Fosroc® Renderoc HB45

constructive solutions

High performance, hand / wet-spray applied, fibre reinforced high build, high strength, concrete reinstatement mortar 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 higher compressive strength is a consideration.

Renderoc HB45 has been specifically developed for the repair of columns and beams, but because of its medium fresh wet density, is also suitable for soffit repairs.

Renderoc HB45 is suitable for repair methods 3.1, 3.3, 4.4, 7.1, 7.2 as defined by BS EN 1504-3.

Advantages

- Exceptional handling characteristics - easy to finish
- High-build applications possible while maintaining higher compressive strengths — fewer layers
- Frequently obviates the need for formwork
- Polymer-modification provides extremely low permeability to water, carbon dioxide and chlorides
- Exceptional system of shrinkage compensation provides long-term dimensional stability
- Can be applied quickly and efficiently by wet spraying
- One component, pre-bagged to overcome site-batched variations
- Contains no chloride admixtures
- Suitable for use with cathodic protection systems
- Shade can be varied with Renderoc Lightener / Darkener*

Description

Renderoc HB45 is supplied as a ready to use blend of dry powders which requires only the site addition of clean water to produce a highly consistent, medium-weight repair mortar.

It is based on Portland cements, graded aggregates, lightweight fillers, fibres and chemical additives which provide the mortar with good handling and finishing characteristics while minimising water demand. The low water requirement ensures good strength gain and long-term durability.

Renderoc HB45 has been specifically engineered for vertical and overhead repair work. It can be applied in sections up to 80 mm thickness in vertical locations and up to 70 mm thickness in overhead locations in a single application without formwork. Thicker sections can be achieved by the use of formwork or can be built up in layers. Deep pockets can sometimes be filled in a single application dependent on the configuration of the pocket and the volume of exposed reinforcing steel.

Renderoc HB45 can be quickly and efficiently applied by the wet spray technique. Consult the local Fosroc office for further information.

The material should not be applied at less than 10 mm thickness.

CE	UKCA
0370 09 0370–CPR–0845	0836 22 UK 0836–CPR–22/F6049

DOP: UK9-25

Fosroc International Limited

Drayton Manor Business Park, Coleshill Road, Tamworth, B78 3XN, UK

Fosroc® Renderoc HB45

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

Compressive strength	Class R4 (>45 MPa)
Chloride ion content	<0.05%
Adhesion strength by pull-off test	≥ 2.0MPa
Thermal compatibility: freeze thaw cycling with immersion	≥ 2.0MPa
Carbonation resistance	Pass
Capillary absorption	0.5 kg / $m^{-2}.h^{-0.5}$
Elastic modulus	≥ 20 GPa
Reaction to fire	A2 s1 d0
Dangerous substances	Complies with 5.4

**Refer to separate datasheet*

Fosroc® Renderoc HB45

Properties

The following results were obtained at a water : powder ratio of 0.13 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 20 MPa @ 28 Days 50 MPa
Bond strength by pull off:	EN 1542:1999	≥ 2.0 MPa	2.1 MPa
Chloride ion content:	EN 1015-17:2000	≤ 0.05 %	0.01%
Freeze thaw cycling:	EN 13687-1:2002	≥ 2.0 MPa	2.0 MPa
Resistance to carbonation d_k	EN 13295:2005	≤ ref concrete	Complies
Capillary absorption	EN 13057:2002	< 0.5 kg/ $m^{-2}/h^{-0.5}$	0.09 kg/ $m^{-2}/h^{-0.5}$
Elastic Modulus in Compression	EN 13412	≥ 20 GPa	25 GPa @28 Days
Fire rating	EN 13501-1		Class A2 s1 d0 Non-Combustible
Flexural strength	BS 6319 Pt 3:1990	-	7.5 MPa @ 28 Days
Tensile strength	BS 6319 Pt3: 1985	-	4.0 MPa @ 28 Days
Setting time	BS4551:2005+A2:2013	-	Initial set: 3 hours Final set: 5 hours
Fresh wet density		-	Nominally 2000 kg/m^3
Shrinkage	ASTM C596-96	-	< 300 microstrain @ 7 days
Alkali reactive particles	Method TI-B 52	-	≤ 1.0 vol%
Chemical resistance		-	The low permeability of Renderoc HB45 severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen.
Highways England Specification	Resistivity		38000 ohm cm @ 28 days
Build Characteristics (hand applied) **Minimum thickness:** **Overhead:** **Vertical:**	- 	- 	 10 mm Up to 70 mm Up to 80 mm

Clarification of property values: The typical properties given above are derived from laboratory testing. Results derived from field applied samples may vary. Maximum build thickness is dependent on location of repair, water content and application technique.

Fosroc® Renderoc HB45

Specification clause

The repair mortar shall be Renderoc HB45 a one component polymer modified high build cementitious mortar conforming to the requirements of BS EN 1504-3 Class R4. The cured mortar shall achieve a compressive strength of 20MPa at 1 day, 50 MPa at 28 days and a drying shrinkage of <300 microstrain at 7 days. It shall be able to be applied in sections up to 80 mm thickness in vertical locations and up to 70 mm thickness in overhead locations in a single application with- out formwork. The product shall be mixed, applied and cured in accordance with the manufacturer's written instructions toa correctly prepared substrate.

Standards compliance

Renderoc HB45 complies with the classification R4 according to EN 1504-3, repair methods 3.1, 3.3, 4.4, 7.1 and 7.2.

Renderoc HB45 complies with Highways England, Standards for Highways, Specifications for Highways Works, clauses 5703, 5704, 5716 (Repair Mortar).

Application instructions

Preparation

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 10mmup 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.

Refer to HSE information sheet CIS36 regarding control of exposure to construction dust, available at www.hse.gov.uk.

Reinforcing steel priming

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.

Concrete Priming

The concrete substrate should be saturated surface dry immediately before the application of the primer i.e. it should be thoroughly saturated with clean water and any residual surface water removed prior to applying Renderoc Primer.

Under severe drying conditions repeated soaking may be necessary to ensure the substrate is still saturated at the time of application of the primer.

Add 3 parts by volume of Renderoc Primer Part A to 1 part by volume Renderoc Primer Part B (4 to 1 by weight) in a clean mixing vessel and mix with a spatula or slow speed drill until a homogeneous smooth slurry is produced.

Scrub Renderoc Primer slurry into the surface.

Renderoc HB45 can be applied immediately to the primed surface. If the primer dries apply another coat of primer before continuing.

Open bags of Renderoc Primer Part A should be sealed and stored in a dry area. Use within 14 days.

In exceptional circumstances, e.g. where a substrate/repair barrier is required or where the substrate is wet or likely to remain permanently damp, Nitobond EP bonding aid should be used. Contact the local Fosroc office for further information.

Mixing

Care should be taken to ensure that Renderoc HB45 is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Renderoc Mixing Paddle (MR4) in a slow speed (400/500 rpm) heavy-duty drill is acceptable for the occasional one-bag mix.

Free-fall mixers must not be used. Mixing of part bags should never be attempted.

For normal applications, depending on the consistency required, place 3.0 to 3.5 litres of drinking quality water into the mixer (typically 3.25 litres).

With the machine in operation, add one full bag of Renderoc HB45 and mix for a minimum of 3 minutes and a maximum of 5 minutes, until fully homogeneous.

The consistency may be adjusted (if required) by the addition of small amounts of water up to the maximum total water content of 3.5 litres.

Note that the powder must always be added to the water.

Mixing warning

As with other 'one pack' repair mortars, Renderoc HB45 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.

Application

Exposed steel reinforcing bars should be firmly secured to prevent movement during application.

Apply the mixed Renderoc HB45 by gloved hand or trowel, thoroughly compacting onto the primed substrate and around exposed reinforcement.

If sagging or slumping occurs Renderoc HB45 should be completely removed and reapplied at a reduced thickness to a correctly primed substrate.

Build-up

Additional build-up can be achieved by application of multiple layers.

The surface of the intermediate layers should be comb scratch-keyed and cured with Nitobond AR. Repriming with Renderoc Primer and a further application of Renderoc HB45 may proceed as soon as this layer has set.

Spray application

Renderoc HB45 can be quickly and efficiently applied by the wet spray technique. In circumstances where large areas of repair are required, the rapid placement and higher build attainable by this method offer economic advantages over hand-trowelling. The resultant repair also offers a generally more dense compound with enhanced mortar/substrate bond characteristics. For further details on wet spray techniques contact the local Fosroc office.

Finishing

Renderoc HB45 is finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats, or damp sponges, may be used to achieve the desired surface texture. The completed surface should not be overworked. After spray application, the mortar may need to be 'cut back' to the required profile using a steel float and then finished with damp sponges as described above.

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

Renderoc HB45 is a cement-based repair mortar. In common with all cementitious materials, it must be cured immediately after finishing in accordance with good concrete practice. The use of Nitobond AR, sprayed on to the surface of the finished mortar in a continuous film, is recommended. A low pressure atomising sprayer is essential for applying the Nitobond AR. Any excessive run-off on verticals or drips on soffits should be removed by brush before they harden.

Large areas should be cured as trowelling progresses (0.5 m^2 at a time) without waiting for completion of the entire area.

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 HB45 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 benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, bringing them 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. Dekguard products may be applied over the repair area without prior removal of the Nitobond AR curing membrane. Other curing membranes must be removed prior to the application of Dekguard products.

Cleaning

Renderoc HB45 and Renderoc Primer should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Clean tools used with Nitoprime Zincrich Plus and Nitobond EP before material cures using Fosroc Solvent 102.

Estimating

Supply

Renderoc HB45:	25 kg bags
Nitoprime Zincrich Plus:	1.9 litre and 800 ml cans
Renderoc Primer: Handy Pack:	20 Kg Part A + 5 litres part B 4 Kg Part A + 1 litre Part B
Nitobond AR:	5 and 25 litre drums
Fosroc Solvent 102:	5 and 25 litre tins

Fosroc® Renderoc HB45

Coverage and yield

Renderoc HB45:	Approximately 14 litres / 25 kg bag (approximately 1.4 m² at 10 mm thickness)
Nitoprime Zincrich Plus:	8 m^2/litre
Nitobond AR:	6 - 8 m^2/litre
Renderoc Primer	Approx. 13 litres - 2m^2/litre Handy pack 2.5 litres - 2m^2/ litre

Notes: the actual yield per bag of Renderoc HB45 will depend on the consistency used. Yield when spraying may be reduced due to variation in application techniques and also in the nature of possible substrates.

Limitations

Renderoc HB45 should not be used when the temperature is below 3°C and falling. Do not mix part bags. Renderoc HB45 should not be used in areas subjected to traffic (in these circumstances, Renderoc S should be considered).
Renderoc HB45 should not be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour.

Where compatibility with lower strength concrete is required, Renderoc HB30 should be used.

If any doubts arise concerning temperature or substrate conditions, consult the local Fosroc office.

Storage

The Renderoc HB45 and Renderoc Primer have 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.

Nitobond AR and Renderoc Primer Part B should be protected from frost.

Precautions

Health and safety

For further information refer to the appropriate Product Safety Data Sheet available at www.fosroc.com

Fire

Renderoc HB45 is 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

Fosroc and Renderoc are trademarks 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 Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of 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 of information given by basis. All Fosroc datasheets are updated on a regular basis. It is the user's responsibility to obtain the latest version.

Fosroc International Limited
Drayton Manor Business Park
Coleshill Road, Tamworth,
Staffordshire B78 3XN, UK

telephone: +44 (0)1827 262222
fax: +44 (0)1827 262444
email: enquiryuk@fosroc.com

www.fosroc.com

bsi. ISO 9001 Quality Management FM 610 ISO 14001 Environmental Management EMS 61113