Renderoc® RG(M)

constructive solutions

High strength, Shrinkage compensated, Free flow, Cementitious micro-concrete for Repairs

Uses

For economical repairs to damaged reinforced concrete elements, particularly where access is restricted and where vibration of the placed material is difficult or impossible.

It is suitable for various structural strengthening measures such as encasement build-ups, jacketing, pile top encapsulation resin system, etc.

Advantages

- Gaseous expansion system compensates for shrinkage and settlement in the plastic state.
- Can be pumped or poured into restricted locations.
- Highly fluid to allow for placement without vibration.
- Pre-packed to overcome site-batched variations.
- Rapid strength gain to facilitate early reinstatement
- High ultimate strengths and low permeability of cured repair

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- Contains no chloride admixture.
- Ensures piletop integrity as part of a waterproofing system .

Description

Renderoc RG(M) 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, non-shrink repair micro concrete. The material is based on Portland cements, graded aggregates and fillers, and additives which impart controlled expansion characteristics in the plastic state, while minimising water demand. The low water requirement ensures high early strength and long-term durability.

For larger repairs, the mixed Renderoc RG(M) may be modified by the addition of 5mm to 12mm clean, graded, saturated surface dry aggregates at site. For exceptionally large repairs, the local Fosroc office should be consulted

Technical support

Fosroc offers a technical support package to specifiers, end users and contractors as well as technical on-site assistance in locations all over the country.

Design Criteria

Renderoc RG(M) can be applied in sections up to 100mm deep. For larger sections, the addition of approved aggregates may be required. This will depend on the specific configuration of the repair location. Fosroc office shall be contacted for further information.

Properties

The following results were obtained at a Water: Powder ratio of 0.16 @ 30^0C.

Test parameters	Typical results at 30^0C
Compressive strength (N/mm^2) IS 4031-6	Tested on 70.6 mm cubes
Age (Days)	Results
1 Day	24.0 N/mm^2
3 Days	45.0 N/mm^2
7 Days	55.0 N/mm^2
28 Days	65.0 N/mm^2
Tensile strength (ASTM C 307)	3.50 N/mm^2 @ 28days
Flexural strength (BS4551-1998)	
Age (Days)	Results
1 Day	2.5 N/mm^2
3 Days	7.0 N/mm^2
7 Days	9.0 N/mm^2
28 Days	10.0 N/mm^2
Young's Modulus (ASTM D 469– 94)	28 kN/mm^2
Expansion characteristics (ASTM C827-1987)	Unrestrained expansion 0 to 4%
Pressure to restrain plastic expansion	Approx.0.004N/mm^2
Coefficient of thermal expansion (ASTM C531)	11 x 10^{-6} / ^{0}C.
Fresh wet density (Mixed density @ 27^0C)	2100 - 2200 kg/m^3

Note: The typical physical properties given above are derived from testing in a controlled laboratory environment. Results derived from testing field-applied samples may vary, dependent on actual site conditions.

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Specification Clause

Performance specification

The fluid micro-concrete repair material shall be Renderoc RG(M), a single component, cement-based, micro-concrete to which only the site-addition of clean water (and approved graded coarse aggregates where specified) shall be permitted. The micro-concrete shall contain no metallic aggregates, or chlorides and shall be shrinkage compensated in the plastic state. The microconcrete should achieve a compressive strength of not less than 24N/mm^2 after 24 hours, 55N/mm^2 after 7 days and 65 N/mm^2 after 28 days at 30^{0}C. Most importantly, The flexural strength shall not be less than 10 N/mm^2 at 28 days. The microconcrete shall have a coefficient of thermal expansion similar to that of the host concrete. The mixed density of microconcrete shall exceed 2100 to 2200 kg/m3 at 27^{0}C.

Application instructions

Preparation

The unrestrained surface area of the repair must be kept to a minimum. 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 in place.

Defective concrete surfaces must be cut back to a sound base. Smooth surfaces should be mechanically roughened. Corroded reinforcing steel should be exposed around its full circumference and cleaned to remove all loose scale and corrosion deposits. It is important to clean the steel to a bright condition. Grit-blasting is recommended.

One coat of Nitozinc Primer should be applied on the reinforcing steel. If any discontinuity in the applied film is noticed, one more coat has to be applied.

In case the reinforcement needs to be protected from corrosion, it is advisable to install Fosroc Galvashield range of anodes as per the design and durability considerations.

Several hours prior to placing, the concrete substrates should be saturated with clean water. Immediately prior to placing, any free water should be removed.

Alternatively, all prepared concrete substrates should be primed using Nitobond EP, a slow - setting epoxy bond aid. Nitobond EP shall be applied only on dry substrate. In places where Fosroc Galvashield anodes are used contact Fosroc for the use of bonding agents.

Note : For concrete jacketing projects its difficult to maintain the open life of the bonding agent, for such cases please contact Fosroc. For repair sections generally deeper than 100mm it may be necessary to mix the Renderoc RG(M) with properly graded 5mm to 12mm silt-free aggregate to minimise temperature rise. The quantity of aggregate required may vary depending on the nature and configuration of the repair location. In case of addition of aggregates at site, please contact Fosroc.

Mixing

Care should be taken to ensure that Renderoc RG(M) is thoroughly mixed in a forced-action mixer of adequate capacity. Alternatively, mix in a suitably sized drum with a high torque (400/500 rpm) rotary drill fitted with a mixing paddle.

It is essential that machine mixing capacity and labour availability is adequate to enable the placing / pumping operation to be carried out continuously. The quantity of water required will generally be between 3.75 to 4 litres per 25 kg bag of Renderoc RG(M). The optimum water content should be determined and accurately measured into the mixer.

However it should not exceed 4.0 litres / 25 kg in any case. With the mixer running, slowly empty Renderoc RG (M) bag into the mixer. Mix continuously for 5 minutes, ensuring a smooth even consistency of the mix.

Where the addition of graded coarse aggregate has been specified it should be added after the water and should be mixed with Renderoc RG(M) properly. Mixing should then continue for a further 1 minute to ensure proper dispersion.

Form Work

Slurry tight form work that will not deform or leak when subjected to hydraulic pressure imposed by the micro concrete will be fabricated and erected where the material is gravity fed. Provision in the formwork will be made for a suitable feed hopper at the highest point. Where necessary, provision will be made for air vents to prevent air entrapment. Form work will be coated with Reebol mould releasing agent prior to fixing.

Placing

The mixed material should be placed immediately. If placed by pump, standard concrete pumping practice should be followed. The pump and pipeline must be primed with cement slurry. Pumping should be commenced immediately after priming. If poured in the form work, avoid air entrapment by pouring from one side only.

Low temperature working

In cold conditions down to 15^0C, the use of warm water (up to 30^0C) is advisable to accelerate strength development. Normal precautions for working with cementitious materials in winter should be adopted.

High temperature working

At ambient temperature above 35^0C the material should be stored in the shade and cold water used for mixing.

Curing

As Renderoc RG(M) is a cement-based repair material, it must be cured immediately after stripping the formwork in accordance with good concrete practice. Fosroc's Concure range of curing compounds can be used on the surface of the Renderoc RG(M) as a continuous film soon after stripping the form work. In harsh drying conditions, supplementary curing such as wet hessian and/or polythene sheeting must be used.

Estimating

Packaging

Renderoc RG(M) is available in 25 kg moisture resistant bags.

Yield

Approximately 12.5 litres per 25 kg bag. Actual yield per bag will depend on the consistency of Renderoc RG(M) and quantity of coarse aggregate added.

Storage

Shelf life

Renderoc RG(M) has a shelf life of 6 months if kept in a dry store in the original, unopened bags. If stored at high temperatures and/or high humidity conditions the shelf life may be reduced.

Precautions

Health and safety

Renderoc RG(M) contains cement powders which, during normal use, have no harmful effect on dry skin. However, when Renderoc RG(M) is mixed, or becomes damp, alkali is released which can be harmful to the skin. During use, avoid inhalation of dust and contact with skin and eyes. Wear suitable gloves, eye protection and dust masks. The use of barrier creams is recommended. In case of contact with skin, wash with clean 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. Renderoc RG(M) is non-flammable.

Additional Information

Fosroc manufactures a wide range of products specifically designed for the repair and refurbishment of damaged reinforced concrete. These include hand placed and trowellable repair mortars, fluid micro concretes, chemical resistant epoxy mortars, Fosroc Galvashield anodes and a comprehensive package of protective coatings. In addition, a wide range of complimentary products are available. These include admixtures, joint sealants, waterproofing membranes, grouting, anchoring, and specialised flooring materials.

Separate datasheets are available for each product.

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