METHOD STATEMENT
Making Good Concrete Better from Start to Finish

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CONCRETE FIBRES

BUILDING TRUST

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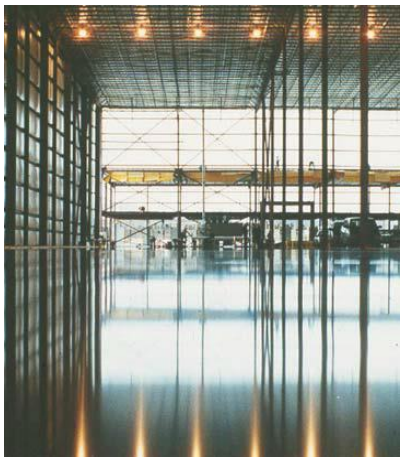
1 OVERVIEW

Sika's range of synthetic fibre and steel fibre reinforced concrete slabs can achieve the same high-quality finishes as plain concrete. Whatever the required finish, satisfactory results can be obtained with synthetic and steel fibres if proper placement and finishing techniques are followed. As always, timing and technique are important when finishing fibre reinforced concrete slabs.

2 FINISHING TIPS



1. Order right - insist on genuine Sika fibres. Don't settle for low-quality substitutes.
2. Get the right amount of water in the mix. Fibre reinforced concrete can look drier than non-fibre, but it has the same workability when placed. As with all concrete, don't expect the best results with a watery mix.
3. Level off using screed, bull float, or straight edge. Rough finish. Don't overwork the mix.
4. Don't get on the concrete too soon. Let all Bleed water evaporate from the surface before finishing. A good test is when your footprint leaves only a (6mm) deep impression.
5. Finish with a broom, hand trowel or power trowel.

Remember, using standard finishing techniques, the fibres stay down in the concrete where they can do their job.

3 PLACING

Synthetic and steel fibres can be placed using conventional methods such as concrete chutes, buckets and pumps. It can also be extruded as well as being placed using shotcrete equipment. Synthetic and steel fibres increase the cohesiveness of concrete. Fibre reinforced concrete may appear stiffer than non-fibre concrete at the same workability level. Apparent slump loss is a characteristic of fibre reinforced concrete and addressed in BS EN 206-1. Check the slump of the concrete before adding fibre or water. In most instances, the addition of water is not necessary. Be sure the mix design is based on current material analysis.

Many factors can affect the workability of concrete and should be analysed when the concrete changes from what is normally expected.

Changes in cement fineness, varying of chemical constituents in cement, changes in gradation, particle size and shape of aggregates, concrete temperature, wind velocity, changes in admix and dosages are just a few typical areas where the concrete consistency may be affected. The addition of synthetic or steel fibres at nominal rates does not alter the workability of the concrete.

4 STRIKE OFF/BULL FLOATING/DARBYING

Manual, vibratory or laser screeds can be used during the strike off operation. Laser guide screeds and vibratory screeds ensure surface vibration, which brings paste to the surface and limits the possibility of exposed fibres. When using a laser screed to finish steel fibre adjustments may need to be made from factory settings.

Magnesium floats are recommended to establish a smooth, level surface and can close up any tears or open areas that occur during the strike off operation. As with finishing any concrete, be careful not to overwork the surface. This will bring excessive fines to the surface and can cause crazing.

Fibre reinforced concrete bleeds more evenly than plain concrete, so you do not experience the same "puddling" effect as with plain concrete. With uniform bleeding, it can seem that initial set has occurred and finishers may get on the concrete too early. Contributing factors such as ambient conditions, site conditions and mix design should also be taken into account when considering the timing of the finishing operation. The beginning of the finishing operation may need to be delayed to accommodate this uniform bleed characteristic. After consolidation by laser guided screeds, vibrator truss screeds, hand rodding, bull floating or darbying, wait until the bleed water has evaporated and a finisher's footprint leaves only a (6mm) deep impression before finishing the concrete further. Otherwise, crazing, dusting or scaling may result.

5 BLEED WATER

Bleeding is the movement of water within the concrete to the surface due to gravitational displacement of cement and aggregate prior to initial set. Normal concrete can form pools of bleed water on the surface in areas where large capillaries have formed. These areas of weakened paste will later appear crusty or cracked. Any finishing operation performed while bleed water is present on the surface can cause serious crazing, dusting, or scaling. Sprinkling water on the surface to facilitate finishing also can cause these problems.

6 MACHINE TROWELLING

Premature trowelling will bring fine particles of sand and cement to the surface. Fibre may be conveyed to the surface with these particles and may be visible at the surface with progressive passes of the finishing equipment. This phenomenon does not indicate a problem with the fibre or the concrete, but is easily corrected with proper timing of the finishing process.

Start floating the concrete with the blades flat. If finishing disks or "pizza pans" are used, you may want to float the slab initially with a walk behind trowel. The floating operation is to consolidate mortar at the surface, remove surface imperfections and to prepare the floor for further finishing operations.

The finishing shall be accomplished by walk behind machine trowels, ride-on double or triple trowels. A sufficient quantity of trowels shall be provided to produce the specified finish the earliest time after the water sheen fades from the concrete surface and the concrete can support the weight of the trowelling machine without adversely affecting the specified finish and floor flatness requirements. The blades should be kept as flat as possible for as long as possible and then slowly increase the angle as the concrete finish is obtained. Finishers without previous fibre

experience may feel the slab is closer to its initial set than it actually is. Synthetic and steel fibres impart cohesiveness to the concrete and an internal support mechanism not present in plain concrete. Premature trowelling has been proven to exhibit more fibre at the surface than properly executed trowelling. If fibres appear on the surface, stop, wait ten to fifteen minutes and start again. Correct timing will produce a smooth, even finish with minimal fibre exposure.

7 RAKE & BROOM FINISHING

Synthetic fibres are compatible with most finishes and surface treatments including pattern stamping, exposed aggregate, brooming and hand or power trowelling. Steel fibres are not recommended for pattern stamping or exposed aggregate finishes.

Burlap drags are not recommended for fibre reinforced concrete as they may lift up fibres and tear the surface.

Brooming and raking is best accomplished by pulling the broom or rake in one direction. There may be some fibres at the surface, but there is no cause for alarm. Synthetic fibres will wear away in a short time with normal traffic. Or if the slab is outside, ultraviolet light will degrade any exposed fibres. A light sandblasting or lightly applying a widespread propane torch will also remove the synthetic fibres. Steel fibres can be removed by clipping the fibre from the surface with offset nippers or wire cutters.

These steps are rarely necessary with experience fibre-reinforced concrete finishers.

8 SAW CUTTING

The final step in finishing fibre reinforced concrete is proper jointing and curing, following industry recommended guidelines. synthetic fibres and steel fibres allow for normal joint sawing operations. The concrete shall be cut a minimum of 1/4 the slab thickness for synthetic applications and 1/3 the depth for steel fibre applications. Saw cuts should be positioned following recommended guidelines.

A Soff-Cut or wet cut operation may be used to cut the control joints. A clean or new diamond tip saw blade is recommended for crisp, sharp saw cuts.

Saw cutting should be attempted at the earliest possible time on concrete first placed by the concrete contractor. A 5-foot-long cut should be attempted and evaluated for aggregate spalling and fibre ravelling before the concrete is cut further. If spalling and fibre ravelling does occur, the operator should terminate cutting and return to cut the slab thirty minutes later. This trial and evaluation process may be repeated several times depending on the ambient conditions, concrete temperature and curing environment.

Using these techniques, satisfactory results can be obtained when finishing Sika's range of synthetic and steel fibre reinforced concrete.

9 REF GUIDELINES

1. ACI Committee 544, Guide for Specifying, Proportioning, Mixing, Placing and Finishing Steel Fibre Reinforced Concrete, ACI 544.3R-93, American Concrete Institute, Farmington Hills, MI., 1993.

2. M. Harding, "Mixing, Placing, and Finishing Fibre Reinforced Concrete", Concrete Construction

10 LEGAL NOTE

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. in practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the products suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

Sika Limited
Watchmead
Welwyn GardenCity
Hertfordshire
AL7 1BQ
www.sika.co.uk

Version given by
Jeremy Francis

Phone: +44 (0) 1707 394444

Mail: francis.jeremy@uk.sika.com