



constructive solutions

Renderoc LA55

Single component free-flowing low alkali micro-concrete

Uses

The highly fluid nature of Renderoc LA55, means that compaction and vibration are not required. Renderoc LA55 provides excellent chloride and carbon dioxide resistance and prevention of concrete affected by alkali-silica reaction (ASR). This makes the product ideal for the following uses:

- Reinstatement of large, structural sections of concrete. e.g. Marine structures, bridge columns and beams.
- Small locations where difficulty of access make hand and trowel applied application impractical. e.g. Honeycombing on precast concrete segments, light railway wall repairs or concrete contaminated by salt water.
- As a repair mortar where cathodic protection systems are being used.

Advantages

- 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 and outstanding water repellent properties. The aggregate grading is designed to aid uniform mixing and to eliminate segregation under pumping pressures. The low water requirement ensures fast strength gain and long-term durability.

Standards compliance

Renderoc LA55 conforms to the requirements of the UK Department of Transport Standard (BD27/86, Clause 4) 'Materials for the Repair of Concrete Highway Structures' and has been formulated to comply with the requirements of the DTp Specification for Highway Works, Clause 1704.6 Control of Alkali-Silica Reaction.

Renderoc LA55 complies with the requirements of the UK Water Fittings By-laws Scheme Tests of Effect on Water Quality.

Technical support

Fosroc offers comprehensive technical support, including help at the design stage, application advice and on site problem solving. Specifiers and contractors are encouraged to contact our trained staff for answers to their questions.

For further information please contact Fosroc.

Design criteria

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 150 mm thick although greater thicknesses may be achievable dependent on the configuration of the repair location and the volume of exposed reinforcing steel. Please consult Fosroc for further information.

Typical Properties

The following results were obtained at a water:powder ratio of 0.135 and temperature of 20°C except where otherwise mentioned.

Test method	HKHA ¹	Typical result
Drying shrinkage (ASTM C596-82):	T.M.8	<450 microstrain@7 days
Compressive strength (BS 6319) wet cured:	T.M.1	19 N/mm ² @ 1 day 45 N/mm ² @ 7 days 57 N/mm ² @ 28 days
Test method	HKHA ¹	Typical result
Water absorption ISAT (BS1881 Pt 208 : 1996) - 10 mins:		0.08 ml/m ² /sec
1 hour:		0.02 ml/m ² /sec
Coefficient of thermal expansion: (5°C - 60°C)		15 x 10 ⁻⁶ /°C

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Modulus of elasticity BS6319 : Part 6 dry cured:	T.M.5 28 kN/mm ² @ 28 days
Bond strength (BS6319 slant/shear - substrate presoaked, no bonding aid):	54 N/mm ² @ 28 days (Monolithic Failure)
Alkali content:	The calculated equivalent sodium oxide content of Renderoc LA55 is approximately 2.9 kg/m ³ .
Fresh wet density:	Approximately 2240 kg/m ³ dependent on actual consistency used.
Chemical resistance:	The low permeability of Renderoc LA55 severely retards chemical attack in aggressive environments. The cured micro-concrete is highly impermeable to acid gases, chloride ions, oxygen and water.

Note: TM1, TM5 and TM8 are the test methods used by Hong Kong Housing Authority.

Specification clauses

Steel reinforcement primer

The steel reinforcement primer shall be Nitoprime Zincrich (WB), two components water based zinc-rich primer. The primer shall be an 'active' type, capable of avoiding the generation of incipient anodes in the immediately adjacent locations. It shall be fully compatible with the Renderoc system of concrete repair.

Fluid micro-concrete repair system

The fluid repair system (micro-concrete) shall be Renderoc LA55, a single component, low-alkali cement-based blend of powders to which only the site-addition of clean water shall be permitted. The micro-concrete shall exhibit a 1 day compressive strength not less than 15 N/mm² and a 28 day compressive strength of 55 N/mm² (at 20°C). The sodium oxide content shall not exceed 3.0 kg/m³. The Rapid Chloride Permeability test result shall be 600 coulombs (ASTM C1202) and a 50mm section of the cured mortar shall provide a carbon dioxide barrier equivalent to not less than 2000mm concrete or 950 metres of air (by the Taywood Method). The thermal coefficient of expansion shall be $15 \times 10^{-6}/^{\circ}\text{C}$.

The micro-concrete shall have a drying shrinkage of <450 microstrain at 7 day. (TM8, dry cured at 20°C, 55% relative humidity).

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 to 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 50mm 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 grit-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. Grit-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 grit-blasting to remove corrosion products from pits and imperfections within its surface.



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Reinforcing steel priming

Apply one full coat of Nitoprime Zincrich (WB) 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 Slowset 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 "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 3.2 to 3.4 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 one 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 3.4 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. The pump and pipeline must be 'grouted' with a rich cement slurry or mortar, discharging the 'grout' as waste. Pumping should be commenced immediately after 'grouting' in this way.

Low temperature working

In cold conditions down to 5°C, the use of warm 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 mixed.

Curing

The formwork should be left in place until the compressive strength of the Renderoc LA55 is 10 N/mm² 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 or Concure RB90. 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 excellent protection to the embedded steel reinforcement within the

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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 or sand-blasting.

Cleaning

Renderoc LA55, Nitoprime Zincrich (WB) , Concure RB90 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 Nitobond EP Slowset should be cleaned with suitable solvent.

Sampling Procedure

Fosroc standard test methods must be employed when performance testing this product. For full information please contact the local Fosroc office.

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 your local Fosroc office.

Estimating

Supply

Renderoc LA55:	25 kg bags
Nitoprime Zincrich(WB):	0.75 litre packs
Nitobond EP Slowset:	4 litre packs
Concure WB:	25 and 200 litre drums
Concure RB90:	25 and 200 litre drums

Coverage and yield

Renderoc LA55:	Approximately 12.3 litres/25 kg bag
Nitoprime Zincrich(WB):	6.5-8.5 m ² /litre
Nitobond EP Slowset:	15 m ² / 4 litre pack
Concure WB:	3.5 to 5 m ² /litre
Concure RB90:	3.5 to 5.0 m ² /litre

Note:

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.

In accordance with Commercial or Health & Safety requirements packaging detail may alter. Please contact your local Fosroc office for detail.

Storage

Shelf life

If kept in a dry store in the original, unopened bags or packs, all products(except Nitoprime Zincrich (WB)) have a shelf life of 12 months, Nitoprime Zincrich (WB) has a shelf life of 6 months.

Storage conditions

Store in dry conditions in the original, unopened bags or packs. If stored at high temperatures and/or high humidity conditions the shelf life may be reduced to 4 to 6 months. Concure WB should be protected from frost.



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Precautions

Health and safety

Renderoc LA55 contains cement powders which, when mixed or become damp, release alkalis which can be harmful to the skin. During use, avoid inhalation of dust and contact with skin and eyes. Wear suitable protective clothing, gloves, eye protection and respiratory protective equipment. The use of barrier creams provide additional skin protection. In case of contact with skin, rinse with plenty of clean water, then cleanse with soap and water. In case of contact with eyes, rinse immediately with plenty of clean water and seek medical advice. If swallowed, seek medical attention immediately - do not induce vomiting.

Nitoprime Zincrich (WB), Nitobond EP Slowset and Concure products should not come into contact with skin or eyes, or be swallowed. Ensure adequate ventilation and avoid inhalation of vapours. Some people are sensitive to resins, hardeners and solvents. Wear suitable protective clothing, gloves and eye protection. If working in confined areas, suitable respiratory protective equipment must be used. The use of barrier creams provide additional skin protection. In case of contact with skin, rinse with plenty of clean water, then cleanse with soap and water. In case of skin contact with cleanse with Nitoprime Zincrich (WB), Nitobond EP Slowset and Concure RB90, remove immediately with resin removing cream followed by washing with soap and water. Do not use solvent. In case of contact with eyes, rinse immediately with plenty of clean water and seek medical advice. If swallowed, seek medical attention immediately - do not induce vomiting.

Fire

Renderoc LA55, Nitobond EP Slowset, Concure RB90 and Concure WB are non-flammable.

Nitoprime Zincrich (WB) mixture is non-flammable.

Nitoprime Zincrich (WB) powder is flammable. Keep away from water. Keep away from sources of ignition. In the event of fire, extinguish with CO₂ or foam. Do not use a water jet.

For further information see relevant Material Safety Data Sheet.

Renderoc is the trademark of Fosroc International Limited



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 Service, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification or 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 or information given by it.
