

Passivhaus: when it's good, it's very good

Building Regulations Making it work

Although the Passivhaus standard is now well established as the benchmark for the very high end of low carbon housing, there is still much debate as to its practicability, deliverability and cost-effectiveness on large scales across the UK.

Envelope focused approach

The most effective way to achieve Passivhaus standards is to avoid overcomplicated designs and focus on the area of greatest impact: the thermal coherence of the building envelope. A simple, highly efficient thermal shell, with minimal thermal bridging, should be created using insulation products with low thermal conductivity, facilitated by

airtightness tapes and membranes.

This approach was followed in the construction of the 66 unit Perryfields development using NBT's woodfibre insulation systems, and will subsequently deliver wall and roof U-values of 0.15W/m²K and Y-values of 0.02W/m²K, as well as an airtightness level of less than 0.6m³/hr/m²@50Pa.

Product specification

As well as being simple, it is vital that the approach adopted for Passivhaus designs is also holistic, with products being selected on the basis of their capacity to work effectively together in high performing systems. Such an approach will ensure that a Passivhaus home is comfortable and healthy.

An understanding of the mechanics of housing, such

as air changes, thermal mass and moisture regulation should lead product specification. This will avoid problems such as summertime overheating and condensation-induced mould growth, which is hazardous to both the health of the building fabric and a home's occupants.

As energy prices continue to rise, energy efficient Passivhaus homes will become increasingly attractive to consumers, and as cost effective and scalable designs become more readily available, they will also become more popular amongst developers and architects. However, in the design of each and every future Passivhaus home, the highest standard of technical support and guidance must be sought, in order to ensure that they are healthy and comfortable, as well as cost effective and sustainable.

THE LARCH HOUSE The UK's first zero carbon (code 6), low cost, certified Passivhaus, built as prototype social housing utilising NBT systems and support, launched at this year's National Eisteddfod for Wales.



Photograph courtesy of bere:architects

nbt consult is able to offer architects high level technical support on the compatibility of building products for Passivhaus and other high performance standards, such as the higher levels of the Code for Sustainable Homes. Product recommendations are supported by robust research and analysis to ensure optimum performance is achieved.

Breathability - the safe option

If we have good ventilation systems in our buildings, we don't need breathability, right? Wrong. Although this misinformation has been touted as a truth, it is, in fact very misleading and, indeed, potentially dangerous – in terms of the health of buildings and their occupants.

Ventilation is about ensuring a healthy, comfortable living environment as made clear in our article on health earlier in this newsletter. It cannot be replaced by breathable structures.

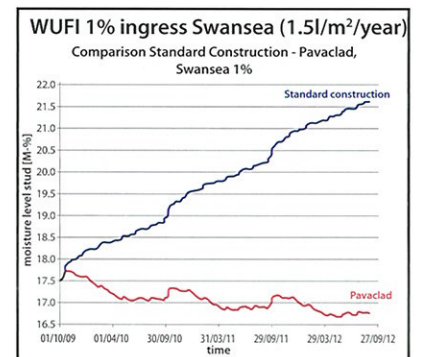
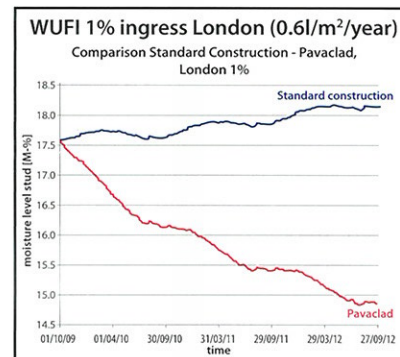
Breathability is mainly about the health of the building fabric when things go wrong. It cannot be replaced by ventilation.

Real World

In the real world, vapour barriers can suffer tears, building movement can create openings and poor workmanship can compromise the airtight or weathertight design of a structure. Moisture can enter the structure from the inside as water vapour (from cooking, bathing or human perspiration) or from the outside as water ingress, particularly around windows and doors and where there are alterations or defects over the life of the building.

Because moisture will always, at some stage, be able to get into the fabric of the building, that building fabric needs to be able to deal with it effectively. The easiest way is for the fabric to be properly breathable.

In this case this means that there is less vapour resistance on the outside of the structure than the inside structure and that moisture is drawn easily to the outside through mechanisms of capillarity, hygroscopicity and vapour permeability. The alternative of non-breathable structures risk decay of the building structure through mould growth, bacteria and insect infestation. This is particularly important in timber frame buildings and it is for this reason that German Building Regulations have decreed that all non-breathing timber frames must be fully treated with preservative chemicals, whilst breathable timber frames only require treatment in the sole plate.



To illustrate this point and to show why NBT Pavaclad and Diffutherm systems are so much safer than standard frames, NBT has undertaken WUFI moisture modelling to assess the difference between a standard non breathable timber frame and our breathable NBT Pavaclad system in London and in Swansea.

As is clear, in both situations

the moisture in the timber frame increases in the standard non-breathable constructions, with levels of timber decay (20% rh) being reached within 18 months in Swansea. The breathable NBT Pavaclad constructions continually dry out and are always safe.

See 'Breathability Matters' article on the NBT website www.natural-building.co.uk



NBT's ThermoPlan structural insulation system enabled an architecturally striking 8.5m tall supporting wall to be built on a curve to form the north facing elevation of this private house development in Charlbury, near Oxford. The system delivers high levels of thermal and acoustic insulation and highly effective breathability, whilst also providing crucial thermal mass, which helps to prevent summertime overheating of the, otherwise, lightweight building.



The Hallam Environmental Learning Centre sets a fine example of sustainable and energy efficient building through the creation of a high performing external envelope using NBT's Diffutherm and Pavaroo fully breathable woodfibre insulation systems.



The 'skewed house' featured in an exciting vision of the future of UK housing at Scotland's first ever Housing Expo, with NBT's Pavaclad and Pavafloor woodfibre insulation systems as well as their Siga airtightness tapes providing ultra high levels of insulation and airtightness.

natureplus in the UK

A not for profit, leading-edge organisation, the Alliance for Sustainable Building Products, is being set up to promote the understanding and delivery of truly low impact building products and systems in the UK. The group will be working with European organisation, natureplus, to promote awareness of the credible natureplus eco-label, which offers architects and specifiers a guide as to which building products among the so-called 'green wash' are genuinely sustainable. Both the alliance and natureplus include not only environmental impact, but also health and social sustainability (i.e. ethical trading) in their criteria. It is a fully transparent system for leading sustainable building products.