

# Fosroc® Renderoc LA

## High performance free flowing low alkali micro concrete 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 is a consideration.

Renderoc LA has been specifically developed for the repair of large areas of concrete where access is restricted or where reinforcement is congested. It can be applied in section thicknesses of 25 - 150mm.

It is suitable for use where excellent chloride and carbon dioxide resistance is required or for repairs to concrete affected by alkali-silica reaction (ASR). Renderoc LA is alkaline in nature and will protect embedded steel reinforcement.

Renderoc LA is suitable for repair methods 3.2, 4.4, 7.1, 7.2 as defined by BS EN 1504-3.

### Advantages

- Maximum compatibility with concrete of compressive strength 30 - 60 MPa
- Dual expansion system compensates for shrinkage in the plastic and hardened states
- Low alkali content minimises risk of alkali-silica reaction
- Exceptional bond to concrete substrates without independent primer
- Suitable for placement by pumping or pouring techniques into restricted locations
- Self-compacting nature eliminates honeycombing and displaces air without vibration
- High strength and low permeability provide maximum protection against carbon dioxide and chlorides
- Pre-bagged to overcome site-batched variations — only the site addition of clean water is required
- Contains no chloride admixtures

### Description

Renderoc LA is supplied as a ready to use blend of dry powders requiring only the site addition of clean water to produce a free-flowing, shrinkage compensated micro-concrete suitable for large volume concrete repairs at nominal thicknesses in excess of 25mm. For application <25mm, contact Fosroc Technical Helpdesk.

The material is based on Portland cement, graded aggregates and additives which impart controlled expansion in both the plastic and hardened states while minimising water demand. Its low alkali content minimises the risk of alkali-silica reaction. The hardened product exhibits excellent thermal compatibility with concrete.

Renderoc LA is designed for large volume repairs typically in excess of 25mm deep. The product can be applied in sections generally up to 150 mm thick although greater



thicknesses may be achievable dependent on the configuration of the repair location and the volume of exposed reinforcing steel. Consult the local Fosroc office for further information.

### Standards compliance

Renderoc LA complies with the classification R4 according to EN 1504-3, repair methods 3.2, 4.4, 7.1 and 7.2.

 <b>0370</b> <b>09</b> <b>0370-CPR-0845</b>	
<b>DOP: UK9-11</b>	
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<b>Fosroc® Renderoc LA</b>	
EN1504-3: Structural and non-structural repair methods 3.2, 4.4, 7.1 & 7.2	
Compressive strength	R4 (≥ 45 MPa)
Chloride ion content	≤ 0.05%
Adhesion 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
Elastic modulus	≥ 20 GPa
Reaction to fire	Class A1
Dangerous substances	Complies with 5.4

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## Properties

The following results were obtained at a water : powder ratio of 0.13 and a temperature of 20°C unless otherwise stated.

Test method	Standard	EN 1504 R4 Requirement	Result
Compressive Strength	EN 12190:1999	≥ 45 MPa	@ 1 Day 14 MPa @ 3 Days 30 MPa @ 7 Days 42 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	2.4 MPa
Resistance to carbonation $d_k$	EN 13295:2005	≤ ref concrete	Complies
Elastic Modulus in Compression	EN 13412	≥ 20 GPa	31 GPa @28 Days
Fire rating	EN 1504-3 cl 5.5		Class A1
Flexural strength	BS 6319 Pt 3:1990	-	6.9 MPa @ 28 Days
Setting time	BS 4551 Pt 14:1980	-	Initial set: 6 1/2 hours Final set: 9 hours
Fresh wet density		-	Nominally 2300 kg/m <sup>3</sup>
Shrinkage 25 x 25 x 285 prisms, 27 °C, 55% RH		-	< 300 microstrain @ 7 days
Alkali reactive particles	Method TI-B 52	-	≤ 1% vol%
Flow Properties	UK Highways Agency BD27/86 Clause 4.6(b) EN 13395-3	-	750 mm within 10 seconds
Chemical resistance		-	The low permeability of Renderoc LA severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen.
Chloride ion ingress	EN 13396	-	0.146% after 6 months in 3% NaCl solution at 8-10mm depth

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

## Specification clause

The repair concrete shall be Renderoc LA, a one component micro-concrete conforming to the requirements of BS EN 1504-3 Class R4 suitable for thicknesses between 25mm and 150mm generally. The micro-concrete shall exhibit a 3 day compressive strength not less than 30 MPa and a 28 day compressive strength of 60 MPa (at 20°C). The product shall be mixed, placed and cured in accordance with the manufacturer's written instructions to a correctly placed substrate.

## Application instructions

The unrestrained surface area of the repair must be kept to a minimum. The formwork should be rigid and tight to prevent

loss of material and have properly sealed faces to ensure that no water is absorbed from the repair material. The formwork should include drainage outlets for pre-soaking and, if beneath a soffit, provision for air-venting. Provision must also be made for suitable access points to pour or pump the mixed micro-concrete into place.

Form a square edge perimeter to the repair area using appropriate methods (feather edging must be avoided), break out the complete repair area up to a minimum depth of 25mm up to the square edge. For application <25mm, contact Fosroc Technical Helpdesk.

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.

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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, powered mechanical scraping or other suitable means 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).

## Reinforcing steel priming

Priming of the steel reinforcement is not normally necessary unless it is to remain exposed in an environment likely to cause corrosion after preparation. When required 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.

## Substrate priming

Several hours prior to placing, the prepared concrete substrates should be saturated by filling the prepared formwork with clean water. Immediately prior to the application of Renderoc LA, any excess water should be removed.

In exceptional circumstances, e.g. where a substrate/repair barrier is required, Nitobond EP bonding aid should be used. Contact the local Fosroc office for further information.

## Mixing

Care should be taken to ensure that Renderoc LA is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Conbextra Mixing Paddle (MR3) with a slow speed (400/500 rpm) heavy-duty drill is acceptable. Free-fall mixers must not be used. Mixing of part bags should never be attempted.

It is essential that machine mixing capacity and labour availability is adequate to enable the placing operation to be carried out continuously. Measure 3.3 litres of drinking quality water and pour three-quarters into the mixer. With the machine in operation, add one full 25 kg bag of Renderoc LA and mix for 1 minute before adding the rest of the water. Mix for a further 2 to 3 minutes until a smooth even consistency is obtained. Note that powder must always be added to water. The quantities mixed may be scaled up as required.

When the drill and paddle mixing method is used, the complete 3.3 litres of water should be placed in the mixing drum. With the paddle rotating, add one full 25 kg bag of Renderoc LA and mix for 2 to 3 minutes until a smooth even consistency is obtained.

It is recommended that the mixed product be passed through a suitable coarse metal screen prior to placing or pumping to highlight any unmixed material.

## Mixing warning

As with other 'one pack' repair mortars, Renderoc LA 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.

## Placing

Pour the mixed material into the prepared formwork in a continuous fashion, ensuring any trapped air at the top of the formwork is released. The mixed material should be placed within 30 minutes of mixing in order to gain the full benefit of fluidity and of the expansion process.

Renderoc LA can alternatively be pumped in place using a Putzmeister S5 or similar (must be capable of handling 4 - 6mm aggregate). Prime the pump and hoses with a neat cement slurry before transferring the mixed Renderoc LA. Once pumping has commenced, ensure a continuous supply of material into the pump to minimise chances of blockage. Recommended hose diameter is 50 mm and any restrictions to flow should be avoided. Contact the Fosroc office for further details.

## Low temperature working

In cold conditions down to 3°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 3°C and falling. At 3°C static temperature or at 3°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

The formwork should be left in place until the compressive strength of the Renderoc LA is 10 MPa or as otherwise specified by the Supervising Officer. Renderoc LA is a cement-based concrete reinstatement material. In common with all cementitious materials, Renderoc LA must be cured immediately after the formwork is stripped in accordance with good concrete practice.

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Immediately after striking the formwork, all exposed faces of the repair should be thoroughly soaked with clean water and then sprayed with a liquid curing membrane such as Concure WB, Nitobond AR or Fosroc Cure B. 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. If the repair is to be overcoated, use Nitobond AR to cure the repair.

## Overcoating with protective decorative finishes

Renderoc LA 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 generally benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, thus bringing them up 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. All traces of form-release oils and curing membranes (other than Nitobond AR) must be removed prior to the application of Dekguard products. This is best achieved by light grit blasting.

## Cleaning

Renderoc LA and Concure WB 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 and Nitobond EP should be cleaned with Fosroc Solvent 102.

## Limitations

Renderoc LA should not be used when the temperature is below 3°C and falling. Do not mix part bags. The product should not be used to reinstate horizontal areas where the surface would remain unrestrained during cure. It should not be exposed to moving water during application.

## 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. Concure WB should be protected from frost.



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### Important note

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## Estimating

### Supply

Renderoc LA:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Nitobond EP:	4.5 kg packs
Concure WB:	20 litre drums
Fosroc Solvent 102:	5 and 25 litre tins

### Coverage and yield

Renderoc LA:	Approx. 12.0 litres / 25 kg bag
Nitoprime Zincrich Plus:	8 m <sup>2</sup> /litre
Nitobond EP:	10m <sup>2</sup> / 4.5kg pack
Concure WB:	3.5 to 5 m <sup>2</sup> / litre

Notes: the coverage figures for liquid products are theoretical — due to wastage factors and the variety and nature of possible substrates, practical coverage figures will be reduced.

## Precautions

### Health and safety

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

### Fire

Renderoc LA, Nitobond EP, Concure WB, Nitobond AR and Fosroc Cure B are 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

## Environmental Data (EPD)

GWP Total, A1 – A3: 0.284 kgCO<sub>2</sub>e per 1kg product.  
GWP Total, A1 – D: 0.481 kgCO<sub>2</sub>e per 1kg product.

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