Fosroc® Renderoc DS

constructive solutions

Polymer modified, fibre reinforced, low rebound, dry spray repair mortar conforming to the requirements of BS EN 1504-3 Class R4

Uses

Renderoc DS is a dry spray material designed for concrete repairs to buildings, bridges, tunnels and marine structures such as culverts. It can be used for both isolated and large area repairs to beams, columns and panels. In addition it can be used as wide scale overlay system to increase cover to the reinforcement.

Advantages

- Low rebound
- Can be applied at 3°C and above
- High resistance to Carbon Dioxide
- Excellent bond to concrete
- Available in 25 and 500kg bags, 1000kg sacks

Description

Renderoc DS is supplied as a ready to use blend of dry powders which is formulated for application using the dry spray process.

The material is based on Portland cements, graded aggregates silica fume, chemical additives and polymer modifiers, providing a spray mortar with low rebound and good handling characteristics. The low water requirement ensures good strength gain and long term durability.

Builds of up to 150 mm vertically and 90 mm overhead can be achieved in a single application. Greater thicknesses can be achieved by multiple applications.

Specification clause

The repair mortar shall be Renderoc DS a one component polymer modified cementitious dry spray mortar, conforming to the requirements of BS EN 1504-3 Class R4. It shall be able to achieve a build thickness of up to 150mm on a vertical surface and 90mm on an overhead surface. The cured mortar shall achieve a compressive strength of 60 MPa at 28 days and a drying shrinkage of <300 microstrain at 7 days. The product shall be mixed, applied and cured in accordance with the manufacturer's written instructions to a correctly prepared substrate.

Standards compliance

Renderoc DS complies with class R4 according to BS EN 1504-3 repair principals 3.3 and 4.4

Renderoc DS conforms to the requirements of Highways England, Standards for Highways, Specifications for Highways Works, clauses 5703, 5704, 5717 (Spray Applied Concrete Repair Materials) and 1704.5 (Control of Alkali-Silica Reaction).

Renderoc DS complies with LU Standard 1-085 'Fire Safety Performance of Materials'.

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Renderoc DS

EN 1504-3 Structural and non structural repair methods 3 and 4

Compressive strength	Class R4 (>45 MPa)
Chloride ion content	<0.05%
Adhesion strength by pull-off test	≥ 2.0MPa
Thermal compatibility: freeze thaw cycling with immersion	≥ 2.0MPa
Carbonation resistance	Passes
Elastic modulus	≥ 20 GPa
Reaction to fire	Class A1
Dangerous substances	Complies wtih 5.4
Capillary absorption (water permeability)	≤ 0.5kg / $m^{-2}.h^{-0.5}$

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Properties

The following results were obtained at a temperature of 20°C.

Test method	Standard	EN 1504 R4 Requirement	Result
Compressive Strength	EN 12190:1999	≥ 45 MPa	@ 1 Day 20 MPa @ 7 Days 45 MPa @ 28 days 60 MPa
Bond strength by pull off:	EN 1542:1999	≥ 2.0 MPa	2.7 MPa
Chloride ion content:	EN 1015-17:2000	≤ 0.05 %	0.02%
Freeze thaw cycling:	EN 13687-1:2002	≥ 2.0 MPa	2.9 MPa
Resistance to carbonation d_k	EN 13295:2005	d_k ≤ ref concrete	Complies
Elastic Modulus in Compression	EN 13412	≥ 20 GPa	28.6 GPa @28 Days
Fire rating	EN 1504-3 cl. 5.5		Class A1 Non-Combustible
Setting time	BS 4551 Pt 14:1980	-	Initial set: 3.5 hours Final set: 5.0 hours
Fresh wet density		-	Nominally 2200 kg/m^3
Shrinkage **25 x 25 x 285 prisms,** **20 °C, 55% RH**		-	< 300 microstrain @ 7 days
Alkali reactive particles	Method TI-B 52	-	≤ 1.0 % vol%
Capillary absorption	EN 13057	≥ 0.5 kg/ m^{-2}/h$^{-0.5}$	0.41 kg/ m^{-2}/h$^{-0.5}$
Resistivity	-	-	28 - 30000 ohm cm
Coefficient of thermal Expansion	-	-	15 x 10^{-6} /°C
Chemical resistance		-	The low permeability of Renderoc DS retards chemical attack in aggressive environments. The cured mortar restricts permeation of acid gases, waterborne chloride ions and oxygen.
Build Characteristics **Minimum thickness:** **Overhead:** **Vertical:**	 - - -	 - - -	 10 mm Up to 90 mm Up to 150 mm

Clarification of property values: The typical properties given are derived from laboratory testing. Results derived from field applied samples may vary

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Application instructions

Preparation

Clean the surface and remove any dust, unsound or contaminated material, plaster, oil, paint, grease, corrosion deposits or algae. Where breaking out is not required, i.e. concrete is sound and of good quality, but cover is to be increased, roughen the surface and remove any laitance by mechanical means. It will still be necessary to cut back the perimeter to a depth of 10 mm so that the repair patch may be 'toed-in' and finished flush with the surrounding concrete.

Oil and grease deposits should be removed by steam cleaning, detergent scrubbing or the use of a proprietary degreaser. The effectiveness of decontamination should then be assessed by a pull-off test.

Expose fully any corroded steel in the repair area and remove all loose scale and corrosion deposits. Steel should be cleaned to a bright condition paying particular attention to the back of exposed steel bars. Abrasive blasting, hydrodem equipment or powered mechanical scraping is recommended for this process.

Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water immediately after abrasive-blasting to remove corrosion products from pits and imperfections within its surface.

Refer to HSE information sheet CIS36 Rev 2 regarding control of exposure to construction dust, available at www.hse.gov.uk.

Reinforcing steel priming

Extra protection to the reinforcing steel can be achieved by application of one full coat of Nitoprime Zincrich Plus and allowing to dry before continuing. If any doubt exists about having achieved an unbroken coating, a second application should be made, and again, allowed to dry before continuing.

Substrate preparation

Soak the prepared concrete surface thoroughly, allowing surplus water to drain off.

Exposed steel reinforcing bars should be firmly secured to avoid movement during the application process as this will affect mortar compaction, build and bond.

Application

Renderoc DS should be applied by trained applicator. The product should be emptied from the bags directly into the hopper of the dry spray process machine. The amount of water added should be controlled by the nozzleman. Too little water will increase rebound and dust emission, too wet a mix will slump.

If sagging occurs during application to vertical or overhead surfaces, the Renderoc DS should be completely removed and re-applied at a reduced thickness on to the correctly prepared substrate.

Finishing

Renderoc DS is finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats, or damp sponges may be used to achieve the desired surface texture. The completed surface should not be overworked.

Low temperature working

Normal precautions for winter working with cementitious materials should be adopted. should not be applied at an air / substrate temperature of 3°C and falling. At a static 3°C, or 3°C and rising, application may proceed.

High temperature working

At ambient temperatures above 35°C, the material should be stored in the shade.

Curing

Renderoc DS is a cement-based mortar. In common with all cementitious materials, Renderoc DS must be cured immediately after finishing in accordance with good concrete practice, i.e. using Concure WB, Fosroc Cure B, wet hessian or polythene. In cold conditions, the finished repair must be protected from freezing.

If the finished surface is to be overcoated then Nitobond AR should be used in lieu of Concure WB and Cure B.

Cleaning

Renderoc DS should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Equipment used with Nitoprime Zincrich Plus should be cleaned with Fosroc Solvent 102.

Estimating

Supply

Renderoc DS:	25 kg bag 500kg and 1000kg sacks
Nitoprime Zincrich Plus:	1.9 ltr and 800 ml cans
Fosroc Solvent 102:	5 and 25 litre tins

Coverage and yield

Renderoc DS:	Approx. 12.5 litres / 25 kg bag (approx. 80 bags/m^3)
Nitoprime Zincrich Plus:	8 m^2/ litre

Notes: The actual yield per bag of Renderoc DS will depend on the water addition during application. The coverage figures are theoretical — due to wastage factors and the variety and nature of possible substrates, practical coverage figures will be reduced.

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Limitations

Renderoc DS should not be used when the temperature is 3°C and falling. The product should not be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour. If any doubts arise concerning temperature or substrate conditions, consult the Technical Services Department.

Storage

The product has a shelf life of 12 months from the date of manufacture if kept in a dry storage in the original, unopened bags.

Store in unopened bags in cool dry internal conditions. If stored at high temperatures and/or high humidity conditions the shelf life may be reduced.

Precautions

Health and safety

For further information refer to the appropriate Safety Data Sheets available at www.fosroc.com.

Fire

Renderoc DS is non-flammable.

Nitoprime Zincrich Plus and Fosroc Solvent 102 are flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO_2 or foam. Do not use a water jet.

Flash points

Nitoprime Zincrich Plus:	41°C
Fosroc Solvent 102:	33°C

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