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From the Ground Up

Time, cost and energy efficiency are three areas regularly cited as critical considerations in selfbuild projects. Once planning has been secured the more efficiently the home can be constructed, the sooner the selfbuilder will reap the benefits of undertaking such a project. Whilst much attention is paid to the external structure of the building, a common oversight is the importance of selecting the right foundation system. In the same way that modern methods of construction have emerged for the building envelope, there are advanced foundation systems now available which offer significant time, cost and energy efficiency benefits over traditional techniques. Here, Andrew Orriss, Insulslab SFRC, discusses the differences in foundation types and explains how modern and fully integrated systems can deliver an effective solution for selfbuild projects.

When preparing the ground for construction, there are a number of traditional foundation methods which are commonly used: suspended slabs, beam and block, raft foundation and piled foundations. However, recent innovations in foundation technology have developed a new breed of fully integrated and insulated system, giving selfbuilders access to a new approach that is proven to deliver major advantages over traditional foundation techniques.

Traditional Versus Modern

The very nature of an integrated system delivers efficiency savings on-site by simplifying the installation process. This has been further enhanced by the development of super-insulated integrated systems, which as the name suggests, incorporate insulation as part of their design.

Traditional beam and block/raft foundations require insulation to be laid on top of the concrete slab, with the final floor screed cast on top. In contrast, super-insulated and integrated systems cast steel fibre reinforced concrete (SFRC) directly over specially developed expanded polystyrene (EPS) pods, delivering the foundation up to ground floor slab level in just one or two pours.

Moreover, standard foundation techniques demand intensive ground preparation and excavation, leaving the selfbuilder with the challenge of either re-using the spoil on-site, or incurring the cost of

removal. Fully integrated systems help overcome this issue, as the ground only needs to be excavated to a depth of approximately 600mm below finished floor level, before hardcore is laid and without the need to dig any trenches. The EPS pods, which interlock in a ‘waffle’ shaped slab, are then positioned with the relevant formwork prior to the SFRC being poured.

As land available for development becomes scarcer, modern integrated foundation systems can also support the selfbuilder in keeping costs down on difficult sites. Extremely flexible, the latest integrated systems can be used on sloping sites, on contaminated soils and on brownfield sites.

The reduced demand on labour resources is a key factor in these modern systems helping residential developers realise commercial benefits, with a typical saving of 25-33% over traditional beam and block/raft quoted by some system manufacturers. However, proven performance benefits, particularly where thermal efficiency is concerned, also make these modern systems a sound specification.

Proven Performance

As super-insulated integrated systems take the foundation up to ground floor slab, thermal performance and sustainability are key specification considerations. With some systems shown to comply with Part L, when correctly specified and constructed, developers can expect to achieve typical U-values of approximately 0.10 – 0.12 W/m²K.

From a sustainability perspective, these systems help reduce waste disposal, minimise site traffic and require less volume of concrete. Overall, their thermal and sustainable performance makes a significant contribution to the Code for Sustainable Homes and BREEAM credit scores.

Foundations such as these have also been designed to integrate well with underfloor heating – making it quick and easy to install the heating system into the ground floor slab.

Using SFRC in residential foundation systems is a groundbreaking technique. This is because SFRC has a higher purchase cost than traditional concrete. By minimising the volume of concrete and steel required in the foundation as well as other efficiencies, the total savings offered by the complete system are significant.

At a Glance

Beam and Block Foundation	Raft Foundation	Fully integrated and super insulated systems
Low U-values achieved only by increasing the depth of	Low U-values only achieved by increasing the depth of	Low U-values are easily achieved providing future proof performance toward zero

insulation	insulation	carbon housing
Cluttered sites, with trenches	Costly design, supply and fix of steelwork	Clean, clutter free site no trenches
Spoil to be removed	Spoil to be removed	Minimal spoil to be removed
Can have restricted access for following trades	Can have restricted access for following trades	Quick access for following trades
Screed required	Screed required	No screed required
Potential difference between design depth and actual depth required deeper trenches increase exit costs beyond estimation	Exit costs can be higher than anticipated due to mounds washing away, requiring over and above concrete	Flexible system overcomes many on-site challenges, with full design support service available with most systems