Concrete Repair and Protection

Weber Technical Mortars for the Construction Industry
About Weber

As a recognised manufacturer and innovator of easy-to-apply products in the technical mortars, facades, flooring systems and tile-fixing markets, Weber is a leading player in the construction products industry.

The natural synergy between these specialist activities enables Weber to provide integrated solutions for a wide range of projects from building renovation and refurbishment to new building developments and major civil engineering.

Weber does not sell only products but the complete solution which includes the services that go with the products; technical support and training. Based on its strong knowledge and experience of the market, the Weber training programmes meet the needs of its customers. Weber provides specifiers, developers and contractors across the board with substantial technical support, both before, during and after contract periods.

About Saint-Gobain

Weber is part of Saint-Gobain, one of the world’s leading industrial groups with activities in construction products, flat glass and packaging, high performance materials and building distribution.

Saint-Gobain is an international group employing around 193,000 people in over 64 countries worldwide. Established in France in 1665, Saint-Gobain is one of the world’s largest industrial groups, with an annual turnover of €43.1 billion.

Some of the UK and Ireland’s most respected companies and brands in the construction sector are part of Saint-Gobain, including British Gypsum, Glassolutions, Isover, PAM, Artex, Celotex, Ecophon and Pasquill. Together these businesses offer an unrivalled range of products and innovative material solutions that give architects and designers the ability to respond to the latest trends, whilst meeting the most exacting performance and legislative standards.

Weber’s Technical Mortar Range

Along with the Concrete Repair and Protection range covered in this guide, Weber also offer solutions to the Construction Market in the form of Precision Grouting, Bedding Mortars and Structural Strengthening...

Precision Grouting – Reliable transfer of loads from structure to supporting foundations is a vital element of design in any civil engineering project. Weber’s high performance Precision Grouts offer excellent dynamic load carrying capacity, are extremely durable and provide good chemical resistance.

Bedding Mortars – Weber offers a range of materials for the bedding of components in the Highway, Airport and Marine market place. These products are designed for the fast installation of components and long lasting reinstatement.

Structural Strengthening – Upgrading of buildings, bridges and structural components through the use of Fibre Reinforced Polymer (FRP) technology where high tensile strength, lightweight fibres and proven durability are utilised in the structural strengthening of concrete, masonry, metallic and timber structures.
Concrete Repair and Protection

Reinforced concrete can be a highly durable structural material requiring little or no maintenance. However, it is now recognised that without correct design, mixing, placement and curing, the durability of reinforced concrete may be impaired. The repair of concrete structures has been a key activity for over 30 years in the construction industry and Weber products have been specified as a solution from the start.

Now the causes of concrete decay are better understood, it is clear that if more care had been taken at the time of construction by following good practice and using better quality materials then far fewer repairs would be necessary now.

Concrete can be affected by causes that are physical, mechanical or chemical in nature.

- Typical physical effects are leaking of water or frost attack due to porous concrete and plastic shrinkage cracking due to poor curing.
- Typical mechanical causes are overloading of the structure or impact damage.
- Typical chemical effects include corrosion of steel, acid rain and the action of chemicals.

Weber has a wide portfolio of products designed to facilitate repair in most circumstances, ranging from handplaced materials for localised non-structural repairs, to flowable or spray solutions for mass structural replacement.

Markets & Applications

- **Highways**
  Repairs to highway structures, roads, bridges, parapets, tunnels and viaducts.

- **Buildings**
  Repairs to residential, commercial, high-rise and low-rise buildings. Fire damaged concrete structures, concrete beams, balconies, walkways, columns, walls and soffits. Protective coatings for buildings in areas of exposure.

- **Marine**
  Repairs to many types of structure subject to sea immersion, wave action, continuous wetting and drying. Sea defences, breakwaters, sea walls, cliff stabilisation, piers, jetties, lifeboat ramps, pontoons.

- **Car Parks**
  Repairs to multi-storey car park structures, concrete beams, columns, soffits and walls. Protective coatings and structural strengthening.

- **Power Stations**
  General concrete repairs, structural strengthening and encasement of steel sections, pylons, chimneys, cooling towers.
A range of ready-to-use, polymer-modified dry mix sprayed concretes, machine applied by specialist contractors to provide dense, fully compacted, homogenous repairs and protective overlays.

**weber.cem spray concretes** will restore the structural integrity, durability, appearance and fitness for purpose of a wide range of structures. They have a rapid strength gain, give high resistance to chloride ion diffusion and carbon dioxide, low permeability to water and provide excellent protection to the reinforcing steel. These products can be used with additional reinforcement to strengthen and refurbish old structures. **weber.cem spray concretes** comply with Highways Agency specifications for repairs to highway structures.

Sprayed concrete has many advantages where the repair quantities make it the most economic solution. It is very suited to large areas, provides high strengths with good early strength development.

- High early strength gains
- Strength >60 N/mm²
- Excellent abrasion resistance & bond strength
- Low water/cement ratio
- Low permeability
- Ready to use
weber.cem spray DS

weber.cem spray DS is a pre-bagged, ready-to-use, polymer-modified, cement-based structural concrete. It contains graded inert limestone aggregates and dust suppressants. The formulation has been designed especially for dry process spray application to give high strength, low rebound and wastage to maximise the application thickness.

Conformity testing to BS EN 1504-3 has confirmed that weber.cem spray DS meets the requirements for a Class R4 repair product.

• Economical - low rebound
• Safe to use and handle. Relatively low dust emission, no siliceous aggregates, no caustic accelerators
• High-build - up to 150mm thickness can be applied in one pass on vertical and overhead faces without any additional mesh reinforcement
• Low permeability to water and chlorides
• Low chloride ion diffusion: better protection of reinforced concrete marine structures

weber.cem spray RS

weber.cem spray RS is a polymer-modified, dry-sprayed concrete able to achieve early set, ideal for permanent concrete repairs where time constraints demand early strength gain. The material contains inert limestone aggregates, dust suppressants and accelerators. The formulation is designed for the dry spray process method of application with reduced rebound and maximum applied thickness.

Conformity testing to BS EN 1504-3 has confirmed that weber.cem spray RS meets the requirements for a Class R4 fast-setting repair product.

• Rapid setting allows work to continue in tidal zones, prevents wash out from tidal action or flowing water
• Economical with lower rebound than conventional spray concretes
• High-build - up to 150mm thickness can be applied in one pass to vertical faces
• Non-reactive aggregate complying with clause 1704
• Total chloride ion content does not exceed 0.05% of the weight of cement. No calcium chloride or admixtures containing chloride salts are used
**weber.cem spray CP**

**weber.cem spray CP** is a cement-based concrete mix. It contains inert limestone aggregates and dust suppressants. The formulation has been designed specially for dry process spray application to give high early strength, reduce rebound and maximise application thickness. It has low resistivity which makes it suitable for application to structures which receive cathodic protection.

Conformity testing to BS EN 1504-3 has confirmed that **weber.cem spray CP** meets the requirements for a Class R4 low resistivity repair product.

- Economical - low rebound - less wastage of materials and labour (rebound levels of about 10 - 15% on vertical faces and 25 - 30% on soffits at a thickness of 50mm can be achieved by an experienced nozzleman)
- Safe to use and handle - low dust emission, no caustic accelerators
- High-build - up to 100mm thickness can be applied in one pass on vertical faces
- Compatible with high quality structural concrete substrates
- Very low resistivity

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**weber.cem conspray**

**weber.cem conspray** is a cement-based concrete mix. It contains inert graded aggregates and dust suppressants. The formulation has been designed for dry process spray application to give rapid throughput, reduced rebound and to maximise application thickness.

- Contains 5mm inert coarse graded aggregate
- Fast throughput on large volume reinstatement jobs: over 5 tonnes per hour
- Economical - low rebound, less wastage of materials and labour
- Safe to use and handle - no caustic accelerators
- Better ultimate strength than site mixed gunite and many general purpose products

For more information please visit www.netweber.co.uk, call 08703 330070 or email solutions@netweber.co.uk
Flowable Repair Concrete

Five Star Repair Concrete
Five Star Repair Concrete CP

Large scale concrete repairs, which often have congested reinforcement configurations, require high performance recasting concretes. Weber has developed products with a proven track record spanning many years and meeting the stringent requirements of the Highways Agency specifications and other leading authorities.

Pre-blended, high flow, cementitious concrete based on rapid hardening Portland cement and non-reactive aggregates. Requiring only the addition of water, they produce high strength recasting concretes which incorporate shrinkage compensators.

Five Star Repair Concretes can be gravity fed or pumped via suitable equipment and can be used in the repair of various structures in an assortment of markets...

- Repair of concrete to bridge structures to Highways Agency specification
- Replacement of defective concrete to beams and crossheads
- Repair of car parks, buildings, balconies and stairwells
- Coastal structural repairs to jetties, piers and seawall reconstruction
- Repairing concrete columns, beams, walls and soffits
**Five Star Repair Concrete**

**Five Star Repair Concrete** is a pre-blended cementitious repair concrete which fully complies with the Highways Agency Specification for Highway Works and Department of Transport specification BD 27/86 for a high strength flowing concrete. Contains non-reactive aggregates and low soluble alkali cement content. The repair concrete can be applied to a range of thicknesses, minimum 15mm. Contains RHPC & PFA to clause 1702, 5mm non-reactive carboniferous limestone to clause 1704, microsilica and shrinkage compensating agents.

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

- Permanent structural repair concrete
- 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 repair concrete allowing formation of intricate formwork
- Ideally suited in structural elements where reinforcement is congested
- Shrinkage-compensated to avoid shrinkage cracks and enhance durability

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**Five Star Repair Concrete CP**

**Five Star Repair Concrete CP** is a pre-blended 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 low soluble-alkali cement content suitable for use where cathodic protection will subsequently be used. Contains RHPC & GGBS to clause 1702, 5mm non-reactive carboniferous limestone to clause 1704, super plasticiser and shrinkage compensating agents. Does not contain microsilica.

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

- 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
- Total chloride content does not exceed 0.05% of the mass of cement
- 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, allowing use in areas of congested reinforcement

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Hand Placed Repair Mortars

weber.cem lightweight
weber.cem HB30
weber.cem HB40
weber.cem bondcoat

Hand placed materials used in patch repairs are polymer-modified to give additional impermeability and a degree of flexibility. They are available in several grades of strength are high-build and can be used to level and protect concrete. Mortars are always applied onto a bonding coat that contains a corrosion inhibitor to reduce the incipient anode effect at the patch perimeter.

- Easy to apply
- Pre-blended eliminating site mixing errors and variations in quality, availability and grading of local cements and aggregates, just add clean water
- High build mortars to repair building facades
- Overhead and vertical repairs to soffits, decks and columns,
- Repair of voids and honeycombed areas
- Repairs to bridge and highway structures
weber.cem lightweight

**weber.cem lightweight** is a polymer-modified, cementitious mortar mix, with specially selected lightweight fillers. Suitable for both soffit and vertical repairs in situations where high-build replacement with conventional concrete is impractical.

- High-build up to 75mm in soffit patch repairs, without formwork
- Excellent adhesion to well prepared concrete
- Formulated to comply with the requirements of BS EN 1504-3 as a R2 mortar
- Can be overcoated with weber.cote anticarbonation coatings for optimum protection of reinforced concrete

weber.cem HB30

**weber.cem HB30** is a single-component, polymer-modified, high-build cementitious mortar, designed for concrete repairs to facades where high compressive strength is not the major consideration. A lightweight, low-permeability, medium-strength mortar suitable for both soffit and vertical repair situations.

- High-build properties – up to 100mm vertically and 75mm overhead, without formwork
- Achieves 30 N/mm² in 28 days
- Unique shrinkage compensation system provides long-term dimensional stability. Less than 0.02% shrinkage at 28 days
- Contains fibres and polymers
- Low permeability to water, carbon dioxide and chlorides
- Formulated to comply with the requirements of BS EN 1504-3 as a R3 mortar

weber.cem HB40

**weber.cem HB40** is a single-component, polymer-modified, high-build cementitious mortar, designed for structural concrete repairs. A lightweight, low-permeability, high-strength mortar for both soffit and vertical repair situations. The mortar is suitable for repairs to bridges and other structures as specified by the Department of Transport.

- High-build properties – up to 75mm vertically and 50mm in a soffit repair, without formwork
- Achieves 40 N/mm² in 28 days
- Unique shrinkage compensation system provides long-term dimensional stability. Less than 0.02% shrinkage at 28 days
- Contains fibres and polymers
- Low permeability to water, carbon dioxide and chlorides
- Formulated to comply with the requirements of BS EN 1504-3 as a R3 mortar

weber.cem bondcoat

**weber.cem bondcoat** is a single-component polymer-modified, cementitious bonding aid and steel reinforcement primer for use with the weber.cem range of repair mortars and new to old concrete.

- High initial grab to improve the build of the repair mortar and promote the bond to the concrete
- This product has been formulated to comply with the requirements of BS EN 1504-3
- Excellent adhesion
- Cementitious, contains no solvents

For more information please visit www.netweber.co.uk, call 08703 330070 or email solutions@netweber.co.uk
Concrete Protection

weber.cote smooth
weber.cote EC
weber.cote primer

Anti-carbonation coatings provide protection of both repaired and unrepaired areas, designed to offer low permeability to carbon dioxide but adequate permeability to allow the escape of water vapour.

weber.cote anti-carbonation coatings are based on polymer dispersions formulated to give a film thickness in the range 150 to 500µm to provide a two-coat barrier. The thicker elastomeric coatings have crack-bridging capability and are essential for protecting structures where some movement is expected.

weber.cote coatings are exceptionally durable with a minimum life expectancy of 15 years and can be applied to most building materials by brush, roller or spray...

• Concrete
• Blockwork
• Masonry
• Renders
**weber.cote smooth**

*weber.cote smooth* is both protective and decorative - available in a selection of colours.

- *weber.cote smooth* may be applied to brickwork for decorative purposes
- Resistant to chloride ion ingress
- Coatings allow vapour diffusion
- Formulated to comply with the requirements of BS EN 1504-2

**weber.cote EC**

*weber.cote EC* is an aqueous exterior coating providing a high-build, protective, elastomeric and decorative finish to exposed concrete and other surfaces.

- High-build: 0.5mm in thickness, thicker than most other coatings
- Better resistance to movement
- Dynamic crack bridging capability
- Allows water vapour diffusion
- Available in a range of colours with good colour retention
- Formulated to comply with the requirements of BS EN 1504-2

**weber.cote primer**

*weber.cote primer* is a low-viscosity surface sealer and stabiliser formulated to penetrate into the surface of permeable, dusty substrates and to consolidate them. Used as a treatment against efflorescence or as a foundation for further decoration.

- Prevents surface dusting & grime penetration
- Resists the penetration of water droplets and salt solutions
- Colourless & vapour permeable solution, allowing substrates to breathe

For more information please visit www.netweber.co.uk, call 08703 330070 or email solutions@netweber.co.uk
Case Studies
In the refurbishment of Chertsey Lock, on the River Thames, Weber supplied high specification weber.cem spray DS structural repair concrete.

After removal of the concrete, resin injection works to 200 linear metres of cracked walls was carried out. The freshly sprayed walls were dragged back with a feather edge rule to level the material and lightly sprayed with water after the initial set of around one hour, to provide a good surface for the final pass of 30-40mm of weber.cem spray DS. A further process of levelling was required before sealing the surface to the specified finish.

weber.cem spray DS has been especially designed for dry process spray application to give high early strength in 2 – 3 hours, reduced rebound and maximum application thickness.

Deansbrook Viaduct was badly damaged in April 2011 when fire broke out in a scrap yard beneath. Concrete repairs, parapet and bearing replacement, and new bridge joints were essential to ensure the continued safety of the structure.

The viaduct was constructed with reinforced precast concrete beams and when subjected to the severe heat, the soffits of the concrete beams spalled and delaminated. The gaps that formed between the beams were filled with weber.cem spray DS, structural repair concrete which is ideally suited for the repair of fire damaged concrete structures.

weber.cem spray RS, was used where a more rapid strength development was required, it is particularly valuable when application is hampered by restricted access and difficult time constraints.

The installation of temporary bearing props required the use of weber.tec EP mortar, a high-strength epoxy resin mortar for repairs, bedding and fixing. This high performance mortar is stronger than concrete in less than 24 hours.
Concrete balconies and walkways were cast post-war onto steel beams using the filler joist form of construction. The spalled concrete from around these beams had to be removed and replaced by a high build polymer-modified mortar. After exposing and cleaning the steel joists, weber.cem HB30 hand applied mortar was bonded with the dual function weber.cem bondcoat which was painted on the beams to provide corrosion protection. A levelling coat of weber.cem fairing coat was applied over the soffits followed by a twin coat application of weber.cote smooth anti-carbonation and decorative coating.

The high performance weber.cem spray RS has been used in the vital repair of the sea wall fortification of the Outer Bight. With a twice-daily battering by the tides, this impressive Victorian wall has been subjected to enormous hydraulic power over its 100-year life. Remedial action was undertaken using the rapid sprayed concrete weber.cem spray RS which is ideal for permanent concrete repairs where time constraints - in this case the tides, demand early strength gain. Initial set is achieved in just 15 minutes and in six hours a compressive strength of 10-15N/mm² is achieved. This prevents washout from the next tidal flow. When correctly mixed and applied, a depth of up to 150mm of weber.cem spray RS can be achieved in a single application.
Project: Midland Links R173

Product: Five Star Repair Concrete CP
weber.cem spray DS

Client: Highways Agency
Contractor: Interserve (Concrete Repairs)
Volker Laser (CP Installation & Overlay)

The elevated motorway sections of the M5, M6 and M54 handle one of Britain’s busiest motorway routes in the heart of the Midlands. These six lane motorways are constructed as elevated viaducts to avoid the existing road and canal networks below. These structures have been plagued with problems relating to the condition of the concrete cross head beams and soffits. Delamination of the concrete is widespread and steel reinforcement has corroded unabated for a number of years.

Working in conjunction with the Highways Agency, Weber specified Five Star Repair Concrete CP, a flowable, micro concrete suitable for the reinstatement of defective concrete which fully complies with the Highways Agency Area 9 specification class 29F repair concrete. weber.cem spray DS was also used to form an overlay to the titanium ribbon cathodic protection system.

These products were specified inline with The Highways Agency’s requirement to include cathodic protection to any repairs to increase the life span of the structure and improve the whole life costs of the repair.

Project: Slough Cooling Towers

Products: weber.cem bondcoat
weber.cem HB30
weber.tec force aramid sheet
weber.tec force EP bonding adhesive
weber.tec EP primer

Client: Scottish & Southern Energy
Contractor/Applicator: Bierrum International Ltd

Slough was the first privately owned power station and an early innovator in CHP (Combined Heat & Power) supplying steam to heat factories and commercial units all over the industrial estate. It now has gas fluidized bed reactors and can use waste paper and plastics collected on the estate as fuel.

The concrete shells of the cooling towers needed a structural upgrade as part of the maintenance program in order to prolong their service life. Surface repairs were carried out using weber.cem bondcoat primer and weber.cem HB30 high build hand placed repair mortar. Structural reinforcement to the outer shell was provided by the Weber Composite System based on the fibre wrap technique. After cleaning the concrete, the weber.tec force EP primer was applied followed by the weber.tec force EP bonding adhesive and several layers of the weber.tec force aramid sheet.
Technical Support and Services

**Weber** has built a reputation for its technical support, both at design and on site during the application programme.

Qualified civil engineers and experienced specialists are available in the field to provide important design and preparation advice to specifier and contractor and support to applicators as the project progresses.

While these teams can assist when problems develop, their main purpose is to address issues vital to the successful completion of a project before the problems occur and assist all involved in reaching the ‘right first time’ goal.

Training

Based on its strong knowledge and experience of its market, the **Weber** training programmes meet the needs of its customers. **Weber** has invested in dedicated training facilities which offer the opportunity for both theoretical and practical training with conference room and purpose designed practical areas.

One-day courses for training on repair and maintenance techniques are undertaken at our Flitwick head office. Subjects include structural concrete repair, bedding, grouting and composite strengthening.

Interest in the availability of training should, in the first instance, be directed to your local Sales Manager or **Weber** direct on 08703 330070 or email: mail@netweber.co.uk

Recognised & Recommended Applicators

Experienced labour is more and more difficult to locate, especially in the application of technical products where the standard of work left reflects directly on specifier indemnity. **Weber** will put specifiers and clients in touch with specialist applicators that have shown they can produce good quality work. A selection of Recognised and Recommended Applicators can be supplied for major projects detailing their range of specialities, skills and resources, all will have experience in successfully applying **Weber** materials.
Quality Assurance & Guarantees

Totally committed to quality, customer service and the ongoing development of high performance materials, Weber provides a Ten Year Materials Guarantee. The Weber Ten Year Guarantee covers all Weber products as long as they have been applied in accordance with the company’s specification, instructions and good working practice. This guarantee does not affect your statutory rights.

Quality Assurance in manufacture is maintained through the use of modern plant and stringent quality testing. All facilities have regularly monitored quality systems and procedures in place and Weber has made considerable investment in achieving and maintaining the highest possible standards available. BS EN ISO standards are an important measure and control of the company’s determination to follow these key drivers. All sites currently operate to BS EN ISO 9001:2000 and BS EN ISO 14001.

Standards

As of 1st Jan 2009 BS EN 1504 became the standard to which all concrete repairs & protection projects must be specified. Weber Concrete Repair and Protection products listed in this guide have all been tested and adhere to the industry requirement of BS EN 1504 standard (Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity).

A number of Weber repair concrete products also comply with the Highways Agency Specification.

Sustainability

Weber takes the issue of sustainable development very seriously. In the UK and Ireland, we approach sustainable development in line with the Group’s global strategy, but tailored to local requirements and circumstances. As part of the world leader in designing, manufacturing and distributing construction materials, we are committed to meeting some of the most fundamental challenges faced by the world today.

These are:
• Reducing energy consumption
• Limiting our impact on the environment
• Creating a new generation of buildings which are safe, comfortable and energy efficient.

Weber is continually investigating innovative concepts for materials and exploring methods of production that are aimed at reducing its impact on the world’s natural resources and involve lower risk to applicators in use.
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