

The 70s are still in fashion

George Pickard reports on how a Salford City Council project built in the 1970s can teach current specifiers a thing or two about thermal performance.

Using thermal mass to stabilise temperature fluctuations and hence reduce a building's energy demands may seem a new idea, but Salford City Council demonstrated 36 years ago that it works. Its recent publication of a report into the project, 'The Salford low-energy house: learning from the past' provides a timely reminder that we can learn important lessons from the recent past.

Faced with greater expectations on build quality and thermal performance, and surrounded by ever tighter financial constraints, fuel poverty and restrictions on supply, and tough targets on CO₂ emissions, there has probably never been more important time to get building specification right. But perhaps the strongest inducement of all is that the Government is maintaining a mandatory zero carbon target for homes by 2016, which for floors, is generally taken to mean a U-value of 0.15 W/m²k.

Salford's vital statistics

Mass/insulation synergy has been developed at ground floor level in the industry by using concrete beam-and-block floors augmented with a white expanded polystyrene (EPS) over-layer. With the introduction of so-called Silver EPS profile panels between the beams, increased insulation characteristics are available and a U-value of 0.08 W/m²k is possible. On first floors, the centuries-old use of timber joists is however in question; changing lifestyles, and the need for greater acoustic

separation has resulted in a pronounced switch to concrete beam-and-block floors. Such construction techniques contribute hugely to the internal thermal mass of a dwelling and so reduce heating demand in winter and cooling demand in summer, saving energy and thus reducing CO₂ emissions.

This approach was demonstrated on the Salford housing project. Designed in 1976 for Salford City Council in conjunction with the University of Salford, and extensively monitored in 1980, the houses have been shown to require an energy consumption about 25% of that of the general UK housing stock and less than 60% of current Building Regulations. The passive design, which incorporates a high thermal capacity internal structure protected by a highly insulated, well-sealed envelope, provides a high level of continuous thermal comfort at low cost.

The thermal storage capacity of a building is largely determined by its internal mass. In the Salford design, high mass is provided by constructing the internal walls of dense concrete blocks with beam-and-block suspended concrete ground and first floors, topped off with a sand-cement screed. The result is an internal mass, and thermal capacity, about four times traditional values. Inner walls were wet-plastered to ensure good air-tightness and good thermal admittance.

The resultant thermal capacity enables maximum use to be made of incidental gains, reduces temperature fluctuations,

A typical EPS-insulated beam and block floor system, as used on the Salford scheme



and permits a range of heating strategies to be adopted. This is in marked contrast to lightweight houses, most UK timber-framed structures, that can have a thermal capacity of around a quarter of traditional values and so can suffer large temperature excursions.

Lessons not learned?

Thirty-six years since the Salford design, it seems strange that the experience did not become widely known and was not implemented to any great extent by the private sector, even though the excellent performance was publicised by a report in 1987. One possible explanation for this can be found in the anecdotal evidence from contemporary private developers that it was difficult to sell the houses without central heating installed, as potential buyers considered that they lacked an essential amenity.

The report recently published by the Council states: "The idea that central heating is not essential for comfort, but is generally only necessary to compensate for inadequate thermal design, was not, and is still not, generally understood or accepted. In fact, the production houses were fitted with just one, or sometimes two, balanced-flue gas convector heaters, (delivering in total 1.5-2.5 kW), one in the living room to provide optimum comfort and the other in the hall to ensure equable whole-house temperatures. Conventional central heating, using water-filled radiators distributed under windows in each room, was not installed because it could not be economically justified and was not necessary to maintain comfort conditions."

With this timely reminder of the huge savings that can be achieved in terms of energy reduction, the Precast Flooring Federation is renewing its drive to expand the use of precast flooring beyond the upper floors of houses at the higher end of the property market and within the self-build sector.

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