

Primary Air Barrier — Design it with CARE

Airtightness is essential in order to prevent unnecessary heat loss through the building fabric due to air movement. Any shortcomings in airtightness will increase heating costs, reduce thermal comfort and may cause interstitial condensation. Airtightness was considered a priority at Stawell with a best case target of 3 m/h@50Pa and a fall back target of 5 m/h@50Pa.

Continuous: The primary air barrier in the walls is provided by the dense tongue and grooved woodfibre boards whilst in the roof the Pro Clima Active membrane has variable water vapour diffusion, is reinforced for extra strength and has a minimum 50% recycled content.

Accessible: The air barrier is easily inspected

Robust: These products are protected by cladding or render and will last the lifetime of the building without degrading

Explicit: All site operatives were briefed on the importance of air tightness with a brief introduction to the subject. Punctures to the building envelope were minimised and were carefully sealed. It is intended to conduct the first air tightness tests shortly.



Complexity—Raked walls

When the OSB cassettes were adapted to the plane of the raking wall, Ecos was left with a complicated intersection where the raking wall meets the plinth wall and additionally where the raking wall meets the side walls. The detailing of these junctions was resolved on-site which, although Ecos has the benefit of a committed team who are air tightness aware, is not ideal.

Windows/doors - The original intention was to have the windows in the same plane as the wall but having consulted numerous window manufacturers it was clear that, using standard window designs, there was an unacceptable risk of water ponding and reducing the life of the joinery. Additionally, the U-value of a window is calculated vertically so the on-paper performance of the building would be misleading if they were tilted. The necessity of window linings to insert vertical windows into a raking wall also posed additional design challenges with regard to the continuity of insulation. These were all overcome but, as before, at a considerable time and financial cost. From an air tightness point of view, by adding a window lining you are introducing an additional interface and an additional gap that needs sealing.

Tolerances - Ecos were able to find an excellent local joinery firm who manufactured the window linings and were a great help in overcoming the major design challenges they posed. The tolerances between the linings and the windows were, as a result, very pleasing. The interface that has been the most vexing has been that between the joinery and the frame. The off site manufacture has had the benefit of being extremely quick in comparison with an on site stick build but the elements are still manufactured by people and are thus subject to the same human error and tolerance levels. As Ecos wanted to have a 'breathing' structure and avoid wrapping the building in plastic this has meant a very time consuming process of dealing with gaps between panels and elements. Ecos are now looking at systems that will improve this for the next development.

Secondary Sealing: Considerable effort consisting of a team of 2 over 3 weeks was spent in ensuring all gaps around the windows linings and frames were sealed and all junctions were checked and sealed



Measurement and Feedback

The benefits of measurement and testing is a key part of the GHA, with all developers signing up to testing and monitoring. It is intended to conduct a series of airtightness tests with the first one due when all the windows are in.

A whole house monitoring system will feedback on the efficacy of the design

Designing Airtight Dwellings – Guidelines

- Understand the subject area and train your design team to understand the airtightness implications of complex design and junctions—simplify if possible
- If you can't draw it, you can't build it.
- Ensure the design and construction team, including sub contractor, understand the importance of good thermal design
- Help make energy visible by explaining to the teams about CO₂ emissions and homes