

# technical summary The Denby Dale **Passivhaus**

## ► Design detailing



### Minimising thermal bridging

Understanding and modelling thermal bridging is becoming absolutely critical to accurately predicting the heat loss of a building. Measures include:

- Use of 300mm insulation in the cavity going right down to the strip foundation, so that any heat lost from the concrete floor slab will have a longer thermal transfer path.
- Use of lightweight aerated block below ground level, which does not transfer heat as readily as standard concrete block.
- Use of basalt resin cavity wall ties (instead of the usual steel ties).
- Positioning of windows and doors at the centre line of the insulation layer.



### Maximising airtightness

Passivhaus buildings require very high levels of airtightness (0.6 ach@50pa). The Denby Dale Passivhaus' design and construction pays particular attention to junctions, which are always difficult for airtightness because of the differential movement between different materials. Measures include:

- Wet plaster coating to interior walls.
- Concrete floor slab is carried across the top of the blockwork of the inner leaf of the wall to minimize shrinkage cracking between the wall and the floor.

- Attention to airtightness detailing around window and door openings and junctions between floors, walls and roofs, including use of airtightness membranes and tapes.
- To improve airtightness around the window opening, a plywood box was set into the wall. An adhesive-backed airtightness tape was then attached to the plywood with a fleece wrapped into the wet plaster, making the junction between the plywood and plaster airtight. Another airtightness tape was used to seal the gap between the window and the plywood box.



### Super insulation

Super insulation is fundamental to Passivhaus construction, along with close attention around junctions of these elements. Measures include:

- Walls: 300mm fibreglass batts
- Under groundfloor: 225mm polyfoam insulation
- Roof void: 500mm fibreglass quilt
- Windows and doors: triple glazing with insulated thermal break in frame

### Mechanical ventilation with heat recovery (MVHR) system

MVHR is an absolutely integral component for achieving the necessary performance levels needed for Passivhaus buildings. It allows for sufficient and comfortable ventilation to all areas of the house whilst minimising the loss of heat gained from the sun, human activity, cooking, showering, electrical appliances etc. This is achieved by use of a sophisticated heat exchanger driven by two very efficient fans. The



incoming air is blown past the outgoing air and is used to heat the incoming air. This has the effect of saving over 90% of the heat that, due to uncontrolled ventilation and draughts, would be lost in a more 'conventional' house.



### Minimising thermal bypass

Thermal bypass refers to air movement through or around insulation, which can reduce its effectiveness. Although not a requirement of Passivhaus design, addressing thermal bypass – by reducing air movement through or around insulation – is becoming good building practice. For the Denby Dale Passivhaus this meant design detailing for windtightness and careful installation of insulation.