

# New guide for suspended concrete ground floor slabs

**Darryl Eddy**

*Twintec Industrial Flooring and writing group chairman for the new ACIFC working party*

Following previously published guides *Guidance on specification, mix design and production of concrete for industrial floors*<sup>(1)</sup>, *Dry shake finishes for concrete industrial floors*<sup>(2)</sup> and *Steel fibre reinforced concrete industrial ground floor slabs*<sup>(3)</sup>, the Association of Concrete Industrial Flooring Contractors (ACIFC) are currently working on further publications which aim to provide the construction industry with advice and guidance on several other flooring related topics.

One such publication currently being produced is intended to provide an introductory guide to the design and installation of suspended concrete ground floor slabs. It is intended that the document will provide expert, wide-ranging direction and impartial information that will enable clients, designers and contractors to fully understand the processes involved and to select the most appropriate solution for their project.

## Increasing use of suspended slabs

The guide will be produced because the industry has shown that it requires guidance on this topic. As the demand for land to develop increases, and brownfield sites become more viable for redevelopment, it becomes necessary to take advantage of the appropriate methods available to achieve good long-term performance of the ground floor slabs within such developments. Currently, it is estimated that 20% of industrial concrete floors are pile-supported (see Figure 1). Publications such as TR34 *Concrete industrial ground floors – a guide to design and construction*<sup>(4)</sup>, ITN11 *The design of ground-supported concrete industrial floor slabs*<sup>(5)</sup> and TR550 *Design of floors on ground*<sup>(6)</sup>, deal comprehensively with the design and construction of ground-supported floor slabs, and much of their content relating to materials and workmanship will be trans-



ABOVE: Figure 1: A finished steel-fibre-reinforced pile-supported concrete slab for B&Q in Hull, Yorkshire.

RIGHT: Figure 2: Piles being installed by two piling rigs at the Tesco Distribution Centre, Thurrock, Essex.



ferable to suspended ground floor slabs. However, at present, there are no documents dealing specifically with suspended slabs, nor one that discusses many of the interfacing specialist components.

## Guide objectives

To provide assistance in this area, the working party felt that the objectives with this document should be as follows:

- to provide awareness of all potential solutions when designing, building or procuring suspended concrete ground floor slabs
- to encourage the integration of all specialist design elements involved in the design and construction of suspended concrete ground floor slabs
- to provide assistance to engineers when checking proprietary design solutions and to point them toward support information when doing so
- to highlight recent and ongoing developments in materials technology and design
- to provide clients with a realistic understanding of the relative features of all systems.

## Guide contents

The guide will deal with all of the available options; from traditional design solutions, using loose steel reinforcing bar, to modern methods of using steel, such as custom mesh. It will also include

the latest developments in steel-fibre-reinforcement, both composite systems using custom mesh to create 'virtual' beams with steel-fibre-reinforced concrete and systems where only steel fibres are used. The guide will also contain a comprehensive list of technical documents and publications that will provide invaluable bibliographical information for designers and contractors.

## Ground conditions

High on the list of items to be discussed will be ground conditions. Many contractor members of ACIFC are reporting an alarming absence of accurate information regarding the ground conditions on certain projects, and the guide contains suggestions that will assist those involved with this aspect of construction. Also discussed will be other options open to clients when constructing ground floor slabs on poor ground, from piling to ground improvement techniques. For the piling section, advice has been sought from the Federation of Piling Specialists. Their assistance has been invaluable in co-ordinating these trades. Members of the Federation agree that their work on site has often been less well integrated with the floor slab design than would be ideal (see Figure 2).

## Design

This section will provide a design overview of each of the options, including

an acceptable approach to analysis. As BS 8110-1: 1997 *Structural use of concrete: code of practice for design and construction*<sup>(7)</sup> and the draft Eurocode 2<sup>(8)</sup> were not written with such options in mind, this section will contain guidance for engineers responsible for checking proprietary designs such as those put forward by steel fibre suppliers. Readers will also be directed to other publications for verification.

#### Materials

While many other documents deal with the subject of materials used for constructing ground bearing concrete floors, the materials used for suspended ground floor slabs need to be different in many respects. This section will consider all the components used, including mesh/bar reinforcement, fibres, joints, membranes, concrete, admixtures, curing agents and dry-shake toppings.

#### Construction issues

As in the materials section, this deals with all areas involved in the construction process, with particular attention paid to the problems most often experienced on site by ACIFC members. These will include the working platform, damage to piles, slip membrane and gas membrane/venting systems. The

guide will also comment on matters common to flooring work in general, for example, working in the right environment, detailing, placement, finishing, curing, tolerances, programme, remedial works and maintenance.

#### Quality control

This section will comment on the type of testing each design option may require,

together with a suggested procedural 'check list'.

#### Concluding remarks

Individual sections of the guide are currently being produced by the writing committee, and the first draft is shortly to be sent to several industry experts for comment. ■

● Should readers wish to contribute to any of these sections, please e-mail your comments to Darryl Eddy on mail@twintec.co.uk or acifc@hotmail.com. Following a period of consultation, the ACIFC working party will expect to publish the document toward the end of 2003.

#### References:

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5. CHANDLER, J. and NEAL F. ITN11 *The design of ground-supported concrete industrial floor slabs*, Cement and Concrete Association, Slough, 1988, 16pp.
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8. COMITÉ EUROPÉEN DE NORMALISATION. prEN 1992-1-1 *Eurocode 2: Design of concrete structures. Part 1: General rules and rules for buildings*, Revised final draft, Brussels, April 2002.

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Twintec Industrial Flooring  
Cottage Leap, Rugby  
Warwickshire CV21 3XP  
Tel: 01788 567722  
Fax: 01788 567700  
E-mail: mail@twintec.co.uk  
www.twintec.co.uk

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