

Concrete approaches top form

Already widely used in the US, Canada and Europe, the use of insulating concrete formwork (ICF) is growing in the UK particularly with the self-build and housing association sectors, reports Guy Thompson, head of architecture and housing at The Concrete Centre



The Concrete Centre

ICF, also known as permanently insulated formwork (PIF) is an innovative modern method of construction. ICF consists of twin-walled expanded polystyrene (EPS) or extruded polystyrene (XPS) panels, blocks, planks or composites, connected by plastic or metal connectors and filled with ready-mixed concrete.

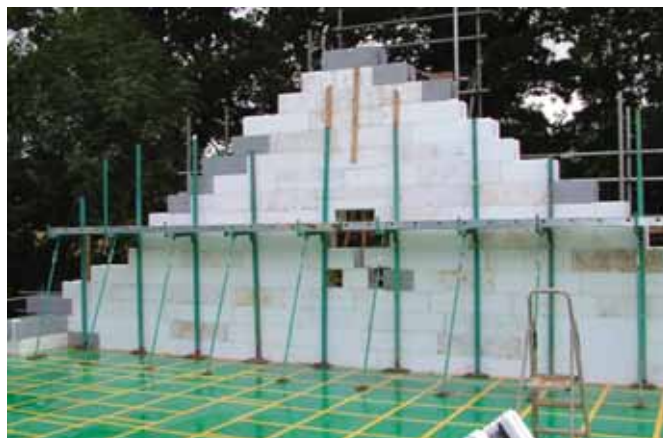
The system combines the inherent strength of concrete with the excellent thermal insulation properties of polystyrene to produce cost-

effective and durable structures. The polystyrene is used as permanent formwork for the concrete and is available in a variety of configurations and a number of proprietary systems, some of which have independent third-party assessments such as BBA, BRE or LABC Type Approval certification and have also been assessed for Robust Details. These are accepted as demonstrating compliance with the relevant Building Regulations.

The basic structure is typically erected by a team of

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three or four site operatives and filled by pumping workable concrete. The resulting construction provides both structural capacity and thermal insulation. The thickness of the concrete, available from the various systems, ranges from 100mm to 300mm. ICF can be designed to enable significant structural capacity both as unreinforced and reinforced walls depending upon the design loadings. The insulation can be varied to provide for U-values in the range of 0.11 to 0.35W/m²K. Almost any finish



or cladding system can be directly applied or fitted to an ICF wall.

In addition to high levels of thermal insulation, ICF structures have very low air infiltration rates, almost all of which are accounted for by window and door openings. Consequently, there is very little heat loss due to air changes, and this boosts the thermal insulation effect.

Both EPS and XPS are closed cell forms and have very low water absorbency. The core is specified as a highly workable concrete. This results in a low risk of voids. Due to the permanent presence of the insulation both during construction and under operation conditions, the concrete undergoes more controlled shrinkage and thermal strains, and as a result, experiences very little shrinkage cracking. These factors combine to produce structural walls that are

inherently resistant to flood damage. This is an increasingly important consideration for buildings in many parts of the UK.

In addition, ICF systems provide the inherent benefits of concrete construction, namely, sound insulation, fire resistance, long-term performance and robustness. There is minimal waste during construction, as off-cuts of polystyrene can be used elsewhere and the ready-mixed concrete can usually be supplied locally.

ICF construction is suitable for a wide range of structures. Significant use has been made in housing where it can be used for single or multi-storey projects. In the UK, ICF was initially championed by innovative self-builders, but now increasingly forward-thinking housing associations, attracted by the fast-build and range of inherent performance benefits, are examining the

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potential of ICF construction.

One such association is the Durham-based Three Rivers Housing Group who received a Constructing Excellence award for building innovation in the North East for the development of 16 two-bedroomed bungalows at West Rainton in County Durham. Using the Beco Wallform ICF system, the homes have been designed to ‘Lifetime Homes Standards’ to achieve an ‘Eco-homes’ rating of very good. This is equivalent to a 30% reduction in annual CO₂ emissions per home. The high insulation values enable tenants to have lower fuel bills. The use of ICF reduced the overall construction time and this in turn reduced preliminary costs such as site set-up and supervision costs. These were important considerations as the scheme had tight budgetary constraints.

A modern method of construction, the use of ICF is set to become more widespread as its ease of construction and wide range of benefits are increasingly recognised.

For further information on ICF, visit the websites of the Insulating Concrete Formwork Association (www.icfinfo.org.uk) or The Concrete Centre (www.concretecentre.com)

