

# Renderoc HB



## Single component lightweight fibre and polymer modified concrete reinstatement mortar for high-build applications

### Uses

For the reinstatement of large areas of concrete and for small, localised patch repairs. Renderoc HB is alkaline in nature and will protect embedded steel reinforcement. It is specifically designed for vertical and overhead high-build applications. The mortar is suitable where exceptional chloride and carbon dioxide resistance is required.

This mortar is approved for use with Norcure realkalisation. Refer to the Norcure note in the 'Application instructions' section of this data sheet for information.

### Advantages

- Lightweight formulation enabling extra high-build and thereby saving time and expense of multiple applications
- Reduces the need for formwork
- Can be applied by the wet spray process for fast, exceptionally high-build repairs with enhanced strength
- Extremely low permeability provides maximum protection against carbon dioxide and chlorides
- Excellent bond to the concrete substrate
- Shrinkage compensated
- Pre-bagged to overcome site-batched variations — only the site addition of clean water required
- Contains no chloride admixtures
- Renderoc Galvashield XP compatible

### Standards compliance

Renderoc HB, Nitoprime Zincrich, Nitobond HAR and Nitobond AR have been approved by the British Board of Agrément, Certificate No. 98/3461.

### Description

Renderoc HB 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, lightweight repair mortar. The material is based on Portland cement, graded aggregates, lightweight fillers and chemical additives and is polymer and fibre modified to provide a mortar with good handling characteristics, while minimising water demand. The hardened product exhibits excellent thermal compatibility with concrete and outstanding water repellent properties. The low water requirement ensures fast strength gain and long-term durability.

### Technical support

Fosroc offers a comprehensive range of high performance, high quality construction products. In addition, Fosroc offers a technical support service to specifiers, end-users and contractors, as well as on-site technical assistance in locations all over the world.

### Design criteria

Renderoc HB can be applied in sections up to 80 mm thickness in vertical locations and up to 50 mm thickness in overhead locations in a single application and without the use of 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 depending on the actual configuration of the pocket and the volume of exposed reinforcing steel. The material should not be applied at less than 10 mm thickness. Thicknesses generally greater than specified above can be achieved by spray application. Consult the local Fosroc office for further information.

### Properties

The following results were obtained at a water : powder ratio of 0.18 and temperature of 20°C.

Test method	Typical result
<b>Compressive strength</b> (BS 6319, Pt 2: 1983 — dry cure):	7 N/mm <sup>2</sup> @ 1 day 12 N/mm <sup>2</sup> @ 3 days 16 N/mm <sup>2</sup> @ 7 days 22 N/mm <sup>2</sup> @ 28 days
<b>Flexural strength</b> (BS 6319, Pt 3: 1983):	4.5 N/mm <sup>2</sup> @ 28 days
<b>Tensile strength</b> (BS 6319, Pt 7: 1985):	1.7 N/mm <sup>2</sup> @ 28 days
<b>Water absorption ISAT</b> (BS 1881, Pt 5: 1970) —	
10 minutes:	0.002 ml/m <sup>2</sup> /sec
2 hours:	0.001 ml/m <sup>2</sup> /sec



<b>Chloride diffusion (Taywood Method):</b>	$< 2 \times 10^{-10} \text{ cm}^2/\text{sec}$
<b>Carbon dioxide barrier —</b>	
<b>Equivalent thickness of concrete to Renderoc HB @ 10 mm (Taywood Method):</b>	800 mm
<b>Equivalent thickness of air to Renderoc HB @ 10 mm (Taywood Method):</b>	320 metres
<b>Coefficient of thermal expansion:</b>	$7 \text{ to } 12 \times 10^{-6}/^\circ\text{C}$
<b>Setting time (BS 4551, Pt 14: 1980) —</b>	
<b>Initial set:</b>	2 hours
<b>Final set:</b>	5 hours
<b>Fire rating (BS 476, Pt 4: 1970):</b>	Non-combustible (Class 0 surface)
<b>Fresh wet density:</b>	Approximately $1400 \text{ kg/m}^3$ dependent on actual consistency used
<b>Chemical resistance:</b>	The low permeability of Renderoc HB severely retards chemical attack in aggressive environments. The cured mortar is highly impermeable to acid gases, chloride ions, oxygen and water

## Specification clauses

### Steel reinforcement primer

The steel reinforcement primer shall be Nitoprime Zincrich, a single component zinc-rich epoxy resin. 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.

### Repair mortar

The fibre and polymer modified reinstatement mortar shall be Renderoc HB, a single component cement-based blend of powders to which only the site-addition of clean water shall be permitted. The cured mortar shall achieve a compressive strength of  $22 \text{ N/mm}^2$ , a flexural strength of  $4.5 \text{ N/mm}^2$  and a tensile strength of  $1.7 \text{ N/mm}^2$  at 28 days. Chloride diffusion coefficient shall be not greater than  $2 \times 10^{-10} \text{ cm}^2/\text{sec}$  (by the Taywood Method) and a 10 mm

section of cured mortar shall provide a carbon dioxide barrier equivalent to not less than 800 mm concrete or 320 metres air (by the Taywood Method).

## Application instructions

### Preparation

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 10 mm 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.

### 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

The 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 one coat of Nitobond HAR primer and scrubbing it well into the surface. Under severe drying conditions repeated soaking may be necessary to ensure the substrate is still saturated at the time of application of the primer. Renderoc HB can be applied as soon as the primer becomes tacky. If the Nitobond HAR is too wet, overhead and vertical build up of the Renderoc HB mortar may be difficult.

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 HB is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved spiral paddle 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, place 3.1 litres of drinking quality water into the mixer and, with the machine in operation, add one full 18 kg bag of Renderoc HB and mix for a minimum of 3 minutes (maximum 5 minutes). Note that powder must always be added to water. Dependent on the ambient temperature and the desired consistency, a small additional amount of water may be added up to a maximum total water content of 3.4 litres per 18 kg bag of Renderoc HB.

### Mixing warning

As with other 'one pack' repair mortars, Renderoc HB 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 avoid movement during the application process as this will affect mortar compaction, build and bond.

Apply the mixed Renderoc HB to the prepared substrate by gloved hand or trowel. First, work a thin layer of the mortar into the primer and then build the mortar on to this layer. Thoroughly compact the mortar on to the primed substrate and around the exposed reinforcement. Renderoc HB can be applied in sections up to 80 mm thickness in vertical locations and up to 50 mm thickness in overhead locations in a single application and without the use of formwork. Thicker sections should be built up in layers but are sometimes possible in a single application depending on the actual configuration of the repair area and the volume of exposed reinforcing steel.

If sagging occurs during application, the Renderoc HB should be completely removed and reapplied at a reduced thickness on to the correctly reprimed substrate.

Note: the minimum applied thickness of Renderoc HB is 10 mm.

### Build-up

Additional build-up can be achieved by application of multiple layers. The final thickness is dependent on the material consistency and substrate profile.

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

### Spray application

Renderoc HB can be 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 greatly enhanced mortar/substrate bond characteristics. For further details on wet spray techniques consult the local Fosroc office.

### Finishing

Renderoc HB 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.

### 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 cool water used for mixing.

## Curing

Renderoc HB is a cement-based repair mortar. In common with all cementitious materials, Renderoc HB 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 Renderoc HB in a continuous film, is recommended. Large areas should be cured as trowelling progresses (0.5 m<sup>2</sup> 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.

*Important note:* When using this mortar in conjunction with Norcure realkalisation, polymer bonding primers and polymer curing agents should not be used. Taped polythene should be used for curing. No steel primer should be applied. Section E of the Norcure Specifiers' Guide must be consulted for details. Refer to the local Fosroc office for further advice.

## Overcoating with protective decorative finishes

Renderoc HB 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 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. 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

Nitobond HAR, Nitobond AR and Renderoc HB 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 and Nitobond EP should be cleaned with Fosroc Solvent 102.

## Limitations

Renderoc HB should not be used when the temperature is below 5°C and falling. Do not mix part bags. Due to the lightweight nature of Renderoc HB, the product should not be used in areas subjected to traffic. Neither should it be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour. If any doubts arise concerning temperature or substrate conditions, consult the local Fosroc office.

## Estimating

### Supply

<b>Renderoc HB:</b>	18 kg bags
<b>Nitoprime Zincrich:</b>	1 litre cans
<b>Nitobond HAR:</b>	5 litre drums
<b>Nitobond AR:</b>	5 litre drums
<b>Nitobond EP:</b>	4.5 kg packs
<b>Fosroc Solvent 102:</b>	5 litre cans

### Coverage and yield

<b>Renderoc HB:</b>	14.5 to 15.0 litres / 18 kg bag (approximately 1.5 m <sup>2</sup> at 10 mm thickness)
<b>Nitoprime Zincrich:</b>	7.4 m <sup>2</sup> /litre
<b>Nitobond HAR:</b>	3 to 4 m <sup>2</sup> /litre
<b>Nitobond AR:</b>	6 to 8 m <sup>2</sup> /litre
<b>Nitobond EP:</b>	10 to 11.5 m <sup>2</sup> /pack

Notes: the actual yield per bag of Renderoc HB will depend on the consistency used. The yield will be reduced if the material is applied by a spray technique. 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

### Shelf life

All products have a shelf life of 12 months if kept in a dry store in the original, unopened bags or packs.

### 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. Nitobond HAR and Nitobond AR should be protected from frost.

Nitoprime Zincrich must be stored in accordance with the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972.

## Precautions

### Health and safety

Renderoc HB 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, Nitobond products and Fosroc Solvent 102 should not come in contact with the skin and 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 Nitoprime Zincrich and Nitobond EP, 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 HB, Nitobond HAR, Nitobond AR and Nitobond EP are non-flammable.

Nitoprime Zincrich and Fosroc Solvent 102 are flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO<sub>2</sub> or foam. Do not use a water jet.

### Flash points

<b>Nitoprime Zincrich:</b>	16°C
<b>Fosroc Solvent 102:</b>	33°C

For further information, refer to the Product Safety Data Sheet.

### Additional information

Fosroc manufactures a wide range of products specifically designed for the repair and refurbishment of damaged reinforced concrete. This includes hand-placed and spray grade repair mortars, fluid micro-concretes, chemical-resistant epoxy mortars and a comprehensive package of protective coatings. In addition, a wide range of complementary products is available. This includes joint sealants, waterproofing membranes, grouting, anchoring and specialised flooring materials.

Fosroc have also produced several educational training videos which provide more detail about the mechanisms which cause corrosion within reinforced concrete structures and the solutions which are available to arrest or retard these destructive mechanisms. Further information is available from the publication: 'Concrete Repair And Protection — The Systematic Approach', available in seven language formats.

For further information about products, training videos or publications, contact the local Fosroc office.



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