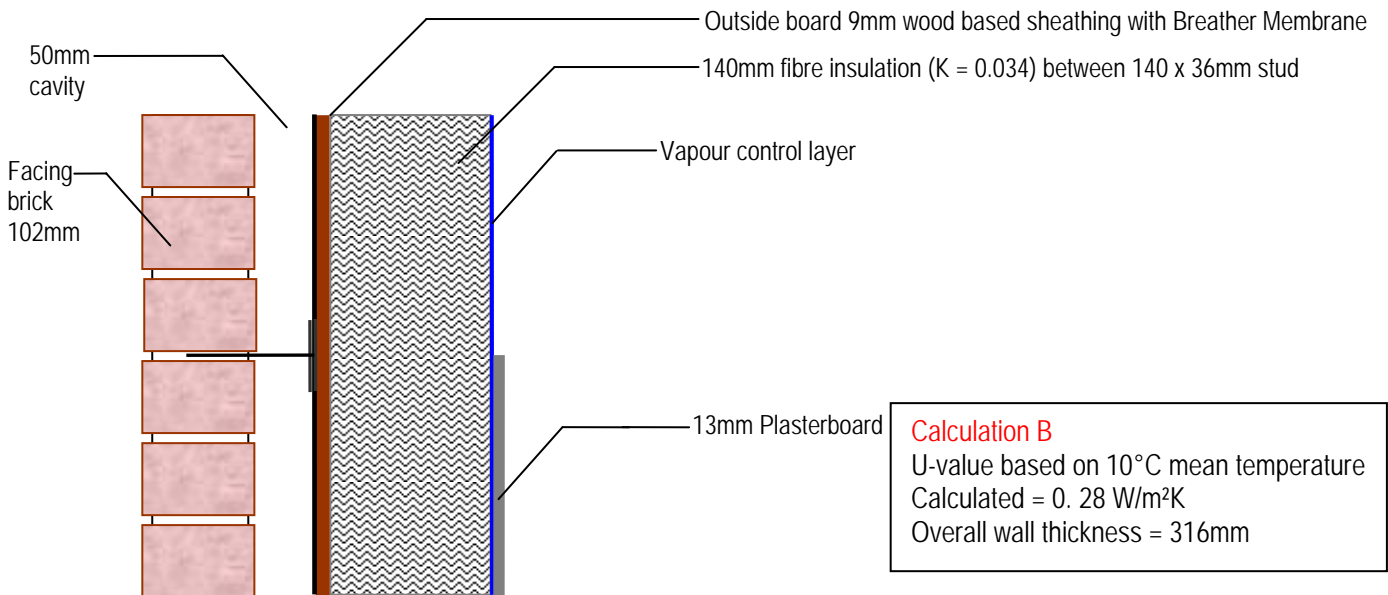
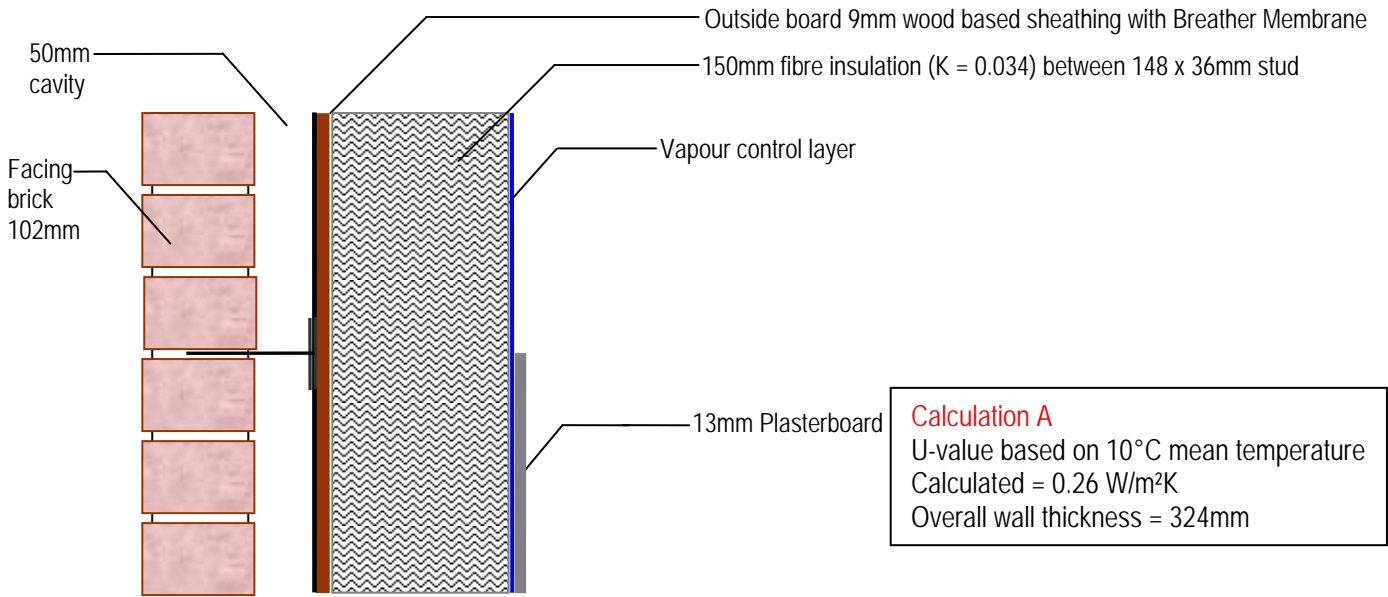
**U values for insulated wall panels with facing brick and 50mm clear cavity**  
**Thermo-Foil® or Eco-Brite® Heat Reflecting Membrane Systems installed.**

NB: Electrical and piped services can be run inside the 23mm airspace.



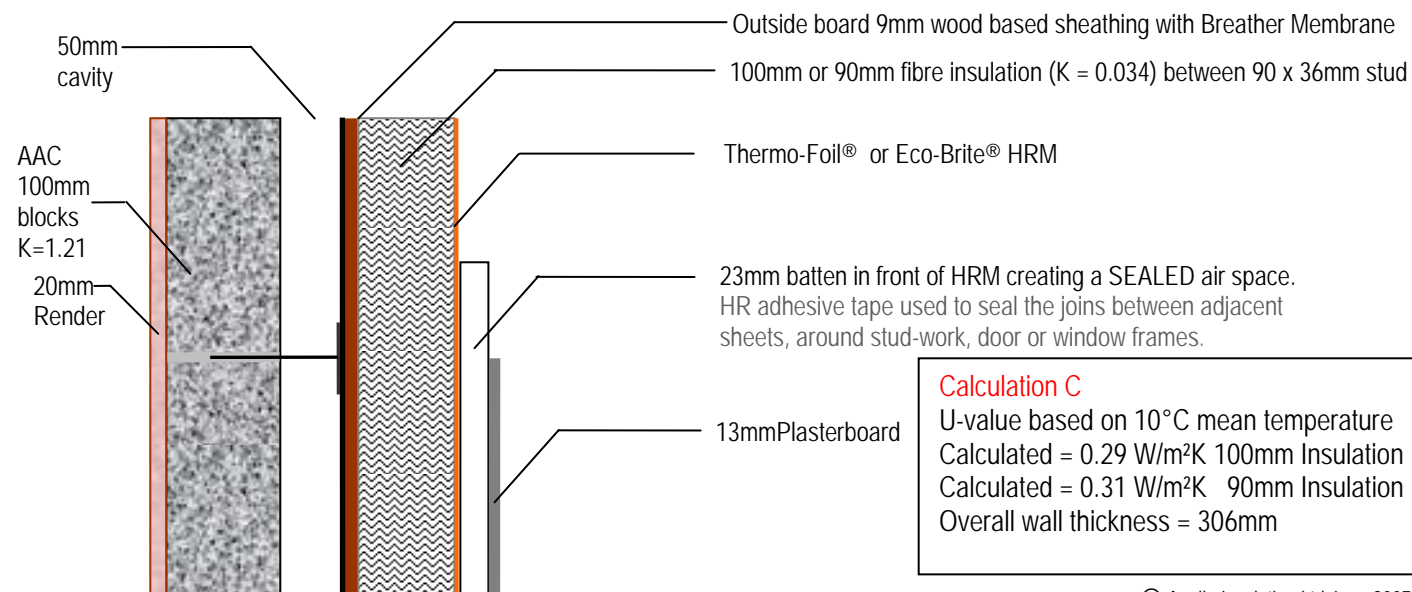
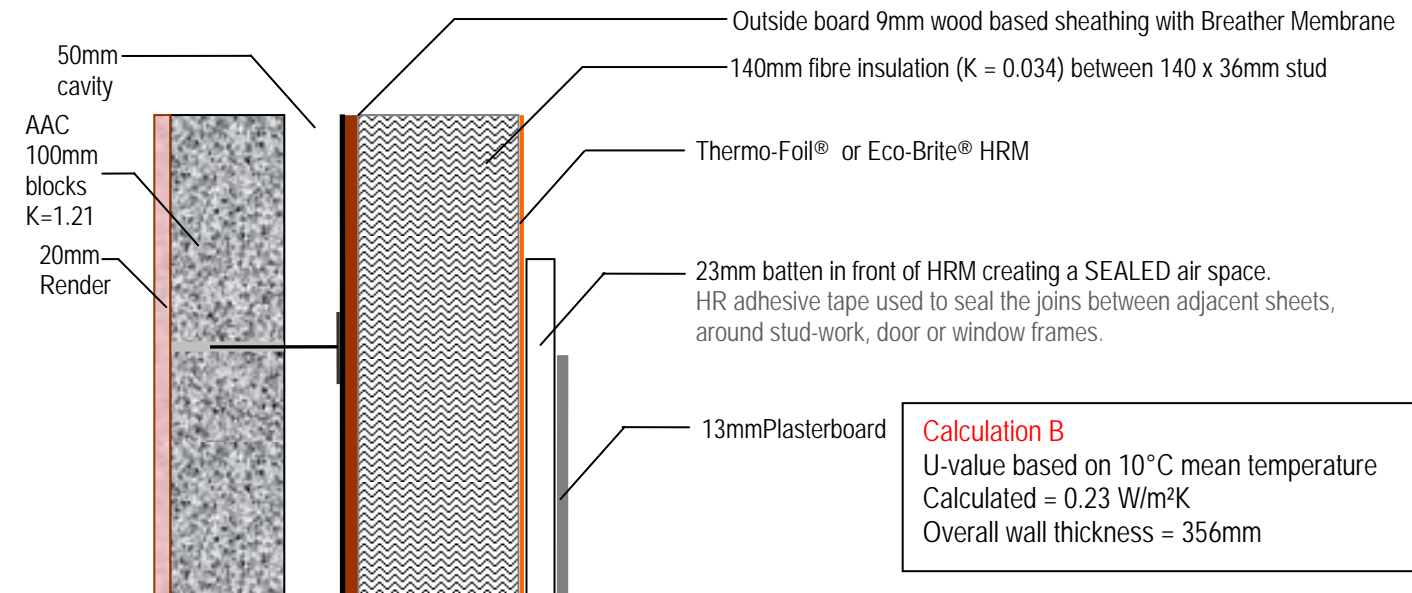
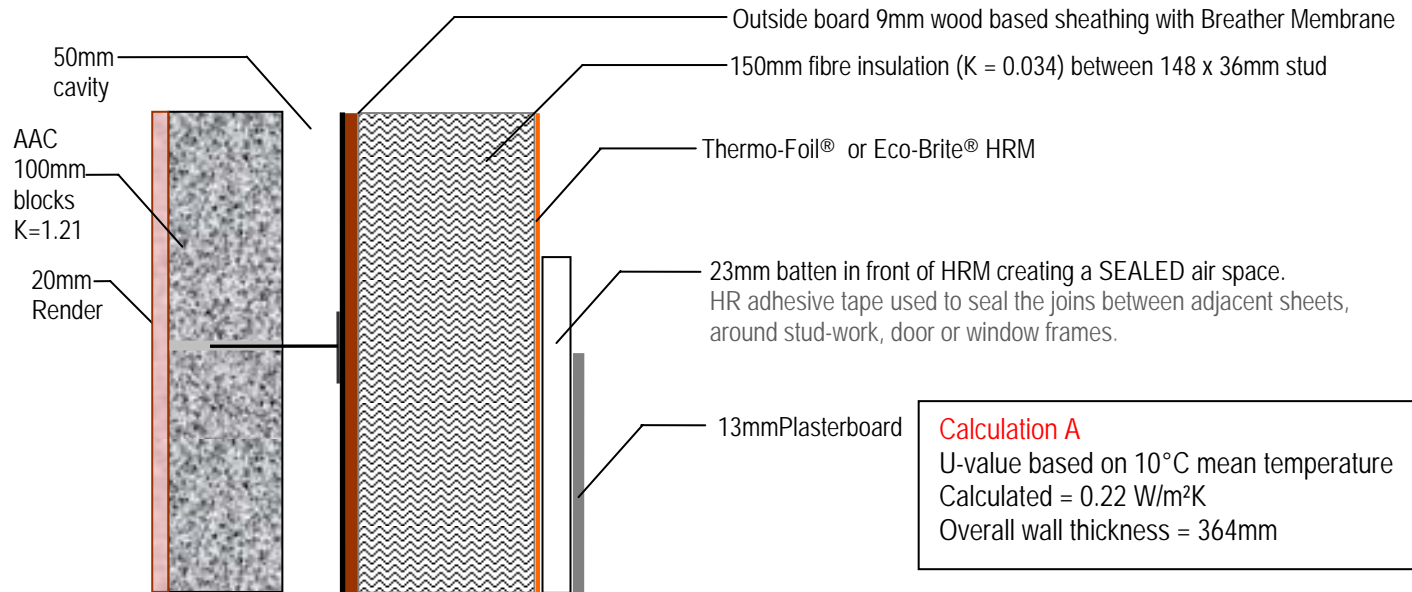
**U values for insulated wall panels with facing brick and 50mm clear cavity  
WITHOUT a Heat Reflecting Membrane Systems installed.**

NB: Electrical and piped services would have to be run on the surface of the wall or inside the insulation



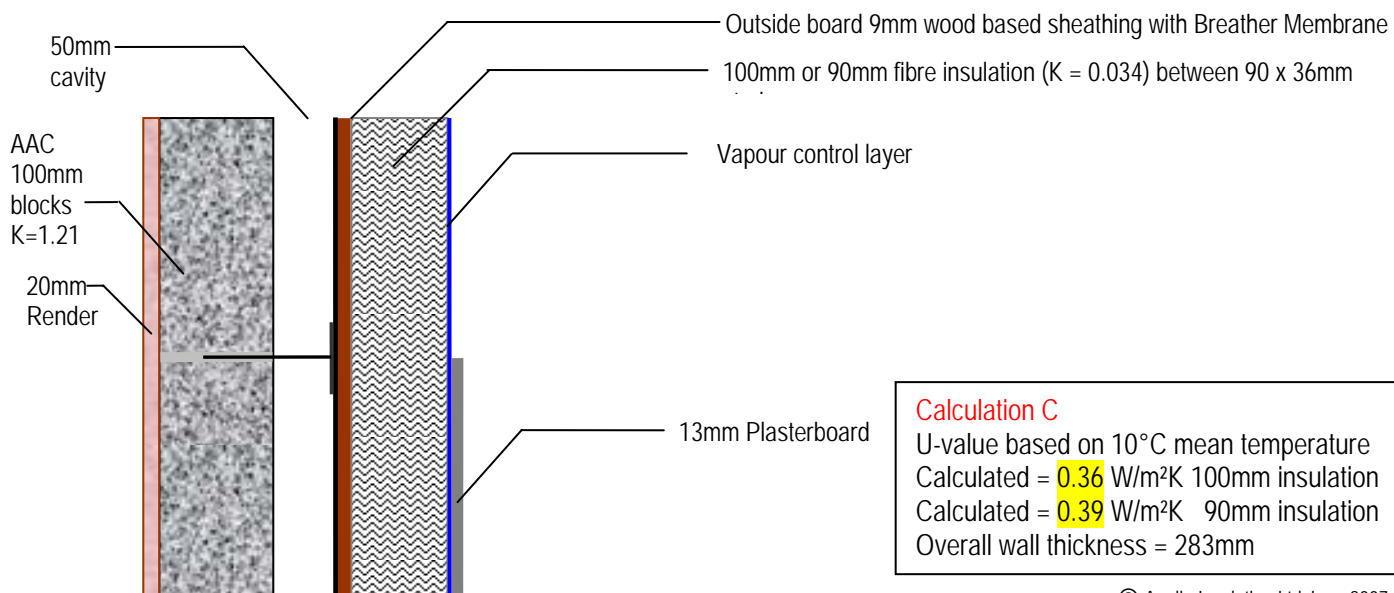
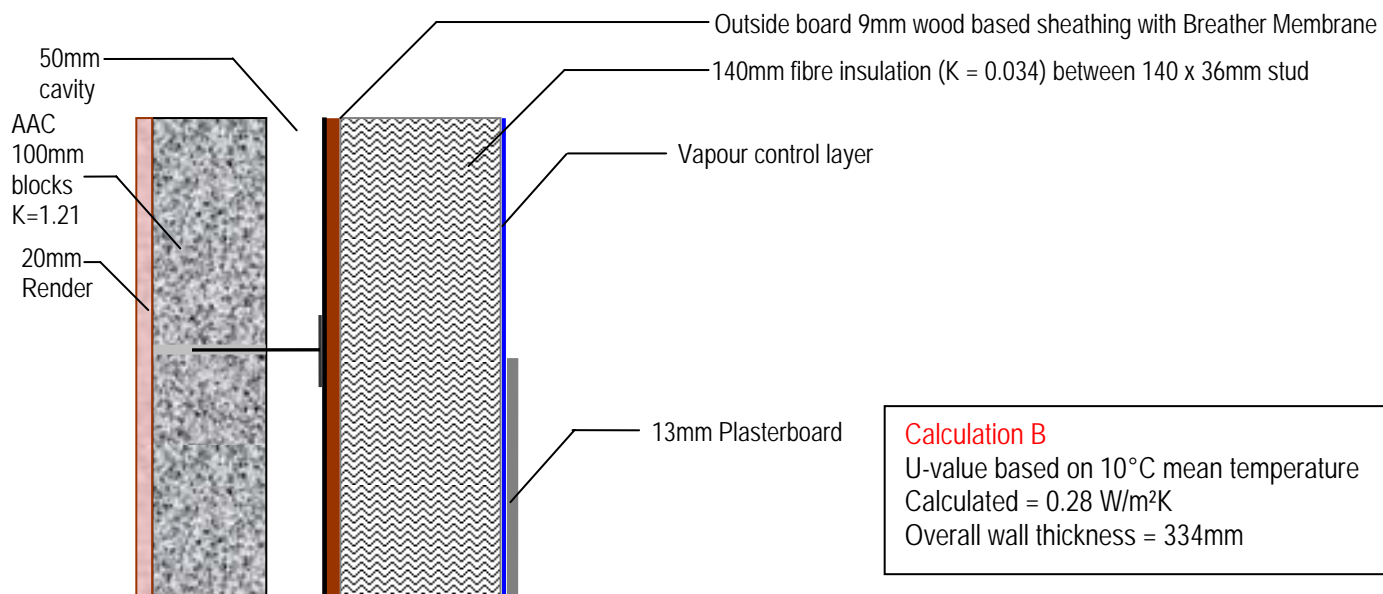
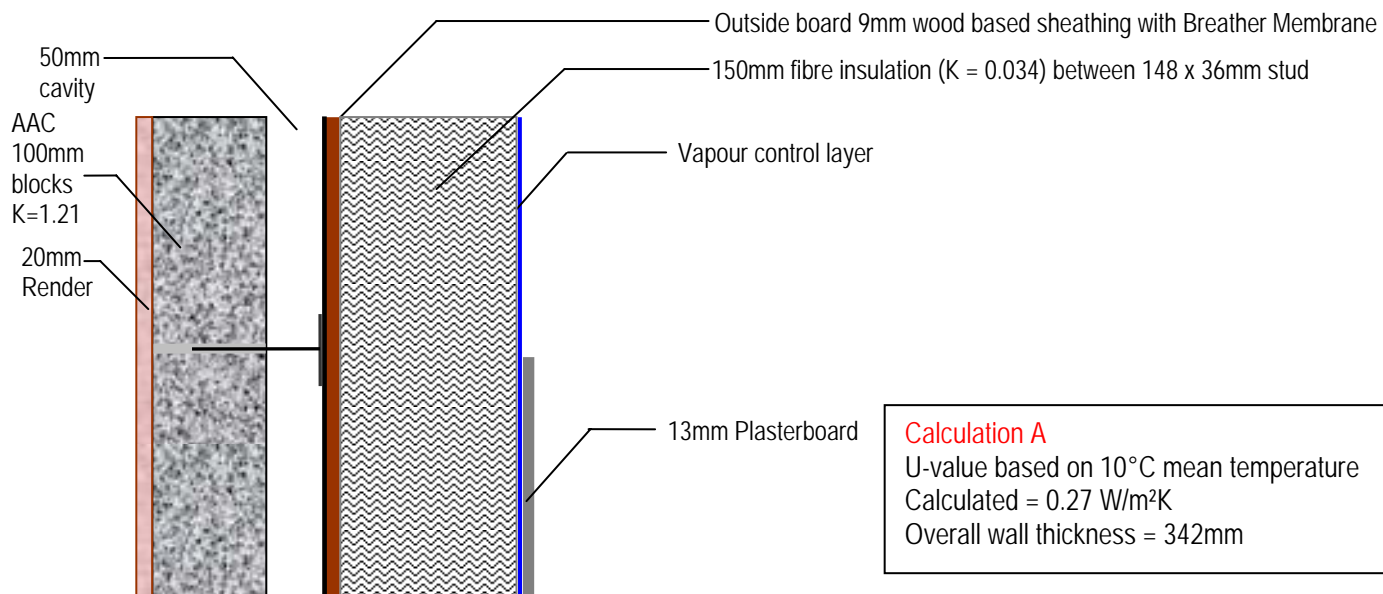
**U values for insulated wall panels with rendered block-work and 50mm clear cavity  
Thermo-Foil® or Eco-Brite® Heat Reflecting Membrane Systems installed.**

**NB: Electrical and piped services can be run inside the 23mm airspace.**



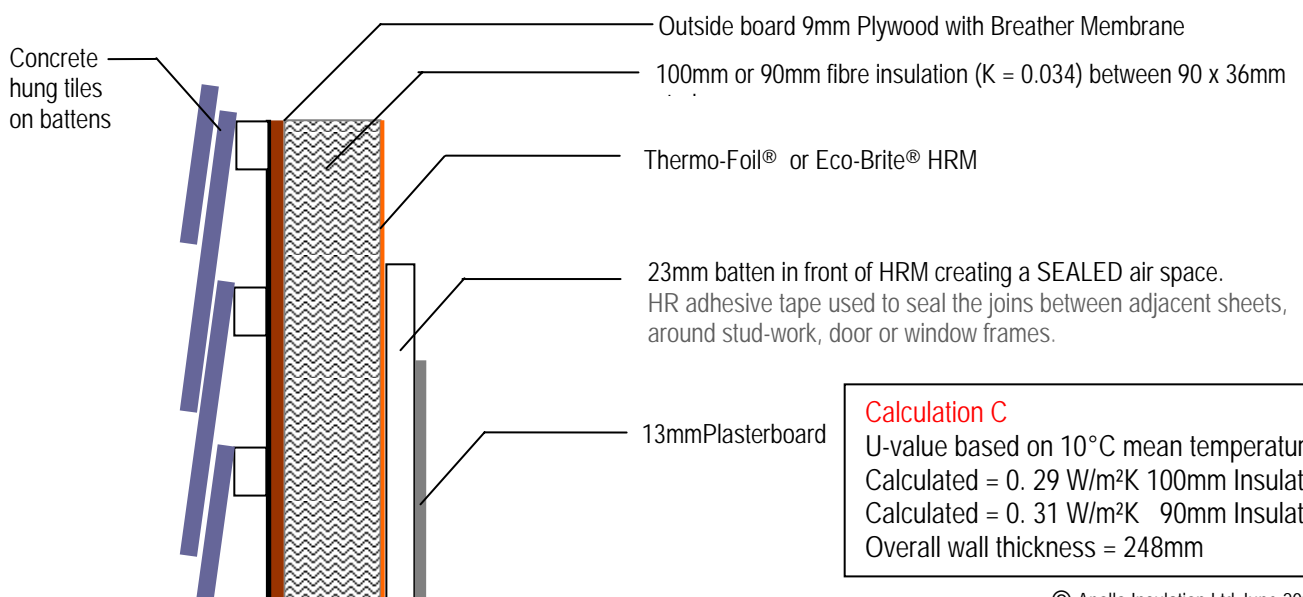
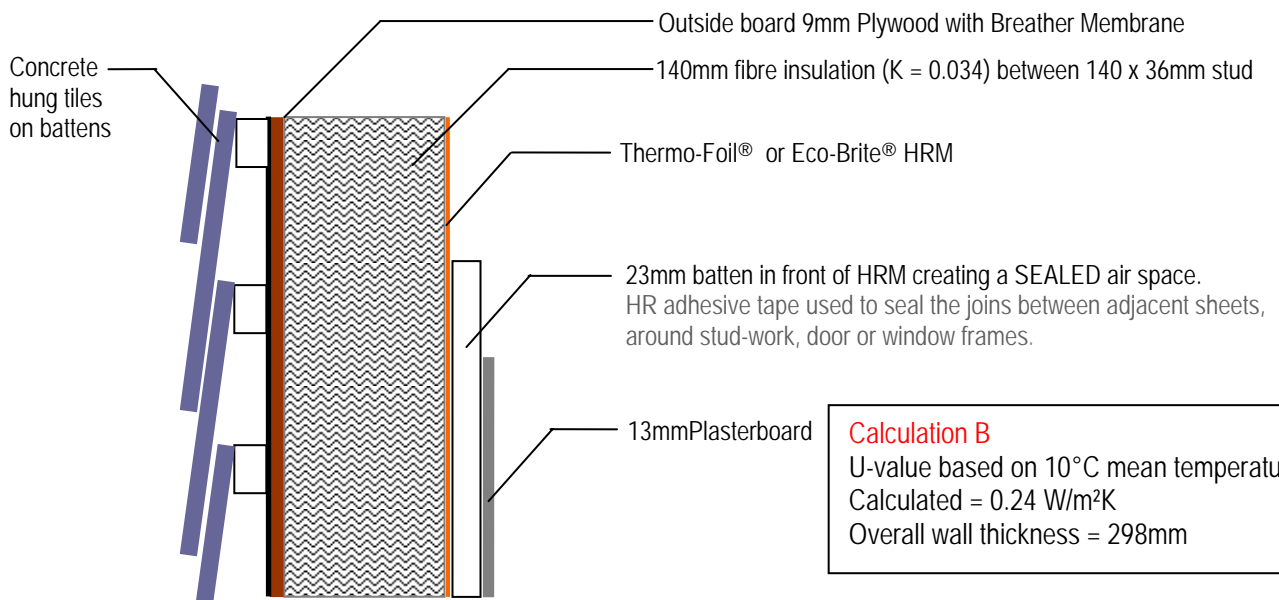
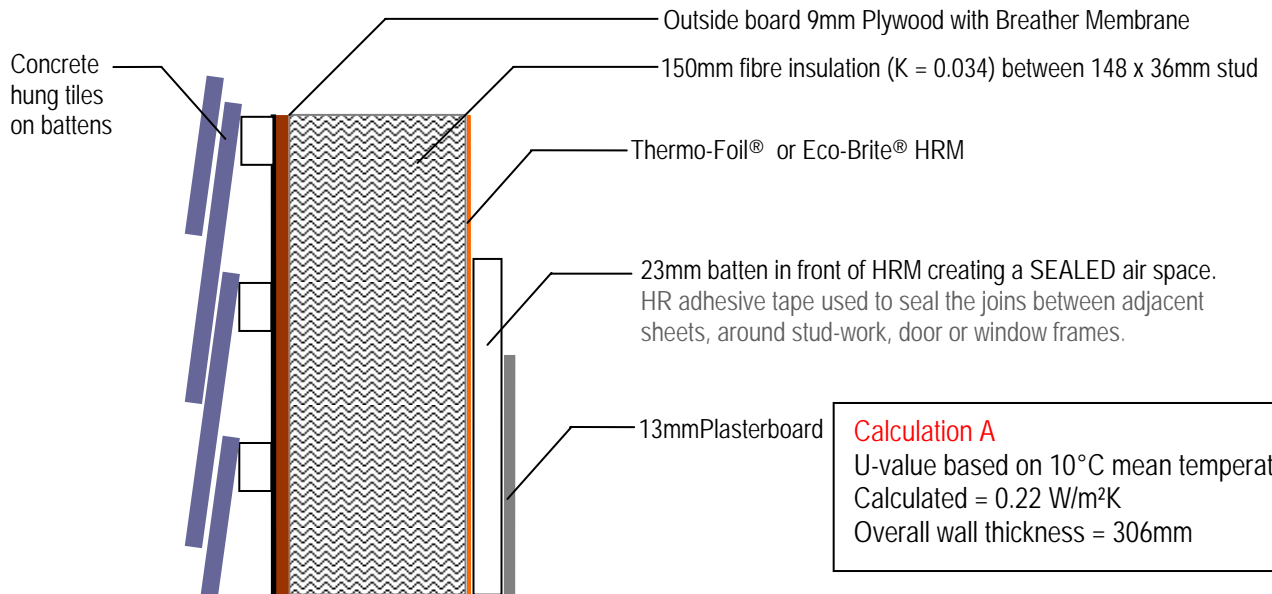
**U values for insulated wall panels with rendered block-work and 50mm clear cavity  
WITHOUT a Heat Reflecting Membrane Systems installed.**

**NB: Electrical and piped services would have to be run on the surface of the wall or inside the insulation**



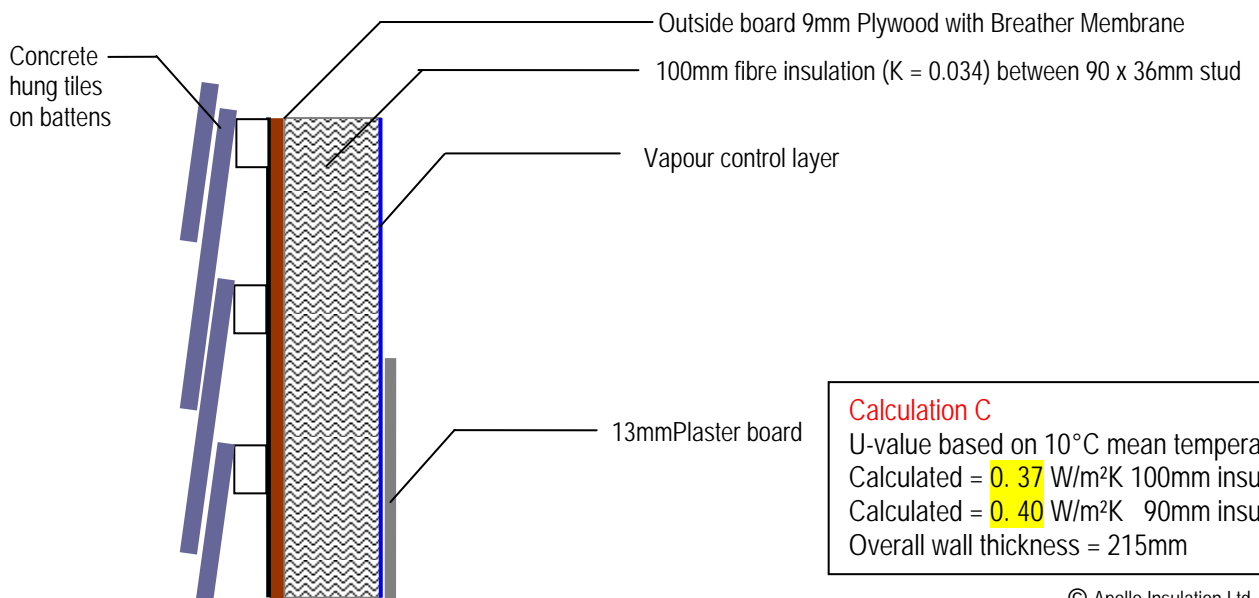
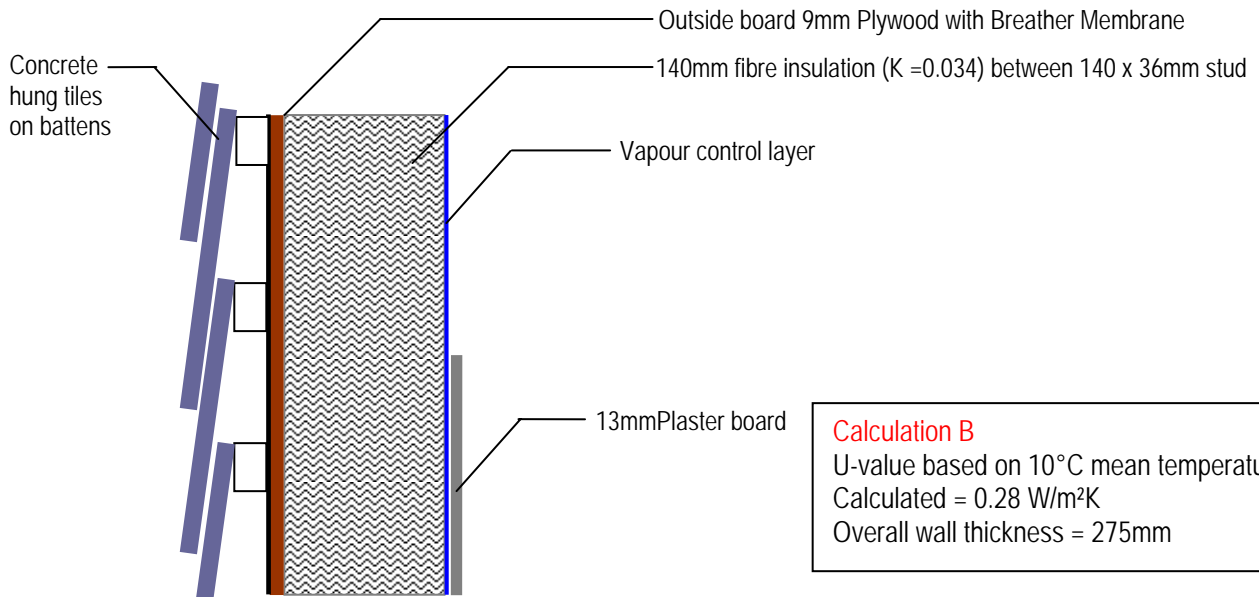
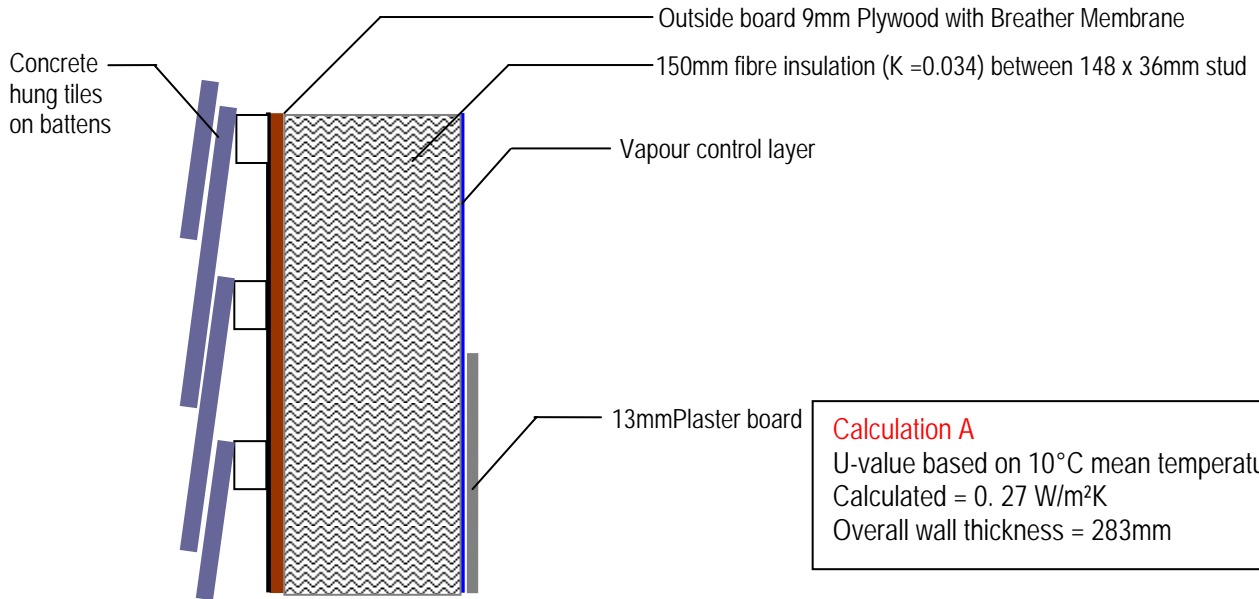
**U values for insulated wall panels with hung tiles on battens**  
**Thermo-Foil® or Eco-Brite® Heat Reflecting Membrane Systems installed.**

NB: Electrical and piped services can be run inside the 23mm airspace.



**U values for insulated wall panels with hung tiles on battens**  
**WITHOUT a Heat Reflecting Membrane System installed.**

NB: Electrical and piped services would have to be run on the surface of the wall or inside the insulation



Extract from Report No 2150 by..

**BYGGFORSK Institute, Trondheim, Norway (Approved European Test Facility)**

Examination of U values for a wall with an un-vented air gap and Thermo-Brite III Radiant Barrier as a damp proof membrane (D.M.P.)

**NOTE:**

Since the publication of Report No 2150, Thermo-Brite III Heat Reflecting Membrane has been re-branded and is now known as Thermo-Foil®.

Other HRM's with similar specification are Eco-Brite®, Thermo-Brite®, and Thermo-Foil® ES

**Conclusions from the Report**

The tests show that the D.P.M., Thermo-Brite III radiant barrier, (Thermo-Foil) reduces radiant heat loss through an adjoining air gap as one expects from calculations.

For air gap thickness up to about 30mm the heat resistance is slightly better than with the equivalent thickness insulation Class 36. When the air gap width increases, the heat resistance stays the same or goes down a bit, but with the normal insulation it increases proportionally with the width. This is also the case with unventilated air gaps with heat resistance on the cold side of the air gap, the equivalent of about 150mm insulation Class 36.

Walls made of timber frame, 148mm x 36mm, 148mm insulation Class 36 (Compressed from 150mm), Thermo-Brite III radiant barrier as a D.P.M. and 23-48mm battens/air gap between D.P.M. and the inside boarding all have a U-value of 0.21 W/m²K. This is lower than is demanded in outside walls (0,22W/m²K) in the technical regulations, in the planning and building law act (Norway 1998).

This is also a good solution in respect to air tightness in that hidden parts for services in the outside walls do not need to go through the D.P.M. but can be placed on the warm side of the wall.

The tests show that the calculation methods which are used, are suitable for walls with air gaps and that they give U-Values with the same security margin for ordinary walls. The tests confirm that it is adequate to work out U-Values with a mean temperature of 10 degrees Centigrade. This applies to the examined air gap widths provided the insulation is protected against air movement by airtight materials on both sides.

