Following a CPD presentation on airtightness and how to achieve a well designed and airtight construction using Protect membranes and sealing tapes,

Mast Architects Glasgow, Airtightness Project

Mast Architects of Glasgow called on the expertise of the Protect Membranes Technical department to assist them in the preparation of their design drawings for a range of properties including houses and flats across three separate sites in Vineburgh, Irvine.

The Proposal

The proposed developments followed traditional timber kit design, consisting of an outer brick skin 50mm cavity, with an internal 140mm stud frame, and using mineral wool insulation minimum 20mm service void, finished with a plasterboard lining. The brief was to achieve air permeability less than 6m³/h/m².

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The Solution
This was achieved by creating a continuous airtight envelope within the structure, linking the floor, wall and roof/ceiling membranes to limit air leakage.

Protect VC Foil Ultra was specified to line the inside face of all external walls. This was combined with a 25mm service cavity to help limit the number of penetrations and potential air leakage through the membranes, as a result of services being fed around the building. If space is at a premium, the minimum 20mm needed can be guaranteed by using **Protect Cavit-E clip** which saves the additional labour of adding an extra 25mm counterbatten.

All service penetrations passing through the Protect VC Foil Ultra were sealed with Protect Reveal tape. Overlaps in the membrane were sealed with Protect Reflective Sealing tape to maintain the additional thermal benefits to be gained from the Protect VC Foil Ultra. At door and window openings, the Protect VC Foil Ultra and **Protect TF200 Thermo** breather membranes used to clad the external face of the wall panels were cross sealed at the openings with Protect Reveal tape. This was to ensure there were no potential air leakage paths into the structure. Finally, all perimeter junctions of the walls were tape sealed with Protect Reveal tape.

The advantage of using Protect tapes was such that all rooms could very quickly be checked to ensure that the membranes had been sealed. Unlike the use of double sided tapes or mastic sealant, which have to be physically checked to ensure completion, the Protect range of tapes with a high tack adhesive also ensures compatibility with most building materials without the need for additional site preparation.

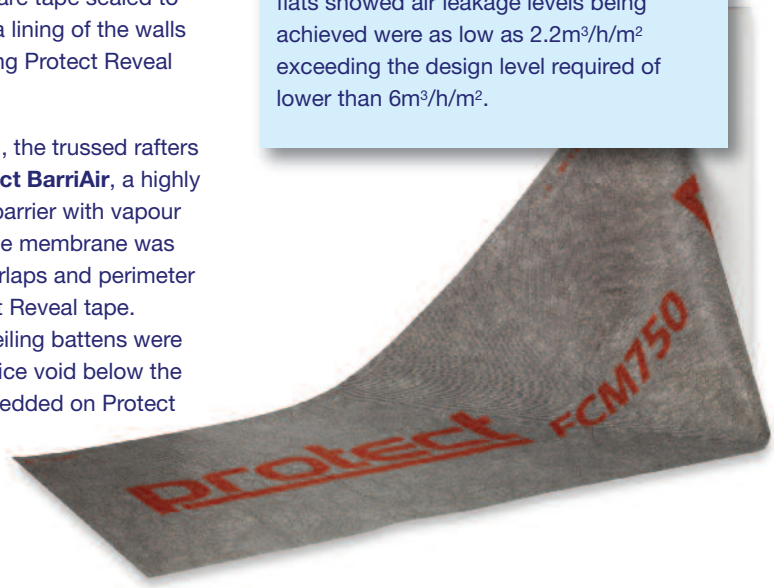
One of the main difficulties in achieving an airtight envelope has been where the floor structure sits between the lower and upper floor panels. This is due to the necessity to ventilate the timber structure where exposed to the cavity, yet providing a continuous vapour control layer (VCL) across the wall. Protect Membranes Ltd developed a suitable airtight, yet breathable membrane, **Protect FCM750** to overcome this difficulty. Lapped around the cavity end of the floor structure, the ends of the FCM750 are tape sealed to the inner VC Foil Ultra lining of the walls above and below using Protect Reveal tape.

Finally, at ceiling level, the trussed rafters were lined with **Protect BarriAir**, a highly effective air leakage barrier with vapour control properties. The membrane was tape sealed at all overlaps and perimeter junctions with Protect Reveal tape. Additionally, where ceiling battens were fitted to create a service void below the BarriAir, these were bedded on Protect

Butyl Nail Sealing tape to limit air leakage through fixings. The air barrier across the ceiling was completed by the installation of a Glidevale loft access trap, which combined closed cell foam seals not only between the frame and lid, but also between frame and ceiling.

The main benefit of a membrane and tape envelope airtight solution is that it allows a first fix pressure test before the final internal linings are fitted.

As a result of the airtightness design implemented using Protect airtightness solutions, testing across a range of properties including houses and 3 storey flats showed air leakage levels being achieved were as low as 2.2m³/h/m² exceeding the design level required of lower than 6m³/h/m².



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