Fosroc® Renderoc LA55

constructive solutions

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 LA55 has been specifically developed for the repair of large areas of concrete where access is restricted or where reinforcement is congested.

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 LA55 is alkaline in nature and will protect embedded steel reinforcement.

Renderoc LA55 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 N/mm²
- 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 LA55 is supplied as a ready to use blend of dry powders which requires 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 50 mm.

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 LA55 is designed for large volume repairs typically in excess of 50 mm deep. The product can be applied in sections generally up to 200 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.

Specification Clause

The repair mortar shall be Renderoc LA55, a one component micro-concrete conforming to the requirements of BS EN 1504-3 Class R4. 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).

Standards compliance

Renderoc LA55 complies with the classification R4 according to EN 1504-3, repair methods 3.2, 4.4, 7.1 and 7.2.

Renderoc LA55 conforms to the requirements of the UK Highways Agency Design Manual for Roads and Bridges (BD27/86, Clause 4) 'Materials for the Repair of Concrete Highway Structures' and has been formulated to comply with the requirements of the Specification for Highway Works, Clause 1704.5 Control of Alkali-Silica Reaction.

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Renderoc LA55

EN 1504-3
Structural and non-structural repair methods 3,4 and 7

Compressive strength	Class R4 (≥ 45 MPa)
Chloride ion content	≤ 0.05%
Thermal compatibility: freeze-thaw cycling with immersion	≥ 2.0 MPa
Adhesive strength by pull-off test	≥ 2.0 MPa
Reaction to fire	Class A1
Dangerous substances	Complies with 5.4
Carbonation resistance	d_k ≤ control concrete
Elastic modulus in compression	≥ 20 GPa

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Properties

The following results were obtained at a water : powder ratio of 0.133 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	2.0 MPa
Chloride ion content:	EN 1015-17:2000	≤ 0.05 %	0.03%
Freeze thaw cycling:	EN 13687-1:2002	≥ 2.0 MPa	3.1 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 13505-1		Class A1
Setting time	BS 4551 Pt 14:1980	-	Initial set: 6.5 hours Final set: 9 hours
Fresh wet density		-	Nominally 2300 g/m^3
Shrinkage **25 x 25 x 285 prisms,** **27°C, 55% RH**		-	< 300 microstrain @ 7 days < 500 microstrain @ 28 days
Alkali reactive particles	Method TI-B 52	-	<1% vol
Flow Properties	UK Highways Agency BD27/86 Clause 4.6(b)		1000 mm within 10 seconds
Resistivity	Midlands Links Specification Clause 1770AR		11800 ohm cm @ 28 days
Chemical resistance		-	The low permeability of Renderoc LA 55 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 8-10mmm depth

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

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Application instructions

Preparation

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 presoaking 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.

*Saw cut or cut back the extremities of the repair locations to a depth of at least 10 mm to avoid feather-edging and to provide a square edge. Break out the complete repair area to a minimum depth of 50 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)

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 LA55, 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 LA55 is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Conbextra Spiral 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 LA55 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 LA55 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 LA55 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

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. If placing by pump, standard concrete pumping practice should be followed. Consult the Fosroc Office for further details.

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.

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Curing

The formwork should be left in place until the compressive strength of the Renderoc LA55 is 10 MPa or as otherwise specified by the Supervising Officer. Renderoc LA55 is a cement-based concrete reinstatement material. In common with all cementitious materials, Renderoc LA55 must be cured immediately after the formwork is stripped in accordance with good concrete practice. 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. 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 LA55 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 must be removed prior to the application of Dekguard products. This is best achieved by light grit blasting.

Cleaning

Renderoc LA55 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 LA55 should not be used when the temperature is below 5°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. If any doubts arise concerning temperature, application or substrate conditions, consult the local Fosroc office.

Estimating

Supply

Renderoc LA55:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Concure WB:	20 litre drums
Fosroc Solvent 102:	5 and 25 litre tins

Coverage and yield

Renderoc LA55:	Approx. 12.0 litres / 25 kg bag
Nitoprime Zincrich Plus:	8 m^2/litre
Concure WB:	5 m^2/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.

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.

Precautions

Health and safety

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

Fire

Renderoc LA55 and Concure WB 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_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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