PRECAST FLOORING FEDERATION
technically sound solutions

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The advantages of precast flooring systems

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The history of precast concrete floors - which goes back more than the 40 years since the Precast Flooring Federation (PFF) was created - is one of dawning realisation by designers and clients of its advantages along with product innovation and development by the manufacturers.

Where the PFF distinguishes itself is in its strong emphasis on safety practice, as demonstrated by the regular updating of its Code of Practice for the safe erection of concrete flooring and associated components. This document, acknowledged by the Health and Safety Executive (HSE) as setting out industry best practice, deals with the whole process of precast concrete flooring installation from design through method statements and risk assessment to control of the lifting operation, fall protection and subcontractor assessment. The latest edition will be published in spring 2007.

Using a PFF member as a supplier is a guarantee that the products:

- have been manufactured under strict quality-controlled conditions
- will be of a high standard and comply fully with specific design requirements of specifiers and builders
- will be delivered to site to suit the contractor's programme for rapid fixing by the supplier's or the contractor's operatives.

With regard to this last point, the PFF is working with Proskills (the Sector Skills Council for people working within the process and manufacturing sector) to develop a training programme for installers. It is intended to be used as refresher training for existing installers or as a full training programme for new starters working towards the appropriate NVQ and CSCS card achievement.

THE FLOOR OPTIONS

There are three generic floor types available in precast concrete: hollowcore, beam and block, and lattice girder .

Hollowcore

Hollowcore consists of concrete elements cored along their length. They are generally available 1200mm wide, although some manufacturers produce up to 1500mm. Narrower units are also available at 600mm or 750mm. Depths are 100-400mm, depending on span and loading conditions, providing efficient flexible solutions across all markets for most building types.

Beam and block

Beam and block uses inverted 'T' sections of beams 150-225mm deep. The infill between the beams can be made up of dense, medium or lightweight aggregate blocks or, where improved thermal performance is required, of expanded polystyrene blocks. The latter provide insulated permanent formwork for a structural concrete topping. Such construction is mainly used at ground floor level, particularly in housing, although it is also suited to upper floor applications in a wide range of markets and building types.

Lattice girder
Lattice girder is found as part of a composite construction and is generally available in widths of up to 2400mm. It consists of a reinforced concrete slab with projecting steel 'lattice-girders'. This design ensures an effective mechanical bond between the precast element and the applied concrete topping. Such floors are particularly suited to car parks and offices.

GETTING IT RIGHT
The correct choice of floor design and material for both ground-floor slabs and for upper levels can contribute to buildability, economy and lifetime costing. Indeed, in the wake of the alterations to Parts E and L of the Building Regulations - where the immediate focus was on walls - concrete floors are increasingly being seen as providing the answer to several needs, particularly the Part E requirement to reduce impact and airborne noise.

When Part E was being updated, some questioned whether beam-and-block flooring could be improved in a cost-effective way to meet the new Standards. However, as concrete is a natural sound-deadener, the industry soon created the beginnings of a workable system. At about the same time, the Robust Standard Detail project - sponsored by the Housebuilders Federation as a possible alternative to pre-completion testing (PCT) - was developing, and robust details (RD) were finally given the green light by the Government in January 2004.

There are two RD solutions for beam-and-block flooring in the March 2006 update of the Robust Details Handbook:

- E-FC-6: Modified beam-and-block floor with Regupol E48 resilient layer and floating screed.
- E-FC-7: Modified beam-and-block floor with tongue and groove (t&g) board floating floor treatments.

Both have been awarded RD status, having been checked by the strict RD testing procedure and found to give consistently sound results exceeding the performance standards in Approved Document E by the significant margin of 5dB. They therefore provide an alternative to PCT as a method of complying with Part E.

FURTHER ADVANTAGES
Acoustic. performance is far from being the only benefit of precast concrete floors. They are more cost-effective than timber and enable thinner floor zones as well as longer spans. In addition, they provide a safe working platform for ongoing construction. Critically, in this environmentally conscious world, their thermal mass can reduce the need for air conditioning, reducing the thermal cycling by day and by night. Add to that their intrinsic one-hour minimum fire resistance and compatibility with other precast concrete components, such as stairs and balconies, and it is easy to see why the technique continues to gain ground.

Another more obvious advantage for concrete floors is the ability to vary room layout without worrying about floor loadings. This feature applies equally at first-floor level, avoiding the concern about the positions of supporting walls. For the designer, this flexibility and adaptability provide a further incentive to choose concrete.

DEVELOPMENTS
One of the more recent developments for floors is the use of prestressed concrete T-beams infilled with high-duty expanded polystyrene panels and topped with C28/35 reinforced concrete structural screed, generally reinforced with polypropylene fibres or steel fabric. Problems with cold bridging are avoided, thanks to the careful design of the panels. The performance fully complies with the requirements of Part L of the Building Regulations.

GASES AND INSULATION
There are two main requirements in new housing that are leading to a dramatic rise in the use of precast concrete flooring. One is to do with gas penetration, the other insulation.

Gas penetration
Although infill dwellings and brownfield land are being adopted as a way of easing the housing shortage, not everything in the garden is lovely. In particular, methane and radon can create problems. In general, potentially explosive methane arises from brownfield sites contaminated by earlier industrial usage or from landfill containing organic material. Radon, a radioactive gas from the natural decay of uranium to lead, can slowly accumulate and increase the risk of lung cancer. Carbon dioxide can also

be a problem on brownfield sites, while other hazardous gases include carbon monoxide, hydrogen and hydrogen sulfide.

The solution to any such gas penetration is precast concrete flooring above a vented plenum. The concrete, when incorporating a membrane, forms an efficient barrier to the gas, while natural or mechanical underfloor ventilation through vents and airbricks avoids any potential build-up. With a solid concrete ground floor, radon-laden air can be extracted with a radon sump.

Insulation

The PFF is also at the forefront in improving insulation within floors. Indeed, the insulation V-value of 0.22W/m^2K for floors, specified in the Building Regulations (England & Wales April 2006, Scotland April 2007), is easily achieved. Roof, wall and floor insulation elements work in unison to provide the total solution to escaping heat. If one element performs below standard, it will act as a heat sink and the insulation of the whole building suffers, leading to condensation.

For all the above reasons, precast concrete is rapidly becoming the flooring solution of choice .