

*Shrinkage-compensated, high-strength, flowing recasting repair concrete*

# Five Star\* repair concrete



## Uses

- Repair of concrete to bridge structures to HA model specification BD 27/86
- Replacement of concrete to beams and crossheads
- Repair of car parks, buildings, balconies and stairs
- Coastal structural repairs and seawall reconstruction
- Repairing concrete columns, beams, walls and soffits
- Infill concrete and anchorage of bolts to large bolt pockets
- For use under baseplates where thick sections are required to be grouted: 75 to 500 mm

## About this product

**Five Star repair concrete** is a preblended cementitious repair concrete which complies with the Highways Agency Specification for Highway Works white book Series 1700 *Structural Concrete* and Department of Transport specification BD 27/86 for a high strength flowing concrete.

Conformity testing to BS EN 1504-3 has confirmed that **Five Star repair concrete** meets the requirements for a Class R4 repair product.

## Features and benefits

- ▲ Permanent structural repair concrete
- ▲ Contains non-reactive aggregates and a low soluble alkali cement content.
- ▲ The repair concrete can be applied to a range of thicknesses, minimum 15 mm.
- ▲ Contains RHPC & PFA to clause 1702, 5 mm non-reactive carboniferous limestone to clause 1704, microsilica and shrinkage compensating agents.
- ▲ Rapid strength development thus reducing repair possession times
- ▲ Dimensionally stable, forms an integral bond to existing concrete and restores structural integrity with proven durability
- ▲ Economical repair
- ▲ Variable application thickness providing flexibility of use
- ▲ Free-flowing recasting repair concrete allowing formation of intricate falsework
- ▲ Ideally suited in structural elements where reinforcement is congested
- ▲ Shrinkage-compensated to avoid shrinkage cracks and enhance durability
- ▲ Class 4 repair product meeting the requirements of BS EN 1504-3

## Technical data

The following test results were obtained in lab conditions at 20°C		HA spec
Working time	45 – 60 minutes	
Set time	300 minutes	
Plastic density	2200 kg/m <sup>3</sup>	
Water/cement ratio (3:3 litres per 25kg)	0.37	max 0.4
Flow trough		
at 5°C immediately after mixing	750 mm in 5 sec	750 mm in 30 sec
at 5°C 30 minutes after mixing	750 mm in 6 sec	
at 20°C immediately after mixing	750 mm in 5 sec	750 mm in 30 sec
at 20°C 30 minutes after mixing	750 mm in 6 sec	
Flow in simulated soffit and top repair	At 5°C and 20°C	Complies
Compressive strength BS 6319: Pt 2	<b>5°C</b> <b>20°C</b>	
1 day		16 N/mm <sup>2</sup>
3 days		35 N/mm <sup>2</sup>
7 days		45 N/mm <sup>2</sup>
10 days	35 N/mm <sup>2</sup>	min 29 N/mm <sup>2</sup>
28 days	—      65 N/mm <sup>2</sup>	min 50 N/mm <sup>2</sup>
Cement content	> 500 kg/m <sup>3</sup>	min 400 kg/m <sup>3</sup>
Air content	2.8%	max 7%

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## Preparation

The concrete substrate shall be adequately prepared by suitable methods to remove all defective concrete or suspect concrete by high pressure water cutting or by mechanical means, i.e. breakers, scabbling, grit blasting, etc.

The perimeter of the prepared area shall be well defined by a saw cut, avoid feather edging of the repair concrete.

All concrete shall be removed to give a minimum clear dimension of 20 mm to all exposed rebar reinforcement. The extent of the concrete removal shall be agreed with the contract supervisor or engineer.

Rust scale corrosion products and other deposits shall be removed from the exposed steel reinforcement by grit blasting or high pressure water cutting. Finish shall be to achieve second quality to BS 7079:1989 which is equivalent to Swedish Standard SA 2½ quality. Degrease with **webertec solvent** where appropriate immediately prior to pouring.

No priming of the reinforcement is required, **Five Star repair concrete** forms a good cementitious bond to the clean exposed reinforcement.

Old concrete surfaces contaminated with oil or grease will require cleaning, care must be taken to ensure all contamination and any coating is removed prior to application of concrete.

Grout-tight formwork is essential. Use a light uniform application of release agent and good quality sealed ply formwork. The formwork shall be adequately supported and fixed to resist fluid concrete pressures.

The parent concrete shall be thoroughly saturated with potable water prior to the application of the repair concrete. This may be achieved by filling the formwork with water, usually for 2 hours, then draining off the water and removal of all surplus water.

## Mixing

Use only freshly opened bags of **Five Star repair concrete** and a clean forced-action mixer of suitable volume, i.e. Daines Mixal mixer, Cretangle pan mixer or a Putzmeister P13 mixer and pump.

Charge the mixer with 3.1 – 3.3 litres of water per 25 kg bag, followed by a gradual addition of repair concrete. For optimum flow use 3.3 litres of water. Mix for 3 minutes. Mix only full bags, do not mix part bags.

**NB:** do not exceed maximum water addition of 3.3 litres water per 25 kg bag.

## Performance to BS EN 1504-3

### Test results – all intended uses

Performance characteristic	Method	BS EN 1504-3 requirement
Compressive strength	EN 12190	≥ 25 MPa
Chloride ion content	EN 1015-17	≤ 0.05%
Adhesive bond	EN 1542	≥ 1.5 MPa
Restrained shrinkage/expansion	EN 12617-4	Bond strength after test ≥ 1.5 MPa
Carbonation resistance	EN 13295	$d_k \leq$ control concrete (1.3)

### Test results – certain intended uses

Performance characteristic	Method	BS EN 1504-3 requirement
Elastic modulus	EN 13412	≥ 15 GPa
Thermal compatibility Part 1 Freeze/Thaw	EN 13687-1	Bond strength after 50 cycles ≥ 2 MPa
Coefficient of thermal expansion	EN 1770	Result = $10.5 \times 10^{-6}/^{\circ}\text{C}$
Capillary absorption	EN 13057	$\leq 0.5 \text{ kgm}^{-2}\text{h}^{-0.5}$

A full set of independent test results is available on application

## Application

The mixed concrete shall be used within 30 minutes of mixing and kept agitated prior to use.

The mixed concrete can be placed either by gravity pouring or by pumping through hoses at least 50 mm diameter. Care shall be exercised to avoid air entrapment during placing. No vibration is needed to compact the repair concrete but the formwork should be tapped with a mallet to release minor air bubbles on the surface of the formwork.

### Setting time

Setting time at 20°C is approximately 225 minutes.

### Winter working

**Five Star repair concrete** can be used down to 5°C provided cold weather working precautions are carried out. At low temperatures the strength development gain of repair concrete is greatly reduced with strengths similar to that expressed by the Sadgrove method. Striking times of formwork will be effected.

For further information please contact **Weber** Technical Services.

## Curing

Immediately after finishing, the exposed surfaces of the concrete shall be cured with wet hessian, polythene or frost blankets for at least 48 hours to prevent rapid loss of water.

The formwork shall not be removed until the repair can support the dead and imposed loads, normally 48 hours at temperatures above 15°C and 72 hours at lower temperatures.

The concrete shall then be cured with a high efficiency sprayed-on curing membrane for at least 14 days.

This membrane must be removed if it is to be overcoated, alternatively use wet hessian and tightly fitting polythene sheeting to cure the concrete.

**Protect from wind, rain and frost.**

## Packaging

**Five Star repair concrete** is supplied in 25 kg bags.

## Coverage

Yield per 25 kg bag is 12.75 litres  
Coverage per m<sup>3</sup> volume is 78 bags of **Five Star repair concrete**.

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## Storage and shelf life

When stored unopened in a dry place at temperatures above 5°C, shelf life is 12 months from date of manufacture.

## Health and safety

Contains cement (Contains chromium (VI). May produce an allergic reaction). Harmful by inhalation. Irritating to eyes and skin. Keep out of the reach of children. In case of contact with eyes, rinse immediately with plenty of water and seek medical help. After contact with skin, wash immediately with plenty of soap and water. Wear suitable protective clothing, gloves and eye/face protection.

**For further information, please request the Material Safety Data Sheet for this product.**

### Technical services

Weber's Customer Services Department has a team of experienced advisors available to provide on-site advice both at the specification stage and during application. Detailed specifications can be provided for specific projects or more general works. Site visits and on-site demonstrations can be arranged on request.

**Technical helpline**  
**Tel: 08703 330 070**  
**e-mail technical@netweber.co.uk**

### Sales enquiries

Weber products are distributed throughout the UK through selected stockists and distributors. Please contact the relevant Customer Services Team below for all product orders and enquiries.

**UK and Ireland**  
**Tel: 08703 330 070**  
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