

Technical Data Sheet

C O N C R E T E

Description

Topforce is a new range of macro-synthetic fibre reinforced, ready-mixed concretes, conforming to BS 8500-2 which are aimed at replacing crack-control steel wire fabric, and steel fibres.

The equivalent crack-control performance is achieved by incorporating high strength, high modulus macro-synthetic fibres in the concrete matrix.

Advantages

Financial Savings

Topforce can reduce the total construction cost by increasing site productivity and cutting overall build-time.

For on-site construction, Topforce eliminates the use of ancillary fixings (i.e. chairs and ties) and reduces labour costs associated with fixing, mechanical (cranes) and manual handling.

For pre-cast works, Topforce removes the reliance and cost of fabrication utilities, and reduces the occurrence of element breakage on delivery. With no fixing and less assembly time needed, the rate of turnover is also improved.

Safety, Health, and Environment (SHE Benefits)

There are many SHE issues associated with the delivery, storage, handling, and application of steel wire fabric. The site use of steel fibres also highlights inherent manual handling concerns.

Topforce significantly reduces the risks associated with conventional crack-control methods (i.e. potential trip hazard working at height) as the reinforcement is delivered in the concrete.

Efficient Crack Control

The crack reduction in concrete containing steel wire fabric is highly reliant on placing methods. If the steel is not positioned correctly, the level of protection is reduced.

Topforce reinforces the full depth of the slab ensuring post crack propagation is controlled without the need for a specific cover.

Residual Flexural Strength

Topforce will achieve residual (post-cracking) flexural strength ($R_{e,3}$) in excess of 30%, and can be designed to replace conventional crack-control steel wire fabric (A142, A193, A252, A393) and steel fibres.



Increased Durability

Topforce exhibits less wear and greater tolerance to impact compared to conventional concrete thus reducing the life cycle costs.

The fibres used in Topforce have a high resistance to acidic and alkaline environments, and unlike steel are not susceptible to corrosion induced by chlorides.

Plastic and Drying Shrinkage

Topforce concrete can reduce the risk of drying shrinkage cracks by redistributing the stresses as they form within the concrete. Topforce can also minimise the occurrence of plastic shrinkage cracking.

Carbon Footprint

Based on a study by one of the UK's leading environmental consultancies, ENVIROS.

Macro-synthetic fibres have at least a 70% lower carbon footprint (per unit area of concrete) when compared to crack-control steel wire fabric, and steel fibres.

Applications

Ground Supported Slabs

Improved impact and abrasion resistance makes Topforce ideal for heavy industrial applications such as waste facilities subjected to heavy loading equipment.

Topforce is suitable for external hard standings as it is less susceptible to de-icing salts that would normally attack steel reinforced concrete.

(Note: Topforce should incorporate an Air Entraining Admixture (AEA) for applications that require freeze/thaw resistance).

Other uses include:

- Industrial floors
- Commercial applications
- Retail outlets
- Recycling
- Waste transfer stations
- Roads and pathways
- Domestic floors
- Agricultural (ground supported floors for livestock)

Topforce can be brush finished. Any fibres remaining at the surface will easily wear away.

Composite Floors

Topforce can be used in composite floors on top of profiled metal decking systems.

Non-Magnetic Applications

Applications such as railways and tunnels are unable to use conventional steel reinforcement due to interference issues.

Coastal/Marine/Inland Flood Water Defence

With the elimination of corrosion associated with steel reinforcement, increased impact and abrasion resistance, Topforce is well suited for aqueous environments, whether the requirement is aesthetic or protection.

Insulating Concrete Formwork (ICF)

Can replace nominal reinforcement.

Note: Openings for doors and windows, and wall to foundation ties still require steel reinforcement.

Water-Retaining Structures

Topforce can be used for swimming pools in place of conventional crack control systems within the cover regions above conventional steel reinforcement.

Pre-cast

- Pipes and ancillary units
- Paving flags
- Revetments and staircases

Composition and Conformity

Constituent	Conformity
Cementitious material	BS EN 8500: 2006 Cement. Composition, specifications and conformity criteria for common cements.
Aggregates	BS EN 12620: 2002+A1: 2008 Aggregates for concrete.
Admixture	BS EN 934-2: 2009 Admixtures for concrete, mortar, and grout. Concrete admixtures. Definitions, requirements, conformity, marking and labelling.
Fibre	BS EN 14889-2: 2006 Fibres for concrete. Polymer fibres. Definition, specification and conformity.
Water	BS EN 1008: 2002 Mixing water for concrete. Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete.

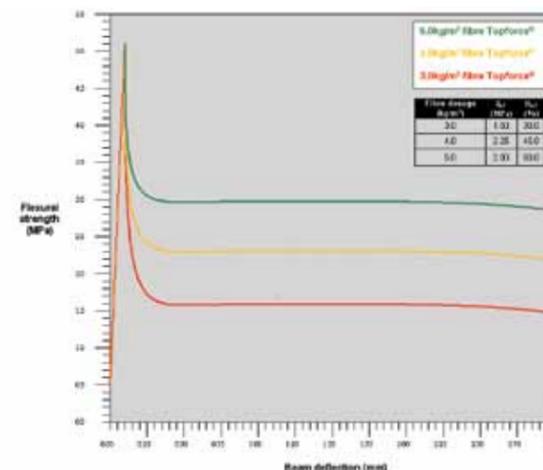
All Tarmac ready-mixed concrete plants are third party accredited to BS EN ISO 9001 through the British Standards Kitemark Scheme (KM 75822).

Technical Performance

Typical Fibre Properties

Typical fibre properties	
Relative density (kg/m ³)	0.90 – 0.92
Absorption (%)	0
Modulus of elasticity (GPa)	Up to 10
Tensile strength (MPa)	Up to 650
Melting point (°C)	150-165
Ignition point (°C)	>450

Typical Effect of Fibre Dosage on Residual Flexural Strength (R_{0.3})



Note: Based on a C32/40 concrete (Test: 150 x 150 x 450mm beams). Performance will vary depending on the grade of concrete tested.

Typical Specification Statement

To purchase Topforce, the client should disclose design parameters such as:

- Concrete compressive strength (N/mm²), e.g. C32/40
- Slab thickness (mm)
- Grade of steel wire fabric

Requirements are job specific and dependant on many variables such as:

- Ground conditions
- Excavation geometry
- Construction sequence
- Loadings
- Design methodology

The data will be used to calculate an equivalent Topforce design using established engineering formulae and submitted to specifiers.

Packaging and Delivery

Topforce is supplied in ready mixed trucks up to 8m³ or minimix trucks up to 3m³.

Placing, Compacting, and Curing

Precautions should be exercised to avoid cold joints, as there will not be sufficient continuity of the fibres across such areas.

The concrete shall be compacted to ensure full elimination of air voids. Floating/trowelling is not expected to be excessive to achieve the required surface finish. However, it is advisable to flatten the blades of the finishing tools for longer compared to conventional concrete to reduce the risk of fibre pullout.

Good curing practice should start as soon as possible after finishing to reduce the probability of plastic shrinkage. All normal curing methods are acceptable, but the use of a spray on curing membrane where appropriate, is recommended as these can be applied earlier in the construction process.

Technical Advisory Service

Tarmac employs a team of Special Product Managers who can advise and work closely with specifiers/contractors as required.

For more information please contact Tarmac's Technical helpline on 01902 382511 or email A.P.Special.Products@tarmac.co.uk.

Case Histories

Topforce is a registered trademark, and has a number of case histories relevant to specific applications. These are available from the Marketing Services Department.

Colours

Tarmac can supply a range of colours. Our suppliers offer a service to match the client's requirements.

Availability

All Topforce products are readily available across the mainland UK from Tarmac's network of ready-mixed concrete plants. The concrete is delivered to site in ready-mixed concrete trucks at a consistence suitable for the application.

Tarmac offers a unique information and advisory service for all applications and type of concrete to assist users and specifiers of concrete to solve problems and optimise the benefits available from Tarmac Ltd and its unique range of special products.

Physical Properties

All physical properties stated for Topforce are typical values and will vary depending on the hardened properties of the concrete. Please consult your local Special Products Manager for more specific requirements. This information is based on our considerable experience with these products and is given with the best of intentions to assist customers in obtaining the best performance from our products. Tarmac Ltd cannot accept any liability or responsibility of any kind (including liability for negligence) for the design of any concrete components or structure or for problems caused by the acts or omissions of third parties or by poor site practices.

Health and Safety

Fibres that remain exposed on the surface of a concrete slab should be removed to prevent risk to follow-on trades and/or the end users of the application.

Good site practice procedures should be followed at all times.

There is a significant risk of contact dermatitis and/or serious burns if the skin comes into contact with wet concrete, mortar or screed.

Wear suitable protective clothing and eye protection. Where skin contact occurs either directly or through saturated clothing, wash immediately with soap and water. If the eye comes into contact, immediately wash thoroughly with clean water. If swallowed, wash mouth immediately, and drink plenty of water.

For further information refer to Tarmac's Safety Data Sheet No. 16.

The information given in this datasheet is based on Tarmac's current knowledge and is intended to provide general notes on our products and their uses.

Tarmac Ltd endeavours to ensure the information it gives is accurate and accepts no liability for its use or its suitability for a particular application because the products are used by the third party without Tarmac's supervision. Any existing intellectual property right must be observed.

Further Information:

Please call the Technical Centre on: 01902 382511.

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