Fosroc®
Renderoc® LA55

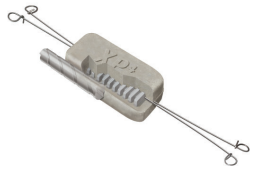
constructive solutions

High performance, free flowing, low alkali, micro-concrete reinstatement mortar conforming to the requirements of EN 1504-3 Class R4

Uses

Renderoc LA55 is ideal for the reinstatement of large, structural sections of concrete as well as for many smaller locations where difficulties of access make hand or trowel-applied mortars impractical. The highly fluid nature of Renderoc LA55 obviates the need for compaction and vibration even where access to the repair zone 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. The resistivity of Renderoc LA55 makes it suitable for electro-chemical repairs.

Renderoc LA55 is suitable for use with Galvashield XP incipient anode protection and Cathodic Protection system. Contact Fosroc for further details.



Advantages

- Maximum compatibility with concrete compressive strength, 30 - 60MPa
- Unique dual expansion system offers an extremely high level of control of plastic and long-term drying shrinkage
- Low alkali content minimises risk of alkali-silica reaction
- Excellent bond to concrete substrates without independent primer
- Very low permeability provides excellent protection against carbon dioxide and chlorides
- Exceptional flow allows pumping or pouring into restricted locations
- Self-compacting nature eliminates honeycombing and displaces air without vibration
- Suitable for electro-chemical repairs
- Pre-bagged to overcome site-batched variations - only the site addition of clean water is required
- Contains no chloride admixtures
- Potable water approved - complies to AS/NZS 4020:2005

Description

Renderoc LA55 is supplied as a ready to use blend of dry powders which require only the site addition of clean water to produce a free-flowing, shrinkage compensated, micro-concrete suitable for large volume repairs at a nominal thickness in excess of 50mm.

The material is based on Portland Cement, graded aggregates and additives, which minimises water demand, promotes high fluidity, ensures fast strength gain and long-term durability. A unique system controls plastic and long-term drying shrinkage. The aggregate grading is designed to aid uniform mixing and to eliminate segregation under pumping pressures. It's low alkali content minimises the risk of alkali–silica reaction. The hardened product exhibits excellent thermal compatibility and very low water permeability.

Maximum aggregate size is 5mm.

Design Criteria

Renderoc LA55 is designed for large volume repairs typically in excess of 50mm deep. The product can be applied in sections generally between 50mm - 200mm thick. Greater thicknesses may be achievable dependent on the configuration of the repair, location and volume of exposed reinforcing steel. Long narrow repairs should be avoided where possible and pours arranged to achieve a length:minimum thickness ratio, of not more than 20:1. Under conditions of high temperature and rapid drying or when very small sections are being constructed this ratio should be reduced. Longer lengths may be achievable, again dependent on configuration, steel position and density, ambient temperature, humidity and other environmental considerations.

Specification Clause

The fluid repair system (micro-concrete) shall be Fosroc 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 3 day compressive strength of 30MPa and a 28 day strength of 60MPa and shall provide 600mm flow without segregation when tested to AS1478.2 - 2005 (flow trough method). The micro-concrete shall exhibit drying shrinkage of < 550 microstrains @ 28 days when tested to AS 1478.2 - 2005.

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Properties

The following results were obtained at a water:powder ratio of 0.133 and temperature of 20°C unless otherwise stated.

Test Method	Standard	EN 1504 R4 Requirement	Test Result
Compressive Strength	EN 12190:1999	≥ 45 MPa	74.3 MPa @28 days
	AS 1478.2 - 2005	-	5 MPa @ 1 day 30 MPa @ 3 days 42 MPa @ 7 days 60 MPa @ 28 days
Bond strength by pull off	EN 1542:1999	≥ 2.0 MPa	Without primer (pre-soak) 3.3 MPa
Chloride ion Content	EN 1015-17:2000	≤ 0.05%	0.002%
VOC content	ASTM D 3960 - 05	-	14g / litre
Capillary Absorption	EN 1307:2002	≤ 0.5 Kg/(m² x $h^{0.5}$)	0.1 Kg/(m² x $h^{0.5}$)
Carbonation Resistance	EN 13295:2005	d ≤ref concrete	Conform
Coefficient of thermal expansion	EN 1770:1990	Declared Value	17.2 x 10^{-6} /°C
Shrinkage and Expansion	EN 12617-4:2002	> 2.0 MPa	Shrinkage: 3.3 MPa Expansion: 3.3 MPa
Elastic Modulus	EN 13412:2008	> 20 GPa	39.3 GPa
Elastic Modulus in Compression	(BS 1881 Pt 121:1983)	-	34 kN/mm² @ 28 days
Chloride Diffusion	Nordtest NT Build 443	-	0.64 x 10^{-12} m²/sec
Flexural Strength	AS 1012.11 - 2000	-	10.1 MPa @ 28 days
Tensile Strength	AS 1012.10 - 2000	-	5.5 MPa @ 28 days
Setting Time	AS 1012.18 - 1996	-	Initial Set: 6 hours, 30 mins Final Set: 9 hours
Fresh Wet Density		-	2270 Kg/m³
Drying Shrinkage (25 x 25 x 285) prisms @ 27°C, 55% RH)	AS 1478.2 - 2005	-	< 300 microstrains @ 7 days < 550 microstrains @ 28 days
Alkali reactive particles	RTA Rapid Mortar Bar Test RTA T363	-	<0.1% (Non-Reactive)
Flow Characteristics	AS1478.2 - 2005	-	600mm (flow trough)
Chemical Resistance			The low permeability of Renderoc LA55 retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen

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 25mm 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. 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 grit-blasting to remove corrosion products from pits and imperfections within its surface.

Reinforcing steel priming

Apply one full coat of Nitoprime Zincrich 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, this water should be removed from the formwork.

Mixing

Care should be taken to ensure that Renderoc LA55 is thoroughly mixed. A forced-action mixer is essential. Mix for 3 to 5 minutes at a slow speed (400/500rpm) in a suitably sized drum using appropriate equipment such the Ransom MDR59 140 x 600 M14 Helical mixing paddle (product code: N4020892-UNIT) fitted to a heavy-duty 1600W mixer, such as Ransom RAN160 (product code: NP7AN160-UNIT) or equivalent.

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 2.4 - 2.8 litres of drinking quality water and pour three-quarters into the mixer. With the machine in operation, add one full 20kg bag of Renderoc LA55 and mix for one minute before adding the rest of the water. Mix for a further 2 - 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 2.4 - 2.8 litres of water should be placed in the mixing drum. With the paddle rotating, add one full 20kg bag of Renderoc LA55 and mix for 2 - 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 'primed' with a rich cement slurry or mortar, discharging the primer mix as waste. Pumping should be commenced immediately after 'priming' in this way.

Renderoc LA55 when used for reinstatement of horizontal areas, must be suitably restrained by formwork.

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 iced water used for mixing.

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Curing

Correct curing is essential to ensure optimum performance of the product.

The formwork should be left in place until the compressive strength of the Renderoc LA55 is 10MPa or as otherwise specified by the Supervising Officer. Renderoc LA55 is a cement-based concrete reinstatement material. It is recommend that the formwork be left in place for as long as practically possible to provide the best curing conditions. 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 A99. Any delay in starting the curing process after the formwork is stripped will adversely affect the performance of the product. 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 repaired locations. The surrounding parts of the structure will generally benefit from the application of a protective 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 recommends 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 and Concure A99 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 should be cleaned with Fosroc Solvent 10.

Limitations

Renderoc LA55 should not be used when the temperature is below 5°C and falling. Do not mix part bags under any circumstances. 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, contact Fosroc.

Supply

Renderoc LA55: Material code	20 kg bag FC302030-20KG
Nitoprime Zincrich:	1 litre can
Concure A99:	20 and 205 litre drums
Fosroc Solvent 10:	4 and 20 litre cans

Coverage and yield

Renderoc LA55:	Approx 10 litres / 20 kg bag
Nitoprime Zincrich:	7 m²/litre
Concure A99:	5 m²/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

Renderoc LA55 has a shelf life of 2 years if kept in the original, unopened bags. Do not use if there are lumps in the product, or a loss of workability (requiring more water to be added) is experienced.

If stored at high temperatures and/or high humidity conditions the shelf life may be reduced.

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