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construction solutions

Ultra-rapid setting, polymer-modified dry-spray concrete

webercem spray RS

About this product

webercem spray RS is a ready-to-use, polymer-modified, dry-sprayed concrete able to achieve very rapid early set, ideal for 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 excellent sprayability. Conforms with BS EN 1504-3 as a Class R4 repair product.

Technical data

The following test results were obtained from actual sprayed panels in accordance with EFNARC Specification for Sprayed Concrete and SCA Guidelines and tested at 20°C. The values given below are indicative of typical properties that are achievable on sprayed material in good conditions by an experienced specialist spray contractor

Physical properties

Dry Density	Approx 2250 kg/m^3
Hardening time	2 minutes
Initial set	10 mins at 20°C, 15 mins at 10°C
Electrical resistivity (4-point Wenner probe)	Dry condition: 203 kΩ.cm, 28day immersion: 96 kΩ.cm
Initial Surface Absorption (ISAT) BS 1881-208	Requirement for low absorption: < 0.10 ml/m^2/s in 60 mins, Result 0.09 ml/m^2/s
Apparent Chloride Ion Diffusion Coefficient (Vinci Technology Centre TP 6120/88/1811)	4.95 x 10^{-13} m^2/s at 20°C
Chloride absorption (Profile grinding Vinci Technology method)	0.8% Cl^- at 2 mm depth, 0.05% Cl^- at 10 mm depth
Oxygen Diffusion Coefficient (Vinci Technology Centre TP 1303/90/4672)	3.74 x 10^{-7} m^2/s
Carbon Dioxide Diffusion (DCO_2)	DCO_2 = 1.18 x10^{-6} cm^{2}s^{-1}
Carbon Dioxide Diffusion	Coefficient μ = 104,000
Carbon Dioxide Diffusion	Equivalent air layer thickness S_D = 229 m
Carbon Dioxide Diffusion	Equivalent concrete thickness S_C = 57 cm

Mechanical properties

Compressive strength on cored samples BS EN 12504-1:2009, tested at 20°C	24 hours	30 MPa
	3 days	37 MPa
	7 days	40 MPa
	28 days	45 MPa

Uses

- Rapid repairs to structures within tidal zones
- Repairs to dock walls
- Repairs to coastal structures
- Structural repairs to jetties, piers, sea walls, quays and docks
- Repairs to river bridge abutments or piers
- Primary linings to underground workings
- Structural repairs to concrete beams, columns and soffits
- Repairs to railway bridge and viaduct soffits

Features and benefits

- Rapid setting concrete allows work to continue in tidal zones
- Rapid set prevents wash out from tidal action or flowing water
- Economical with low rebound
- High-build – up to 150 mm thickness can be applied in one pass to vertical faces
- Good adhesion to concrete substrates
- Non reactive aggregate complying with HA 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
- Good resistance to salts absorption

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Preparation

As with all repairs and applications it is essential to apply to a clean, sound surface free from all grease, oil, dust and loose material.

Concrete
Concrete substrates must be adequately prepared by a suitable mechanical method such as scabbling, grit blasting, water jetting or needle gunning, or by such other means as appropriate. Concrete must be carefully prepared to give a clean, freshly-exposed surface. The outer limits of concrete patches should be cut square to avoid feather edges.

Old concrete surfaces contaminated with oil or grease must be cleaned with a suitable detergent. Care must be taken to ensure that the oil or grease is removed from the surface and not simply spread over a larger area.

Steel Substrates
Reinforcing bars should be exposed leaving a clear gap at least 25mm behind the bars to allow for full encapsulation. Steel bars should be free of loose rust and grease. Ideally they should be grit blasted to a uniform grey metal finish to achieve first quality to BS 7079-A1 followed by degreasing with a suitable solvent.

Additional mesh reinforcement
Where there are no exposed bars and where the thickness of the sprayed concrete is 50mm or greater, then mesh reinforcement must be provided. Mesh helps to evenly distribute stresses due to thermal movement or shrinkage and reduces the risk of cracking especially on corners. The mesh should be designed and fixed in accordance with the guidelines of the *Code of Practice for Sprayed Concrete* published by the Concrete Society.

Reducing suction
Before using **webercem spray RS**, the concrete substrate must be thoroughly pre-wetted for at least 30 minutes and then all surplus water removed. Water from the spray nozzle followed by high pressure air is the method commonly adopted.

Application

Guidelines on the method of working are detailed in the *Code of Practice for Sprayed Concrete* published by the Concrete Society and should be strictly observed.

In addition, request the Weber Technical Information Note on the best practice for using webercem spray RS.

webercem spray RS should be emptied from the bags directly into the hopper of the dry process spraying machine. The equipment should be balanced so as to produce a steady stream of material with minimal pulsing.

The amount of water added at the spraying nozzle will be controlled by the nozzleman –

too low an addition will increase rebound and dust emission; too wet a mix will slump. The correct amount of water can be judged by the appearance of the sprayed concrete; any glossiness of the surface should be avoided.

Note that **webercem spray RS** has a lower water demand than **webercem spray DS** and will require less water. Keep the water content as low as possible

In case of a long delay between applied coats of the sprayed concrete, the surface of the newly applied hardened concrete should be water jetted using maximum air pressure and water flow through the nozzle to ensure that any laitance and all weak or loose material has been removed.

The surface should be allowed to drain before proceeding with the next coat.

webercem spray RS can be applied down to 15 mm thickness but, because of the higher cement content, (due to aggregate loss through rebound) there is the likelihood of greater shrinkage. The recommended minimum thickness is 25 mm. The recommended minimum thickness for protection over steel is 40 mm.

Finishing
This material will set quickly and any finishing must take place within 15 minutes of application.

We recommend an 'as sprayed' finish is used with **webercem spray RS**.

Curing
Proper curing is essential to maintain the strength development. As the **webercem spray RS** is rapid setting, it develops an exotherm that can drive off water that is needed for full hydration. This water needs to be replaced by curing. The best method for curing this product is to spray the surface with clean water as soon as possible as concrete spraying has been finished. On large areas, the water should be applied as soon as the concrete hardens, in sections rather than waiting for the whole area to be completed.

Where possible and where site restrictions are not a hindrance, water can be applied by direct spray at intervals of about 30 minutes or by spray bar, for at least 2 hours after completion of spraying.

In summer conditions, protect from direct sunlight and warm drying winds and protect from frost in winter.

Further details on curing and protection are available from the Weber Technical Services office.

Performance to BS EN 1504-3

Test results – all intended uses

Performance characteristic	Method	BS EN 1504 requirement	Test result
Compressive strength	EN 12190	≥ 45 MPa @ 28d for Class R4	> 45 MPa
Chloride ion content	EN 1015-17	< 0.05% by mass of sample	0.01%
Adhesive bond	EN 1542	≥ 2.0 MPa for Class R4	2.2 MPa
Carbonation resistance	EN 13295	d_k < control concrete (MC 0.45)	Zero carbonation at 14 days and 47% of control at 56 days

Test results – certain intended uses

Performance characteristic	Method	BS EN 1504 requirement	Test result
Elastic modulus	EN 13412	≥ 20 GPa	28.5 GPa
Capillary absorption	EN 13057	≤ 0.5 ($kg.m^{-2}.h^{-0.5}$)	0.37 ($kg.m^{-2}.h^{-0.5}$)
Freeze/thaw resistance	BS EN 13687-1	Bond ≥ 2.0 MPa for Class R4	Bond 2.2 MPa
Chloride ion ingress	EN 13396	Declared value	Control 0.023% no immersion Test 0.029% at 10 mm depth after 6 months

See next page for Packaging, Coverage, Storage, Health and Safety.

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Packaging

webercem spray RS is supplied in 25 kg polylined paper bags.

Coverage

Approximately 11.5 litres per 25 kg bag. An allowance must be made for rebound and wastage.

Storage and shelf life

Store the product in a dry covered enclosure off the ground at temperatures above 5°C and protect from frost, rain and high humidity. This product has a shelf life of 6 months from date of manufacture. In marine applications which require ultra-rapid setting to resist washout and salts ingress, the product should be used within 3 months.

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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