

# Fosroc® Renderoc S

## High performance concrete reinstatement mortar conforming to the requirements of BS EN 1504-3 Class R4

### Uses

For the reinstatement of reinforced concrete where low permeability characteristics are required and where high compressive strength and abrasion resistance is a consideration. Where compatibility with lower strength concrete is required, Renderoc HB30 should be used.

Renderoc S has been specifically developed for the repair of large areas of concrete and also localised patch repairs.

Where high build vertically and overhead is required Renderoc HB30 or Renderoc HB45 should be used.

Renderoc S is suitable for repair methods 3.1, 3.3, 4.4, 7.1, 7.2 as defined by BS EN 1504-9.

### Advantages

- Maximum compatibility with concrete of compressive strength 30 - 60 MPa
- High abrasion resistance
- Polymer-modification provides extremely low permeability to water, carbon dioxide and chlorides
- Exceptional system of shrinkage compensation provides long-term dimensional stability
- Can be applied quickly and efficiently by wet spraying
- One component, pre-bagged to overcome site-batched variations
- Contains no chloride admixtures

### Description

Renderoc S is supplied as a ready to use blend of dry powders which requires only the site addition of clean water to produce a highly consistent, repair mortar.

It is based on Portland cements, graded aggregates and chemical additives providing a mortar with good handling characteristics while minimising water demand. The low water requirement ensures good strength gain and long-term durability.

Renderoc S has been specifically engineered for vertical or horizontal use. It can be applied up to 10 mm thickness in vertical locations and up to 100 mm thickness in horizontal locations in a single application. Thicker sections can be built up in layers. Thicknesses vertically greater than 10 mm can be achieved by spray application.

For horizontal trafficked locations individual bays should not exceed 4 m<sup>2</sup> in area.

Renderoc S can be quickly and efficiently applied by the wet spray technique. Consult the local Fosroc office for further information.

The material should not be applied at less than 5 mm thickness.


## Specification Clause

The repair mortar shall be Renderoc S a one component polymer modified high build cementitious mortar conforming to the requirements of BS EN 1504-3 Class R4

The cured mortar shall achieve a compressive strength of 55 MPa at 28 days and a drying shrinkage of < 300 microstrain at 7 days.

## Standards compliance

Renderoc S complies with the classification R4 according to EN1504-3, repair methods 3.1, 3.3, 4.4, 7.1 and 7.2.

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Renderoc S	
EN 1504-3: Structural and non-structural repair methods 3, 4 and 7	
Compressive strength	≥45 MPa
Chloride ion content	≤ 0.05%
Adhesive strength by pull-off test	≥ 2.0 MPa
Thermal compatibility: freeze-thaw cycling with immersion	≥ 2.0 MPa
Carbonation resistance	$d_k \leq$ control concrete
Reaction to fire	Class A2 s1 d0
Dangerous substances	Complies with 5.4

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## Properties

The following results were obtained at a water : powder ratio of 0.11 and a temperature of 20°C unless otherwise stated.

Test Method	Standard	EN 1504 R4 Requirement	Test Result
Compressive strength	EN 12190:1999	$\geq 45$ MPa	@ 1 Day 20 MPa @ 28 Days 55 MPa
Bond strength by pull off:	EN 1542:1999	$\geq 2.0$ MPa	2.1 MPa
Chloride ion content:	EN 1015-17:2000	$\leq 0.05$ %	0.03%
Freeze thaw cycling:	EN 13687-1:2002	$\geq 2.0$ MPa	2.0 MPa
Resistance to carbonation $d_k$	EN 13295: 2005	$d_k \leq$ ref concrete	Complies
Elastic Modulus in Compression	EN 13412	$\geq 20$ GPa	37 GPa
Fire rating	EN 13501-1	-	Class A2 s1 d0 Non-Combustible
Flexural strength	BS 6319 Pt 3: 1990	-	13.8 MPa @ 28 days
Setting time	BS 4551 Pt 14:1980	-	Initial set: 3 hours Final set: 5 hours
Fresh wet density	-	-	Nominally 2150 kg/m <sup>3</sup>
Shrinkage 25 x 25 x 285 prisms, 27 °C, 55% RH	-	-	< 300 microstrain @ 7days
Alkali reactive particles	Method TI-B 52	-	$\leq 1.0\%$ vol %
Chemical resistance	-	-	The low permeability of Renderoc S severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen.
Build Characteristics hand applied Minimum thickness: Max. horizontal thickness per layer: Max. vertical thickness per layer:			5mm Up to 100mm Up to 10mm

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

## Application instructions

### Preparation

\*Saw cut the edges of the repair to a depth of at least 5 mm to provide a square edge. Break out the complete repair area to a minimum depth of 5 mm up to the sawn edge.

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, roughen the surface and remove any laitance by light scabbling or abrasive-blasting.

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 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 regarding control of exposure to construction dust, available at [www.hse.gov.uk](http://www.hse.gov.uk)).



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## Reinforcing steel priming

Apply one full coat of Nitoprime Zincrich Plus and allow 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.

## Concrete Priming

The concrete substrate should be saturated surface dry immediately before the application of the primer i.e. it should be thoroughly saturated with clean water and any residual surface water removed prior to applying Nitobond AR.

Under severe drying conditions repeated soaking may be necessary to ensure the substrate is still saturated at the time of application of the primer.

Scrub Nitobond AR into the surface.

Renderoc S can be applied as soon as the primer becomes tacky. If the Nitobond AR is too wet, vertical build up of the Renderoc S mortar may be difficult.

In all areas subject to trafficking, where a substrate/repair barrier is required or where the substrate is wet or likely to remain permanently damp, Nitobond EP bonding aid should be used. Contact the local Fosroc office for further information.

## Mixing

Care should be taken to ensure that Renderoc S is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Renderoc Mixing Paddle (MR4) with a slow speed (400/500 rpm) heavy-duty drill is acceptable for the occasional one-bag mix.

Free-fall mixers must not be used. Mixing of part bags should never be attempted.

For normal applications, place 2.5 to 3.0 litres of drinking quality water into the mixer.

With the machine in operation, add one full bag of Renderoc S and mix, for a minimum of 3 minutes and a maximum of 5 minutes, until fully homogeneous.

The consistency may be adjusted by the addition of small amounts of water up to the maximum total water content of 3.0 litres.

Note that the powder must always be added to the water.

## Mixing warning

As with other 'one pack' repair mortars, Renderoc S may exhibit satisfactory handling characteristics even though inadequately mixed. This will result in a significantly lower level of performance or possible failure. It is therefore essential that mixing instructions are strictly adhered to with particular emphasis on the quantity of water used and the time of the mixing operation.

## Application

Exposed steel reinforcing bars should be firmly secured to prevent movement during application.

Apply the mixed Renderoc S by gloved hand or trowel,

thoroughly compacting onto the primed substrate and around exposed reinforcement.

On vertical surfaces, if sagging or slumping occurs Renderoc S should be completely removed and reapplied at a reduced thickness to a correctly re-primed substrate.

## Build-up

Additional build-up can be achieved by application of multiple layers. The final thickness is dependent on the material consistency and substrate profile.

The surface of the intermediate layers should be comb scratch-keyed and cured with Nitobond AR. Re-prime with Nitobond AR and a further application of Renderoc S may proceed as soon as this layer has set.

## Spray application

Renderoc S can be quickly and efficiently applied by the wet spray technique. In circumstances where large areas of repair are required, the rapid placement and higher build attainable by this method offer economic advantages over hand-trowelling. The resultant repair also offers a generally more dense compound with enhanced mortar/substrate bond characteristics.

For further details on wet spray techniques contact the local Fosroc office.

## Finishing

Renderoc S 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. After spray application, the mortar may need to be 'cut back' to the required profile using a steel float and then finished with damp sponges as described above.

## Low temperature working

In cold conditions down to 5°C, the use of warm mixing water (up to 30°C) is advisable to accelerate strength development. Normal precautions for winter working with cementitious materials should then be adopted. The material should not be applied when the substrate and/or air temperature is 5°C and falling. At 5°C static temperature or at 5°C and rising, the application may proceed.

## High temperature working

At ambient temperatures above 35°C, the material should be stored in the shade and cool water used for mixing.

## Curing

Renderoc S is a cement-based repair mortar. In common with all cementitious materials, it must be cured immediately after finishing in accordance with good concrete practice. The use of Nitobond AR, sprayed on to the surface of the finished mortar in a continuous film, is recommended. A low pressure atomising sprayer is essential for applying the Nitobond AR. Any excessive run-off on verticals or drips on soffits should be removed by brush before they harden.

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Large areas should be cured as trowelling progresses (0.5 m<sup>2</sup> at a time) without waiting for completion of the entire area.

In fast drying conditions, supplementary curing with polythene sheeting taped down at the edges must be used. In cold conditions, the finished repair must be protected from freezing.

## Overcoating with protective decorative finishes

Renderoc S is extremely durable and will provide long-term protection to the embedded steel reinforcement within the repaired locations. The surrounding parts of the structure will benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, bringing them to the same protective standard as the repair itself. Fosroc recommend the use of the Dekguard range of protective, anti-carbonation coatings. These products provide a decorative and uniform appearance as well as protecting areas of the structure which might otherwise be at risk from the environment. Dekguard products may be applied over the repair area without prior removal of the Nitobond AR curing membrane. Other curing membranes must be removed prior to the application of Dekguard products.

## Cleaning

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

Clean tools used with Nitoprime Zincrich Plus and Nitobond EP before material cures, using Fosroc Solvent 102.

## Estimating

### Supply

Renderoc S:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Nitobond AR:	5 and 25 litre drums
Fosroc Solvent 102:	5 and 25 litre tins

### Coverage and yield

Renderoc S:	Approximately 12 litres / 25kg bag (approximately 1.2 m <sup>2</sup> at 10 mm thickness)
Nitoprime Zincrich Plus:	8 m <sup>2</sup> / litre
Nitobond AR:	6 - 8 m <sup>2</sup> / litre

Notes: the actual yield per bag of Renderoc S will depend on the consistency used. The yield will be reduced if the material is applied by a spray technique.

## Limitations

Renderoc S should not be used when the temperature is below 5°C and falling. Do not mix part bags.

Renderoc S 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 local Fosroc office.

## Storage

The product has a shelf life of 12 months from the date of manufacture if kept in dry storage in the original, unopened bags. If stored at high temperatures and/or high humidity the shelf life may be reduced to less than 6 months.

Nitobond AR should be protected from frost.

## Precautions

### Health and safety

For further information refer to the appropriate Safety Data Sheets available at [www.fosroc.com](http://www.fosroc.com).

### Fire

Renderoc S 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<sub>2</sub> or foam. Do not use a water jet

### Flash points

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

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#### Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation of information given by it.

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