New Guard Coatings Group

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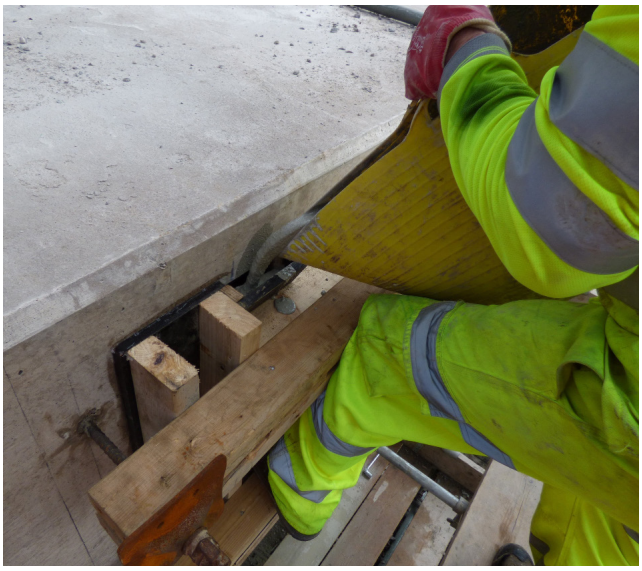
Fosroc®
Renderoc LA60

constructive solutions

High performance free flowing low alkali micro concrete conforming to the requirements of Highways England Specification for Highways Works and EN1504-3 Structural and Non-structural concrete Class R4.



Uses

For the reinstatement of reinforced concrete where low permeability characteristics are required and where high compressive strength is a consideration.

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 LA60 is alkaline in nature and will protect embedded steel reinforcement.

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
- 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
- Suitable for use with cathodic protection systems
- Controlled heat of hydration minimizes risk of thermal cracking, even in thick sections
- Maximum 3mm aggregate to improve application and finish

Description

Renderoc LA60 is based on selected hydraulic cements, graded aggregates and additives which impart controlled expansion in both the plastic and hardened states while minimizing water demand. Requiring only the addition of clean water on site, the products controlled heat of hydration means Renderoc LA60 can typically be applied in thicknesses between 25 and 300mm whilst minimizing risk of thermal cracking. Consult the local Fosroc office for further information. Renderoc LA60 is chloride free, alkaline in nature and will protect embedded steel reinforcement.

Specification Clause

The repair concrete shall be Renderoc LA60, a one component micro-concrete conforming to the requirements of BS EN 1504-3 Class R4 suitable for thicknesses between 25mm and 300mm 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 20ºC). The product shall be mixed and placed in accordance with the manufacturer's written instructions to a correctly placed substrate.

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Renderoc LA60

BS EN 1504-3
Structural and non-structural repair Class R4

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
Resistance to capillary absorption	≤ 0.5kg/(m²xh$^{0.5}$)

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Properties

The following results were obtained at a water : powder ratio of 0.148 and a temperature of 20°C unless otherwise stated

Test method	Highways England Specification	Result
Cement content	> 400 kg/m^{-3}	>890 kg/m^{-3}
Water / cement ratio @ 3.7 litres per 25Kg bag	≤0.45	<0.45
Chloride ion content	≤ 0.1	0.03%
Working time	-	Typically 60 minutes
Set time	-	Typically 6 hours
Wet density	-	2.260
Air content	≤ 7%	Typically 2%
Flow trough	> 750 mm in 30 seconds @ 5°C immediately after mixing @ 5°C 30 minutes after mixing @ 20°C immediately after mixing @ 20°C 30 minutes after mixing	750 mm in 9 seconds 750 mm in 10 seconds 750 mm in 7 seconds 750 mm in 9 seconds
Flow in simulated soffit / top repair	@ 5°C and 20°C	Complies
Compressive Strength	3 day @ 20 °C >29 Nmm^{-2} 7 days @ 20 °C <60 Nmm^{-2} 10 days @ 5°C >29 Nmm^{-2}	37Nmm^{-2} 42Nmm^{-2} 43Nmm^{-2}
Electrical resistivity @ 28 days	5000- 15000 ohm cm^{-1}	10500 ohm.cm
Flow in a simulated soffit repair 5°C 20°C	 Satisfactory Satisfactory	 Satisfied Satisfied
Flow in a simulated top repair 5°C 20°C	 Satisfactory Satisfactory	 Satisfied Satisfied

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

Test method EN1504-3 Structural and non-structural repair Class R4	Standard	EN 1504 R4 Requirement	Result
Compressive Strength	EN 12190:1999	≥ 45 MPa	60 MPa @ 28 days
Chloride ion content	EN 1015-17:2000	≤ 0.05 %	0.01%
Bond strength by pull off:	EN 1542:1999	≥ 2.0 MPa	3.5 MPa
Freeze thaw cycling:	EN 13687-1:2002	≥ 2.0 MPa	2.7 MPa
Resistance to carbonation d_k	EN 13295:2005	≤ ref concrete	Complies
Elastic Modulus	EN 13412	≥ 20 GPa	Complies
Resistance to capillary absorption	EN13057:2002	≤ 0.5kg/(m^{2}xh$^{0.5}$)	≤ 0.2kg/(m^{2}xh$^{0.5}$)

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Standards compliance

Renderoc LA60 conforms to the requirements of Highways England, Specification for Highway Works Series 1700: Structural Concrete 1770AR Repair Concrete - Class 29F Flowable Concrete and EN1504-3 Structural and Non-structural Repairs Class R4.

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.

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.

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, 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.

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

Two hours minimum prior to placing, or as detailed by the Supervisory Officer, the prepared concrete substrates should be saturated by filling the prepared formwork with clean water. Immediately prior to the application of Renderoc LA60, 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 LA60 is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using a 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 3.4 - 3.7 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 LA60 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 required water content should be placed in the mixing drum. With the paddle rotating, add one full 25 kg bag of Renderoc LA60 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 LA60 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, 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.

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Renderoc LA60 can alternatively be pumped in place using a Putzmeister S5 or similar (must be capable of handling 3mm aggregate). Prime the pump and hoses with a neat cement slurry before transferring the mixed Renderoc LA60. 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 LA60 is 10 MPa or as otherwise specified by the Supervising Officer. Renderoc LA60 is a cement-based concrete reinstatement material. In common with all cementitious materials, Renderoc LA60 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, 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 LA60 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 LA60 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 LA60 should not be used when the temperature is 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. If any doubts arise concerning temperature, application or substrate conditions, consult the local Fosroc office.

Estimating

Supply

Renderoc LA60:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Nitobond EP:	4.5 kg packs
Concure WB:	20 litre drums
Nitobond AR:	25 litre drums, 1 litre & 5 litre bottles
Fosroc Solvent 102:	5 and 25 litre tins

Coverage and yield

Renderoc LA60:	Approx. 13 litres / 25 kg bag
Nitoprime Zincrich Plus:	8 m^2/litre
Nitobond EP:	10 m^2/ 4.5kg pack
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.

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Precautions

Health and safety

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

Fire

Renderoc LA60, Nitobond EP 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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