

Shrinkage-compensated, high-strength, low-resistivity, flowing repair concrete for recasting in conjunction with cathodic protection systems

Five Star* repair concrete CP



About this product

Five Star repair concrete CP is a preblended cementitious repair concrete which fully complies with the Highways Agency Specification for Highway Works Class 29F high-strength flowing concrete. Contains non-reactive aggregates and a low soluble-alkali cement content suitable for use where cathodic protection will subsequently be used.

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

Technical data

The following test results were obtained in lab conditions at 20°C		HA spec
Working time	45 – 60 minutes	
Set time	Between 360 and 440 minutes under laboratory conditions	
Plastic density	2200 kg/m ³	
Water/cement ratio (3-6 litres per 25kg)	0.425	max 0.45
Flow trough		
at 5°C immediately after mixing	750 mm in 8 sec	750 mm in 30 sec
at 5°C 30 minutes after mixing	750 mm in 15 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 8 sec	
Flow in simulated soffit and top repair	At 5°C and 20°C	Complies
Cement content	> 600 kg/m ³	min 400 kg/m ³
Air content	3.0%	max 7%
Electrical resistivity (28 days)	7000 Ωcm (Wenner 4-pin method)	5000-15000 Ωcm

Uses

- Repair of concrete to bridge structures to HA specification
- In conjunction with electro-chemical cathodic protection systems
- Replacement of defective concrete to beams and crossheads
- Repair of carparks and buildings
- Coastal structural repairs to jetties and piers
- Repairing concrete columns, beams, walls and soffits

Features and benefits

- ▲ Excellent electrical resistivity for cathodic protection systems
- ▲ 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
- ▲ Contains RHPC and GGBS to clause 1702, 5 mm non-reactive carboniferous limestone to clause 1704, superplasticiser and shrinkage compensating agents
- ▲ Does not contain microsilica
- ▲ Total water-soluble sulphate content of concrete, SO₃, does not exceed 4%, complies with HA specification
- ▲ Complies with HA specification for use on highway structures
- ▲ Free-flowing recasting concrete allowing use in areas of congested reinforcement
- ▲ Class 4 repair product meeting the requirements of BS EN 1504-3

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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 **Five Star repair concrete CP**.

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. Temporary structural supports shall be erected as necessary and shall be left in place until the repair concrete has gained sufficient strength.

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 CP** forms a good cementitious bond to 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, followed by removal of all surplus water.

Mixing

Use only freshly opened bags of **Five Star repair concrete CP** 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 2.9 – 3.7 litres of water, per 25 kg bag, followed by a gradual addition of repair concrete. For optimum flow use 3.7 litres of water. Mix for 3 minutes. Mix only full bags, do not mix part bags.

NB: do not exceed maximum water addition of 3.7 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	≥ 45 MPa
Chloride ion content	EN 1015-17	≤ 0.05%
Adhesive bond	EN 1542	≥ 2.0 MPa
Restrained shrinkage/expansion	EN 12617-4	Bond strength after test ≥ 2.0 MPa
Carbonation resistance	EN 13295	$d_k \leq \text{control concrete (1.3)}$

Test results – certain intended uses

Performance characteristic	Method	BS EN 1504-3 requirement
Elastic modulus	EN 13412	≥ 20 GPa
Thermal compatibility Part 1 Freeze/Thaw	EN 13687-1	Bond strength after 50 cycles ≥ 2 MPa
Coefficient of thermal expansion	EN 1770	Result = $11.5 \times 10^{-6}/^{\circ}\text{C}$
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 300 minutes.

Winter working

Five Star repair concrete CP can be used down to 5°C provided cold weather working precautions are carried out. At low temperatures the strength development 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 for a minimum of 14 days; a spray-on curing membrane can be used – **webertec ritecure**. Protect repairs from frost and ice formation.

Packaging

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

Coverage

Yield per 25 kg bag is 13.0 litres
Coverage per m³ volume is 77 bags of **Five Star repair concrete CP**.

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Storage and shelf life

When stored unopened in a dry place at temperatures above 5°C, shelf life is 6 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
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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.

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