

# TECHNICAL INFORMATION

## TOPROC ES (EARLY STRENGTH)

A high early strength, high performance readymix concrete

### PRODUCT DESCRIPTION

Toproc ES is a high performance readymix concrete suitable for use in industrial, commercial and infrastructure construction where high early strength is required.

Toproc ES is a very cohesive concrete with a dense micro structure and improved bond between paste and aggregate imparting benefits including high, early and ultimate strength, reduced permeability and increased durability.

### APPLICATIONS

- Heavy industrial applications
- Airport runway repairs
- Infrastructure construction
- Structures under repair
- Any other applications requiring high early strength

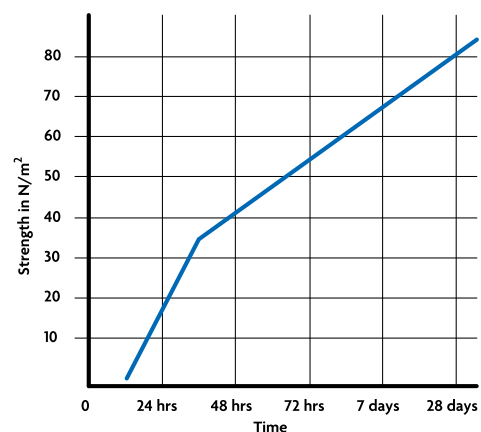
### KEY FEATURES OF TOPROC ES FRESH CONCRETE

- Easy to pump
- One pass finishing
- Increased cohesion
- Virtually no bleeding
- Less prone to segregation

### HARDENED CONCRETE

- High early compressive strength
- Improved ultimate compressive strength
- Earlier access
- Low permeability
- Improved durability
- Low water/cement ratio

Toproc ES - Typical strength development



### 24 HOUR COMPRESSIVE STRENGTH

Toproc ES achieves a minimum 24 hour compressive strength of 30N/mm<sup>2</sup> but can typically achieve in the range of 35-40N/mm<sup>2</sup>.

### 28 DAY COMPRESSIVE STRENGTH

Toproc ES achieves a minimum 28 day compressive strength of 60N/mm<sup>2</sup> but can typically achieve in the range of 75-90N/mm<sup>2</sup>.

Cube strengths based on 100mm cubes

### PERMEABILITY/DURABILITY

Due to its very cohesive nature Toproc ES allows very little, if any, bleed water to migrate to the surface. Combined with a dense micro structure it results in a concrete with low permeability.

The effectiveness of concretes to resist the ingress of water, gases, chloride/sulfate solutions and aggressive liquids depends to a high degree on their impermeability. As a consequence the low permeability of Toproc ES helps slow the ingress of these substances when compared to a typical RC32/40 concrete.

This, combined with a very low water/cement ratio means Toproc ES will improve the concrete's durability to a variety of conditions including weathering, chemical attack, abrasion and freeze/thaw attack.

### SHRINKAGE

Plastic Shrinkage – Toproc is more susceptible to plastic shrinkage cracking due to the lack of bleed water. While the polypropylene fibres in the mix will help, correct curing is essential (see curing).

Long-term Drying Shrinkage - similar to that of conventional concrete.

### PUMPABILITY

Toproc ES can be pumped more easily than conventional concretes, as the inclusion of pozzolonic materials improves the pumpable properties. Toproc ES is typically delivered at an S3 consistence.

### TYPICAL DENSITY

Approximately 2,400 kg/m<sup>3</sup>.

### TYPICAL AIR CONTENT

0.5 to 1.5%.

### PLACING, COMPACTING AND FINISHING

The cohesive nature of Toproc ES means that it releases very little, if any bleed water. The lack of bleeding means that finishing can commence immediately after compaction has been completed without having to wait for bleed water to evaporate.

If a power floated finish is not required then a 'one pass finish' can be employed to significantly speed up construction time.

Toproc ES can be vibrated by any of the conventional means but, as with all concretes, it is essential that Toproc ES is vibrated fully to ensure good compaction.

Toproc can be finished in a similar

manner to conventional concrete, except that wooden equipment (beams and floats) may drag on the surface.

Toproc ES can be laser screeded, however, we suggest the use of a reputable flooring contractor whose operators are familiar with the product and system.

Toproc can be power floated as normal, however, correct curing is essential (see curing section).

### EARLY ACCESS

Due to its high early strength Toproc ES can be lightly trafficked after 24 hours, however, if abrasion resistance is paramount it is preferable to leave the concrete for at least three days preferably seven days prior to trafficking as abrasion resistance develops over time. Curing is still essential, so a suitable high efficiency curing membrane should be considered.

### CURING

As with all concretes, proper curing is essential to ensure that all the benefits of Toproc ES are achieved. It is essential that curing should start as soon as possible, ideally within 10–15 minutes of placing to reduce the probability of plastic shrinkage cracking.

If the concrete is to be used in any sort of flatwork construction such as bridge decks, slabs etc. then the concrete should be cured for a minimum of seven days. If the flatwork needs to be trafficked earlier a suitable high efficiency grade curing membrane should be considered.

If a power floated finish is required, appropriate curing of the concrete is recommended during the interval between initial floating and application of the final trowelled finish with either a curing membrane or sheeting. A reapplication of the curing membrane after the final power trowelling is also recommended.

All normal curing methods are acceptable, but the most effective curing is best achieved by using spray-on curing membranes such as 90% efficiency resin based compounds or acrylic sealers, as these can be applied earlier in the construction process.

### PACKAGING AND DELIVERY

Toproc is supplied in readymix form:

- Readymix trucks up to 8m<sup>3</sup>
- Minimix trucks 2 to 3m<sup>3</sup>

## BESPOKE FORMULATIONS

In the past where the need has arisen to formulate a product to meet a specific application. Tarmac has worked alongside customers to achieve design requirements. Toproc ES can also incorporate macro fibres within the mix.

Please contact Tarmac's customer helpline with your specific requirements on +44 (0)800 1 218 218 or email [toproc@tarmac.com](mailto:toproc@tarmac.com)

## AVAILABILITY

All Toproc products are readily available across the mainland UK from Tarmac's network of readymix concrete plants.

The concrete is delivered to site in readymix concrete trucks at a consistence suitable for the application, but generally at a higher consistence than conventional concrete. This, together with Toproc's unique properties, makes Toproc easier to pump, place, pour etc.

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

## PHYSICAL PROPERTIES

All physical properties stated for Toproc products are typical values due to local variations in the naturally occurring constituent materials. 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 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.

## TYPICAL SPECIFICATION STATEMENT

Toproc ES conforming to BBA certificate No. 08/4547 and BS 8500-2.

The maximum aggregate size and consistence shall be agreed between the specifier and Tarmac. The concrete shall be placed, compacted and cured in accordance with current good practice, the specification for the contract and any additional requirements of Tarmac.

## OTHER TOPROC CONCRETES

Toproc ES is just one of the many formulations in the extensive. Toproc range available from Tarmac. For details of other products in the Toproc range, please refer to our website. Supporting test data can be made available upon request.

## TECHNICAL ADVISORY SERVICE

Tarmac employs a team of specialists who would be very pleased to advise or work closely with contractors as required. Our specialists are supported by a Product Development Team and Technical Services Centre.

## PRECAUTIONS OF USE

### SAFETY

There is a real danger of contact dermatitis or serious burns if skin comes into contact with wet cement mixes such as fresh 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. For eye contact, immediately wash out eyes thoroughly with clean water. If swallowed wash out mouth and drink plenty of water.