

|REPAIR METHODOLOGY OF



**Dakshinayan Apartments CGHS
Dwarka Sector 4, Dwarka Road, New Delhi**

HOUSING SOCIETY

Repair Recommendation:-

- A. Proper propping and safety arrangement should be made during the repair works. .**
- B. Pipe line joints to be sealed wherever there is leakage from the pipeline joints.**
- C. Patch repair to be done in spalling and corroded area wherever it is visible . This is applicable where spalling area is less than 0.5 Sqm and depth of spalling is less than 50 mm.**
- D. All major spalled area (0.5 Sqm in a single patch) where reinforcements are exposed and loss of reinforcement is more than 20% and depth of spalling is more than 50 mm to be repaired with RCC jacketing method (RCC Wall, Column, Beam & Slab.**
- E. Injection epoxy grouting to be done at voids, moist & cracks at RCC members.**
- F. Chajja should be dismantle if corroded and new light weight chajja to be used.**
- G. Protection coating & routine maintenance to be taken care at regular interval.**

Note:- Demolition of Non- structural members like Chhajjas (sunshades), parapet wall and Fins which are not intact with roof slab or main structural system should be demolished. Similarly all non-structural members which has lost its residual life and repairing cost is less than its support system costs like scaffoldings.

Proper propping and safety arrangement should be made during the repair works.

Chhajja

Which columns to be jacketed with RCC.

Wherever patch repair to be done

Pipe lines waste /rain to be separated and old damaged pipelines should be replaced with new one.

Repair Summary

Serial No	Repair Type/Structural members	Vulnerability/priority Order	Corrosion crack and spalling in RCC members	Grit Wash	Shaft wall	Repair of plumbing work in shaft area	External moist wall	Parapet Wall	Bathroom & kitchen wall	Balcony	Fins / Chhajja
1	Patch Repair-A	Vulnerability index 1									
2	Injection Grouting-B	Vulnerability index 1									
3	Dampness and Waterproofing-C	Vulnerability index 2									
4	Replacement Of Plumbing System And Shaft Area-E	Vulnerability index 2									
5	Demolition Of Structure-F	Vulnerability index 3									
6	Grit wash Application-D	Vulnerability index 4									
7	General Maintanance to be done by resident indivisually -G	Vulnerability index 5									

A. Patch Repair- Non Structural Repair Scheme

**Against Corrosion Cracks, Spalling
& Exposure of Reinforcement**

Members:- Beam-Column-Slab

**Reference:- wherever corrosion and
spalling are shown**

**Note:- Spalled area is less than 0.5
Sqm in a single patch**

**Depth of concrete spalling is less
than 50 mm**

Representative Distress Picture of Site- where patch repair is recommended



Patch Repair- Non Structural Repair Scheme

Execution Methodology

Patch repair

This method will be used when non-structural distresses occur in RCC sections and it get damaged by delamination of concrete and the reinforcement gets exposed due to corrosion or localized damage which are not effecting the structural system.

• SURFACE PREPARATION

1. Target the damaged area and remove the unsound concrete from the surface using a chipping hammer. The cut should be made in order to remove all the loose concrete and also draft should be given for better bonding of new material. Mark the perimeter of the repair area and give it a simple geometric shape like square or rectangular using a saw cutter. Cut 100 mm extra sound concrete around the spalled/damaged area.
2. Rub the rusted reinforcement bar with wire brush and wash it as necessary. Given conditions may be followed depending on repair area:
 - Repair area is large (greater than 10^6 mm^2) use abrasive material along with rust remover chemical (as per given material specifications) for rubbing the corroded steel bar. Apply rust remover on corroded steel bars in order to completely scrap off the rust and corrosion generating chemical agents.
 - Repair area is small (less than 10^6 mm^2) use water jet only.

• ADDITION OF REINFORCEMENT

Now the diameter loss of reinforcement is checked. Solution to this can be provided as if:

1. Diameter loss is less than 20% in a localised area , then additional steel of the type originally used is welded to the place where corrosion has occurred. The amount of steel reinforcement added is same as loss %.
2. Diameter Loss is 20% to 40% then additional steel is added to the entire reinforcement of same diameter and lap length of extra reinforcement should be designed as per IS 456:2000.
3. Diameter loss is greater than 40% universally, patch repair method is ineffective and not recommended and structure repair methods are used after complete structural adequacy analysis.
4. Apply anti-corrosive zinc coating to the old as well as newly added reinforcement bars to prevent further rusting.

• APPLICATION OF CONCRETE

1. In order to increase its adhesive properties between new and old concrete, epoxy or acrylic based adhesives can be used. For smaller regions acrylic bonding agent is used and for larger sections epoxy bonding agent is used. This helps in binding the new incoming surface (old hardened concrete and green concrete/repairing mortar) and helps in improving surface strain carrying capacity.
2. Shuttering & Form Work :
 - If the filling depth is less than 25mm, filling is done in single layer of PMC.
 - Else up to 50 mm depth, a layer of 25mm PMC is filled and when it is about to settle, another layer of epoxy adhesive is laid and new layer of PMC is applied.

Flow Chart Of Patch Repair Scheme For Non-structural Failures



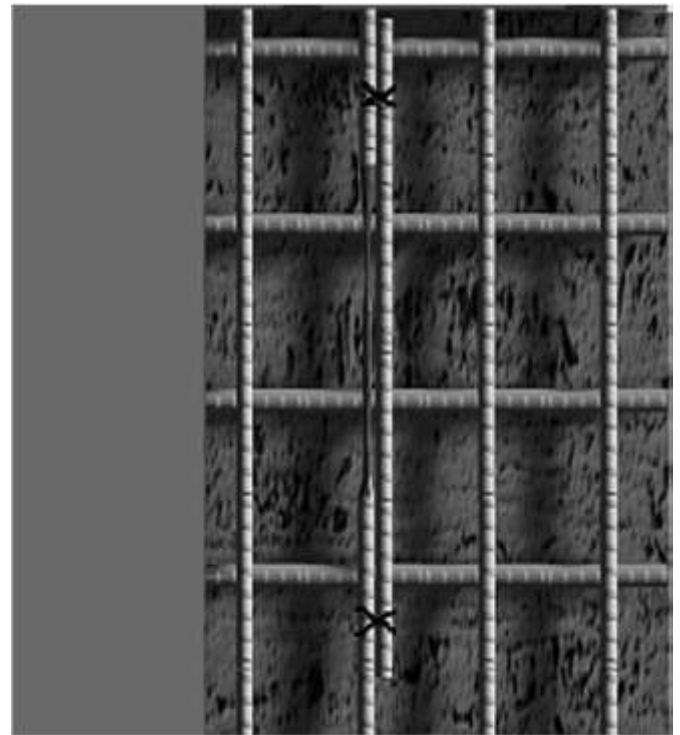
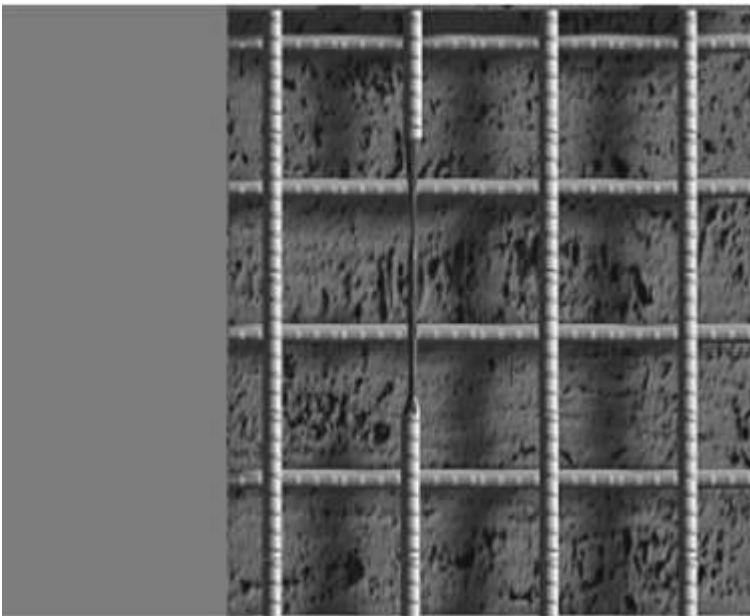
Pictorial Representation Of Execution- Vertical Members



Removal of loose concrete

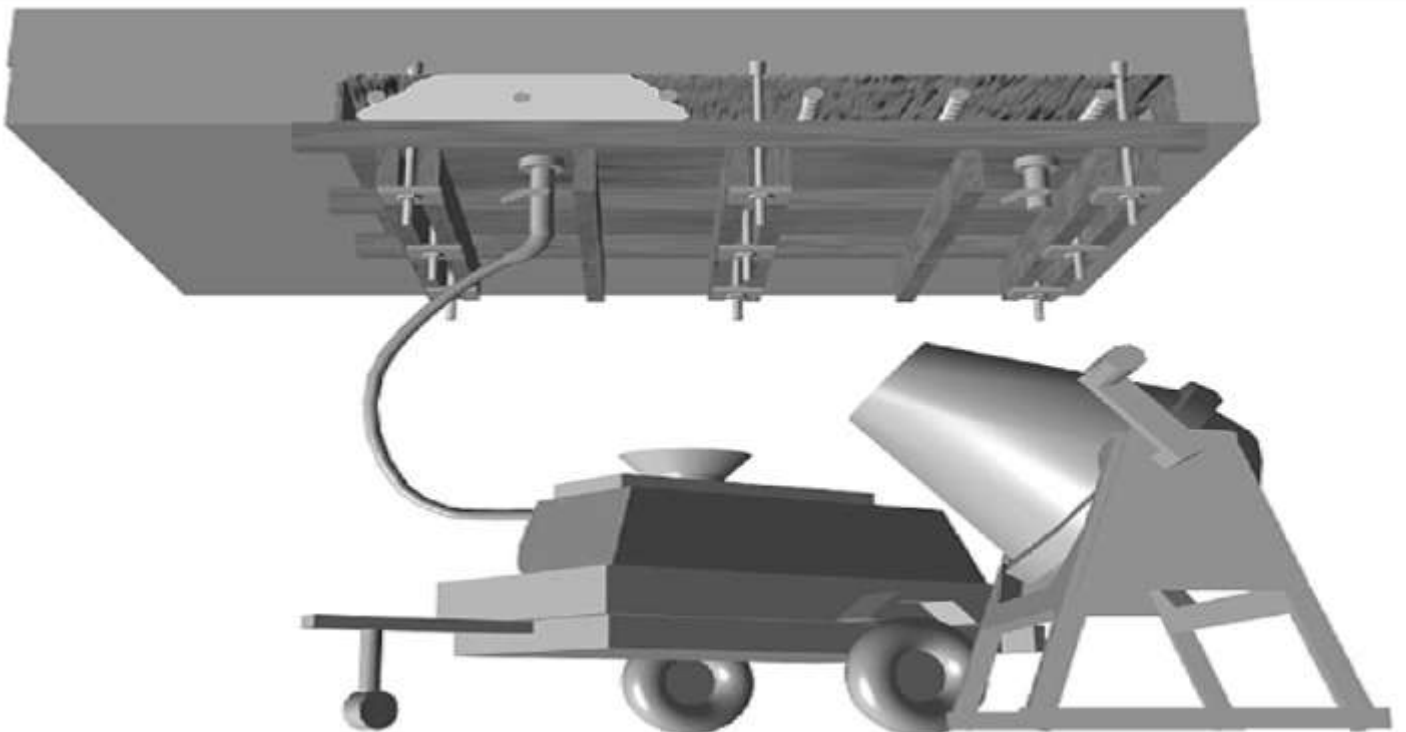
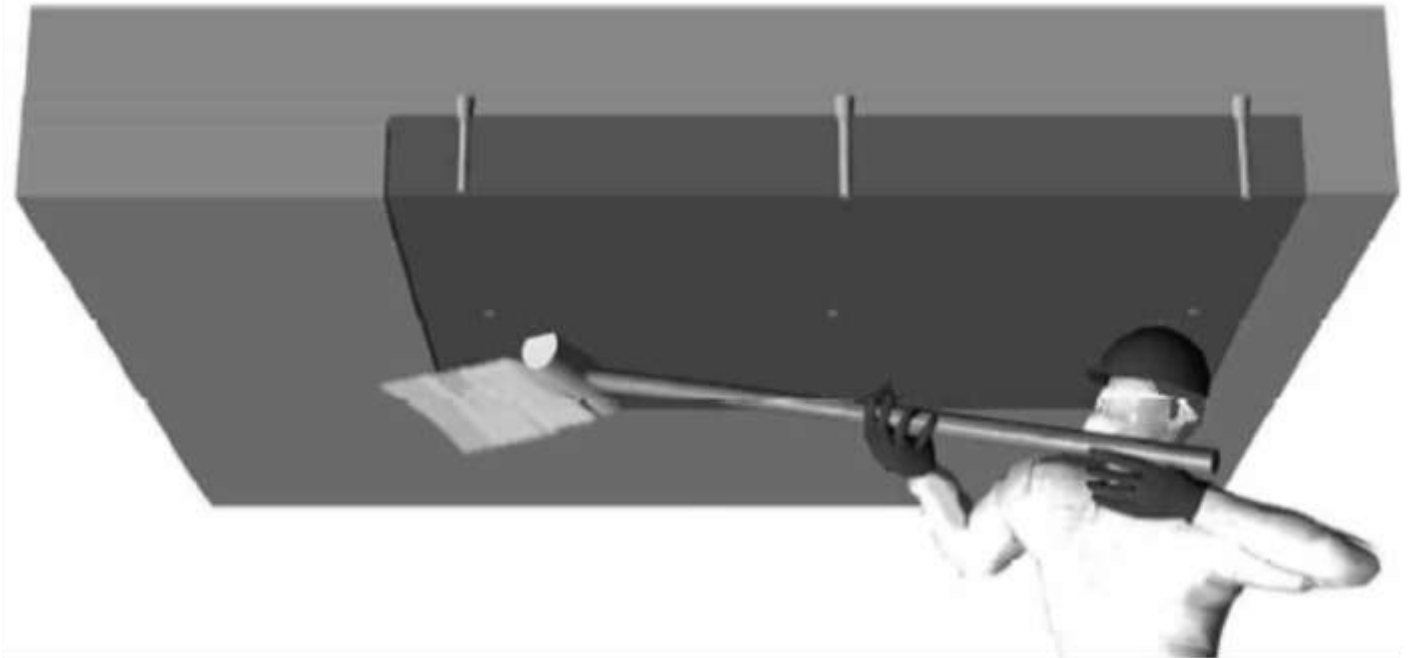


Marking perimeter of the repair area followed by cleaning of the rusted reinforcement bars



Rust removal and addition of steel

Pictorial Representation Of Execution-Horizontal Members



Filling up of removed section with PMC or Micro concrete

Pictorial Representation Of Execution

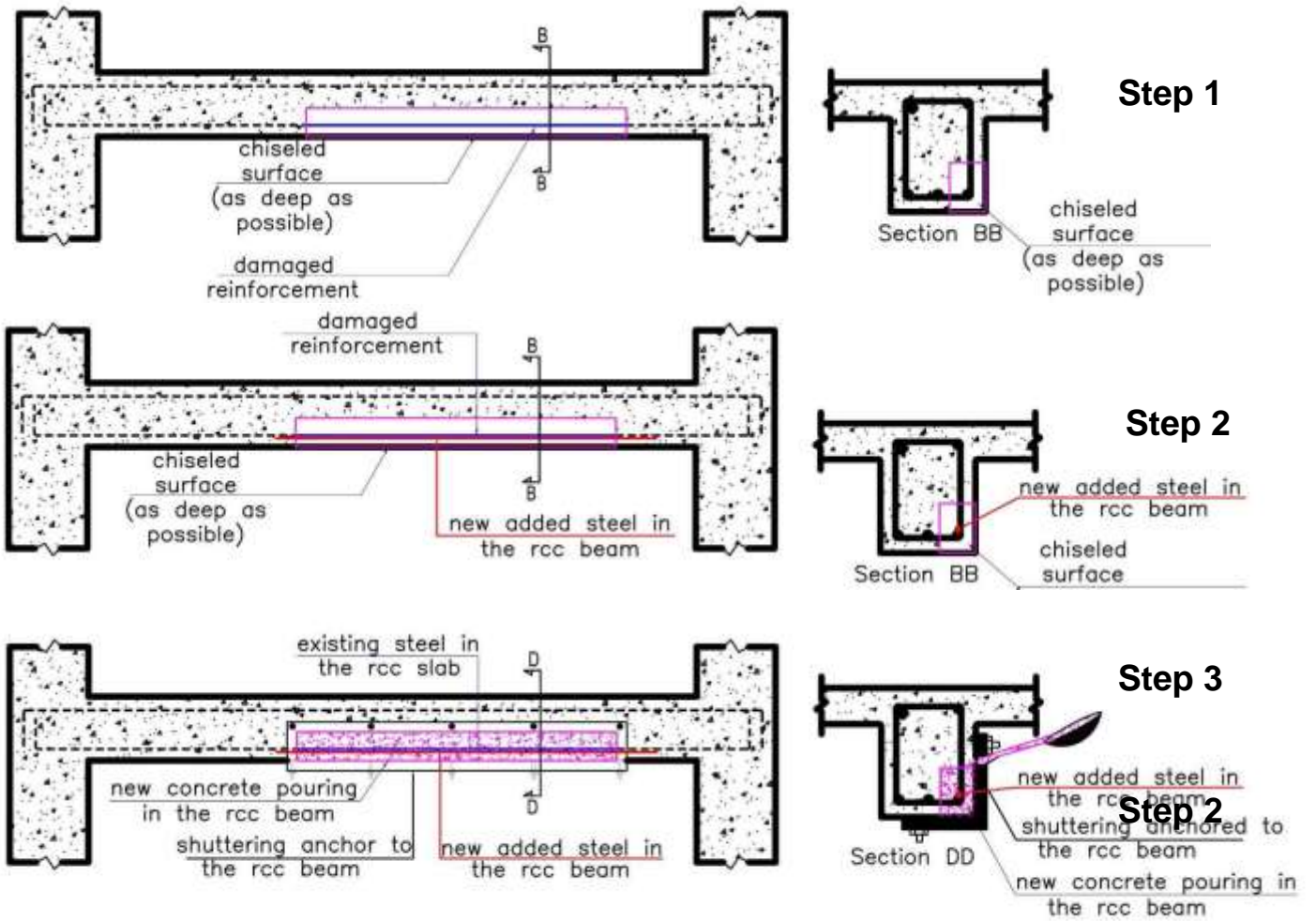


Pictorial Representation Of Execution

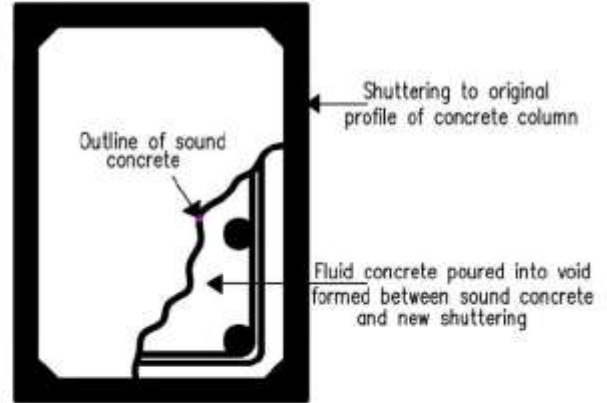
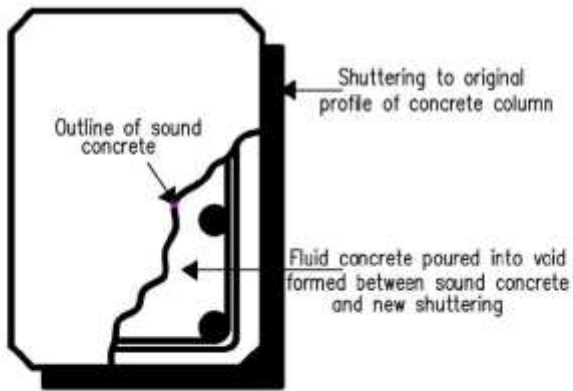


Standard drawings - Patch Repair Scheme of Beam/Slab

Use of Micro Concrete with addition of reinforcement

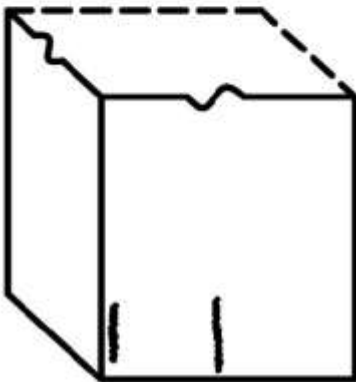


Standard drawings - Patch Repair Scheme for Column

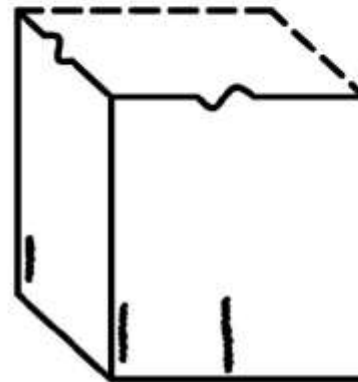


Plan on column to be repaired
(Two side damage)

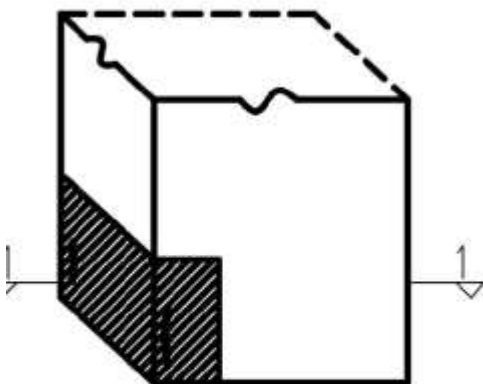
Plan on column to be repaired
(All sides damage)



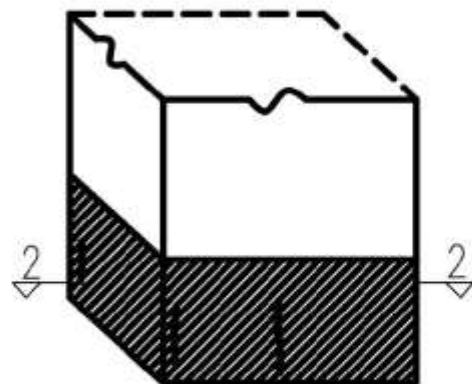
Before damage



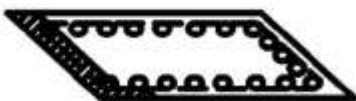
Before damage



After repair



After repair



sec-11

Repair scheme for column

(Two side Damage)



sec-22

Repair scheme for column

(Four side Damage)

B. Injection Grouting

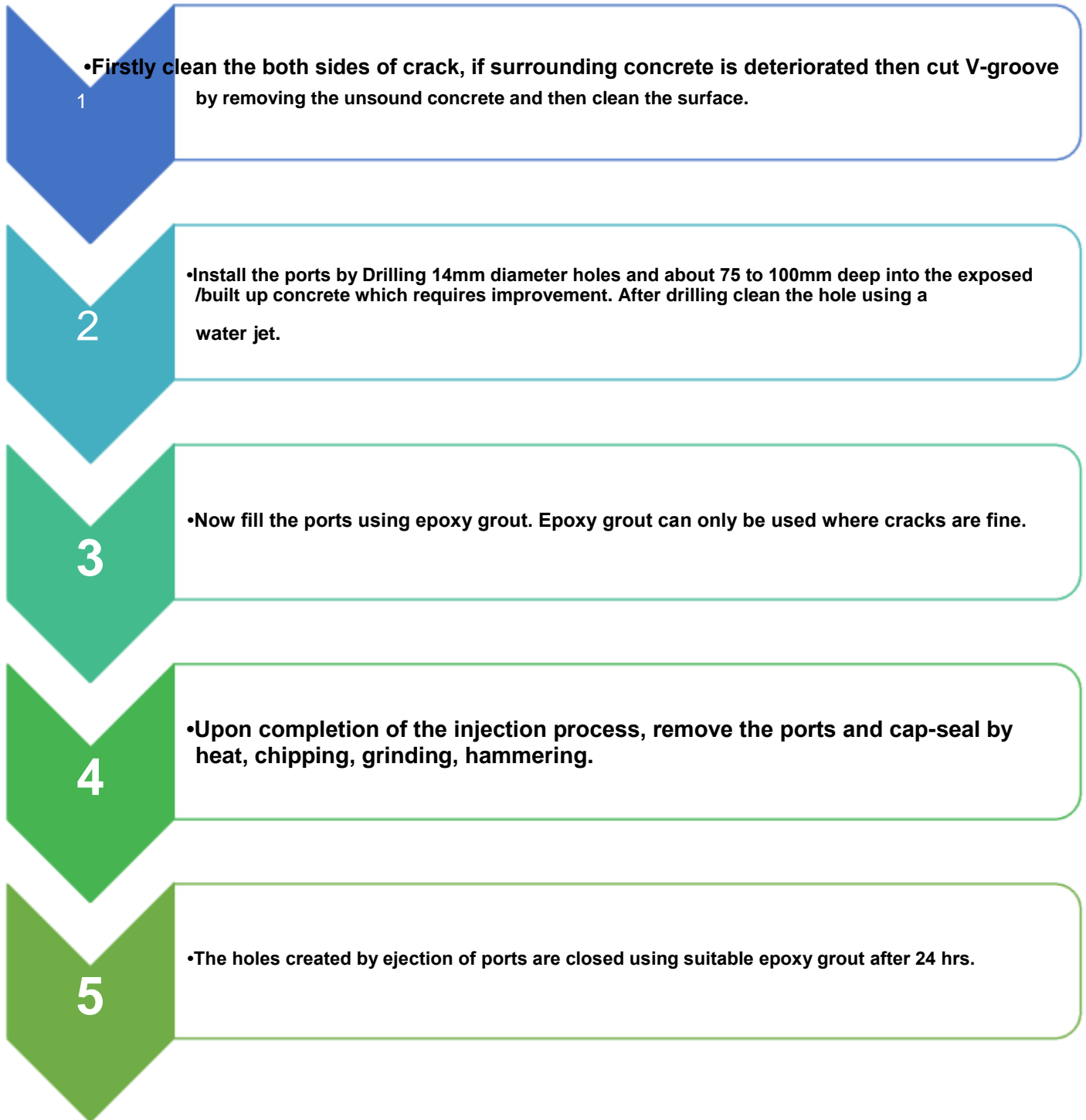
To minimize the seepage condition in balcony and seepage from bathroom area



• EPOXY GROUTING:- PROCEDURE

- Drilling 14mm diameter holes and about 75 to 100mm deep into the exposed /built up concrete which requires improvement at around 300mm c/c in staggered form from all surfaces**
- Thoroughly clean the holes with compressed**
- Fixing of Neoprene nozzle 12mm diameter and 40mm length into the holes with non shrink grade two component epoxy putty in order to carry out pressure grouting.**
- Let the packer is kept in position for 1 hrs to get the material cured for plugging being it as self packing material to avoid back flow of pressure.**
- Grouting the nozzle with high molecular weight low viscosity (2-5 cps) thermo-set polymer with pressure of 1 - 2.5 kg/cm² or/and with epoxy material of super low viscosity grade so that the material penetrates into the concrete to strengthen the matrix. Injection of Low viscous epoxy, the two-component epoxy injection resin shall be low viscosity resin system having viscosity less than 350 cps at ambient temperatures.**
- Cutting the nozzle and filling the cavity with epoxy putty**
- Removal of the Packer (Neoprene) portion after injected material gets cured.**

Flow Chart for Epoxy Grouting



Representative Picture of Injection (Epoxy Pressure Grouting)



C. DAMPNESS & WATERPROOFING



WATERPROOFING FOR MASONRY WALL

Recommended System for damp treatment of masonry walls:

Application Methodology: All the instruments & facilities to be shifted along the wall. Plastering to be removed entirely along the length of brick wall from inside starting from the floor level up to lintel level, which to be considered as effective area of treatment. Over the exposed brick surface, wire brushing to be done to make the surface smooth and make free from any residual plaster left on it. Joints of the brick work to be checked for soundness,

Pointing of brick wall by cement mortar (C:M – 1:4) admixed with styrene butadiene emulsion at a recommended dosage mentioned by manufacturer after removing the existing plaster, followed by Waterproofing coating with Two component cementitious, elastomeric waterproofing coating NITOCOTE CM 210 at 2mm thickness used for effective & durable waterproofing from positive side & as well as negative of wall.

Priming: Before application, the surface should be primed with Hydroproof Xtra as: 1 part of Hydroproof Xtra : 2 parts of Water : 4 parts of Cement Mixed at a coverage rate of 16-17m² for 1L of Hydroproof Xtra. Application of W/P Coating (two component elastomeric cementitious coating): Apply thoroughly mixed two component elastomeric cementitious coating NITOCOTE CM 210 using a soft bristled brush or roller or trowel over the prepared substrate. The first coat should be well brushed into the substrate and be applied at a w.f.t. of 1mm. Finish the application in one direction to give a neat appearance. Dampen the surface in case the brush begins to drag during application. The first coat should be allowed to cure for a period of 3 hours @ 35°C and longer at lower temperatures, prior to proceeding with the application of the second coat. The second coat also should be applied like the first coat at a w.f.t of 1mm, in one direction but does not require dampening of the surface. The total coating thickness will be 2mm in 2 coats. The material should be capable to arrest water/seepage from positive & negative side of wall when applied to either side.

Protect the treated surface with plaster of minimum thickness of 15mm at CM 1:4 admixed with styrene butadiene emulsion at a recommended dosage mentioned by manufacturer.

D. PROTECTIVE COATING AFTER REMOVING OF GRIT WASH



CRYSTALLINE CRACK HEALING MATERIAL/WATERPROOFING AT WALL

Crystalline admixtures should be mixed with dry cement @ 5 kg per 50 kg of cement. Sufficient water should be added to this mix to obtain slurry. The concrete surface should be saturated well with water and a crystallization waterproofing compound should be applied on the clean and saturated surface of the walls in 2 coats at 1 kg per m². A two-component epoxy resin based coating specially formulated for internal applications for the wall surface should be also be used after application of crystalline coating.

CEMENT-POLYMER COMPOSITE COATING SYSTEM (CPCC):

This is a new method developed by CECRI. This system has been developed to overcome demerits of inhibited cement slurry coating system.

This system consists application of one coat of rapid setting primer followed by a coat of cement polymer sealing product. The primer and sealing products have thermoplastic acrylic resin as basic raw material. Sealing product is formulated with resin mixed with cement as a pigments. Rapid setting primer and sealing coats both are patented item.

This system has been developed mainly as a factory / shop process. The approach behind development of this system is that the base metal of rebars, contains electrons which get readily released in corrosive environment leading to oxidation of iron and thereby formation of Fe_2O_3 (rust) as principal deterrent. In order to prevent this oxidation a surface coating capable of interacting / nullifying the released electrons is provided. Further pre-stressing and reinforcing steel, in concrete during service life, are exposed to an alkaline environment and this necessitates introductions of a top coat which should be compatible to primer and alkaline environment. To meet these two contingencies, suitable polymers are carefully tailored through the formation of a single phase in the polyblend which provides the necessary mechanical and physical properties.

Briefly the following steps are involved in the process:

- **SURFACE PREPARATION:**

The surface of the steel reinforcing bars to be coated is cleaned by abrasive (dry sand) blast cleaning to the near white metal in accordance with SSPC-SP10/NAC No.2-1994. It includes the following procedures.

- i. Prior to blast cleaning visible deposits of oil or grease are removed by suitable cleaning method.
- ii. Clean dry compressed air is used for nozzle blasting.
- iii. Dry uniformly graded silica sand is used for blast cleaning which should be free from contaminants.
- iv. Dust and residues are removed from prepared surface by brushing, blowing off with clean, dry air, vacuum cleaning.
- v. The prepared surface shall meet the visual standards of comparisons as in SPC-VIS 1 of SSPC-VIS 2.

- **APPLICATION OF THE COATING:**

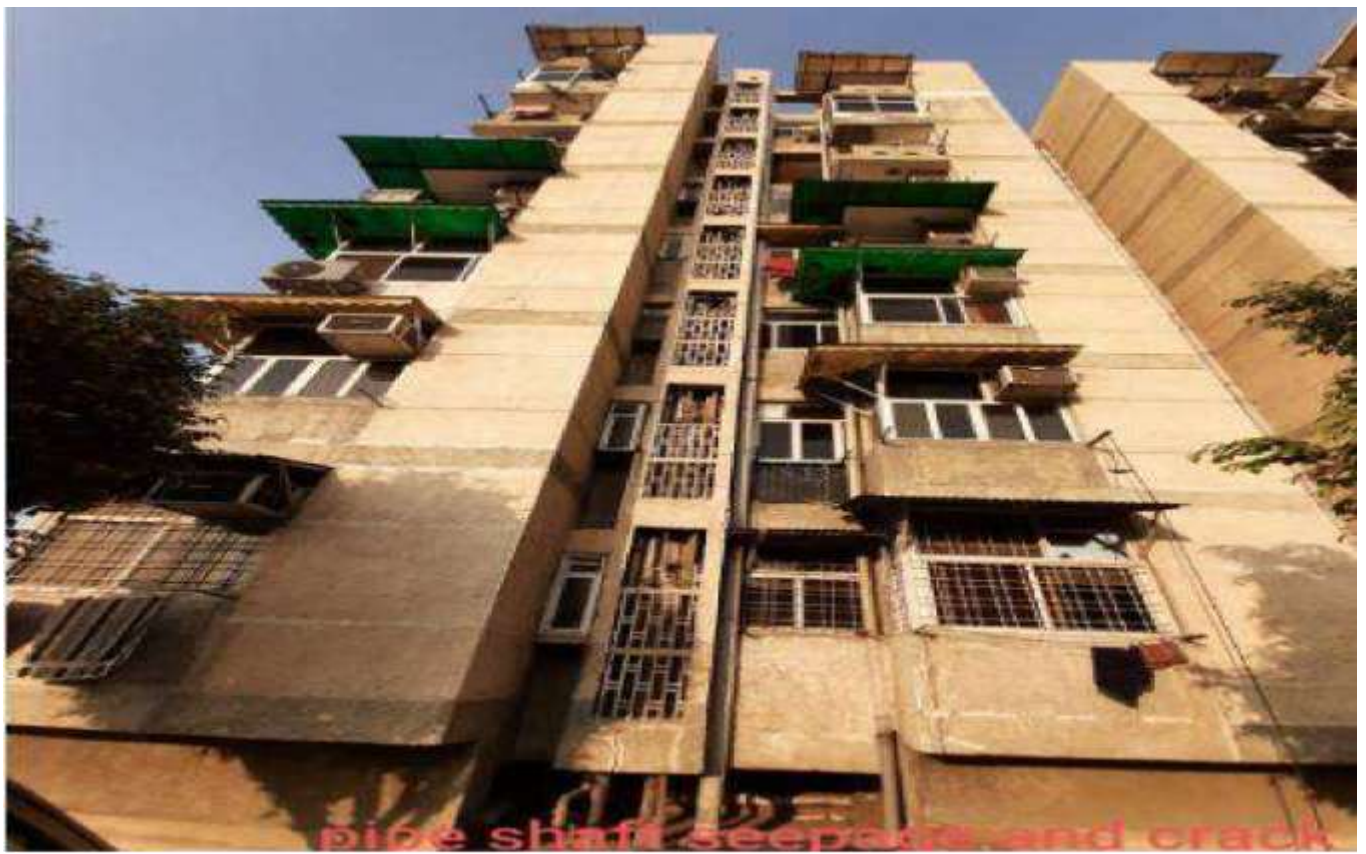
- i. **The coating is applied to the cleaned surface as soon as after cleaning and before oxidation of the surface discernible to the unaided eye occurs. However, the application of the coating should not be delayed more than 4 hr after cleaning.**
- ii. **A rapid setting primer shall be applied over the prepared surface of the reinforcing steel either by brushing or dipping.**
- iii. **After 30 minutes of application of the primer a cement polymer sealing coat shall be applied either by brushing or dipping.**
- iv. **The coated rods shall be handled after 6 hours.**

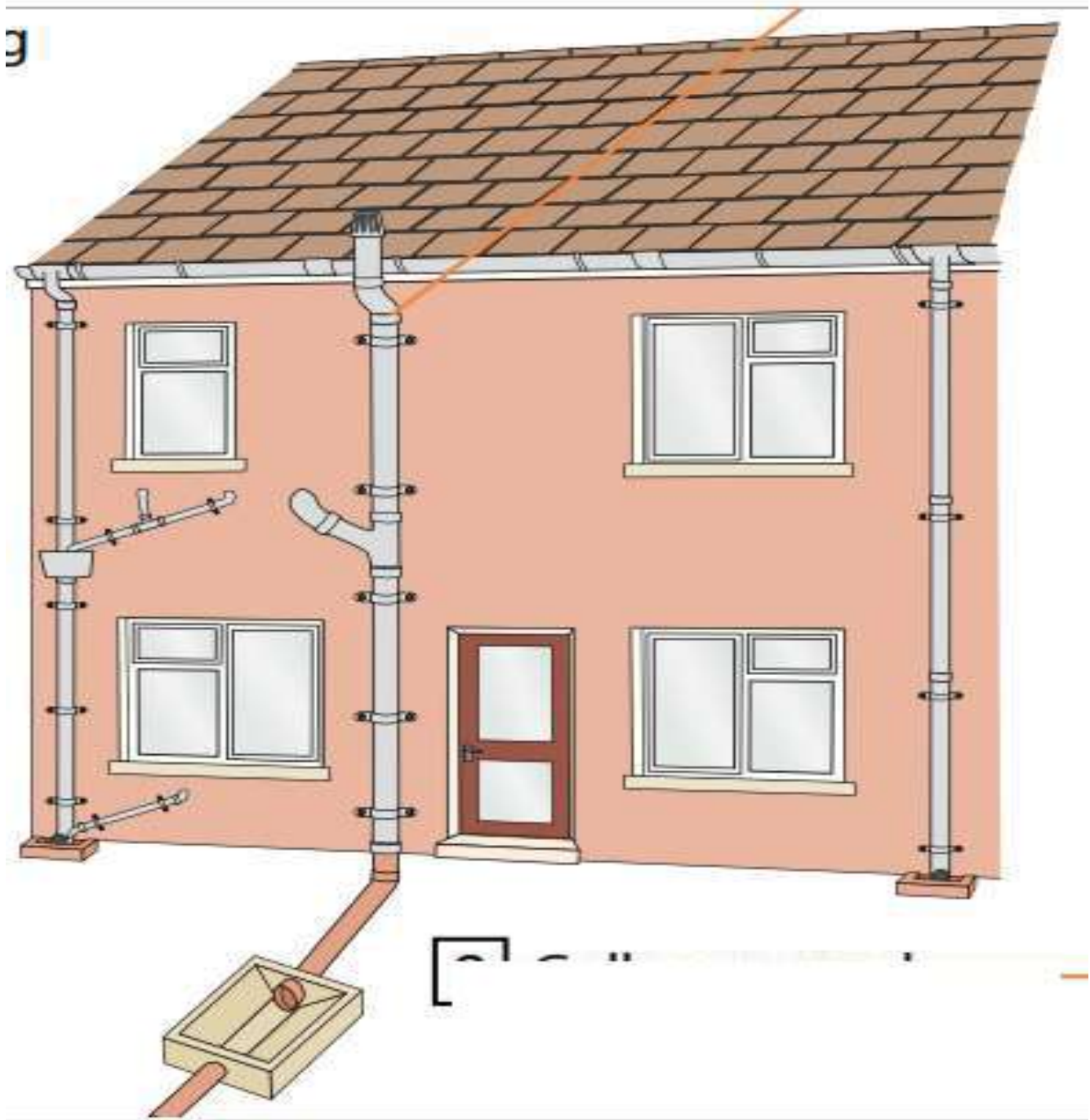
- **INSPECTION AND TESTING :**

Coated rebars shall be checked for minimum average dry film thickness, uniformity of thickness, defects such as cracks, peeling, bulging and uncoated areas etc. Coating shall be tested for adhesion, bond strength, abrasion resistance, chemical resistance . as per specifications laid down by the manufacturer.

- d) **Detailed specification of chemicals/solutions and quality control aspects, if required, may be obtained from CECRI, Karaikudi. Code of Practice for this system, as received from CECRI is annexed with the report as Appendix-II.**

E. Replacement of Damaged plumbing system and shaft area





**Note: All damaged plumbing works should be either repaired or replaced with new plumbing system
This is major source of leakage and seepage in the building**

Drainage System improvement approaching steps

Drainage systems can be classified into the rain-water pipe system and sewage pipe system. The integral parts of a drainage system comprise the drain pipes, traps and manholes.

Drain pipes should by no means be connected in an improper way, e.g. sewage discharged from sinks should not be emptied into any rain-water pipe.

Drainage outlets should be clear of rubbish or fitted with gratings to prevent rubbish from blocking the pipes.

All drain pipes, including soil pipes, waste pipes, ventilating pipes and underground drain pipes should be maintained in good working order without defects. All such pipes should be inspected regularly, and where leakage, blockage or defects are detected, they should be rectified immediately.

In order to prevent putrid air and insects in the soil pipe from entering the premises, sanitary installations including hand basin, sinks, bathtubs and showers toilets and floor drains should be fitted with a trap (U-shaped water trap, bottle traps or anti-siphon traps). If the installation is not used regularly, pour about half a litre of water into each drain outlet once a week. Then, pour a teaspoon of 1:99 diluted household bleach solution into the drain outlet. For floor drains, spray insecticide into the drain outlets after cleansing.

Manholes should be checked regularly and any blockage detected should be dealt with immediately.

Manholes should be readily accessible for regular maintenance. Access to them should not be obstructed by floor finishes, planters or furniture items. Foul air leaking from manholes can be stopped by using double seal type manhole covers, or repairing the edges of the manhole openings or cracks in the manhole covers.

Responsibilities for repair and maintenance of the drainage system is determined on whether the defective section of the pipe is for common use or for individual use. For example, if a rain-water pipe bursts, the owners' corporation or all owners shall be liable for repairing it. However, if a branch pipe connected to an individual flat is damaged, the owner or occupant of that flat shall be responsible for repairing it.

F. DEMOLITION OF STRUCTURE



DEMOLITION OF STRUCTURE

Most of sunshade area exhibit exposed corroded rebar shall be treated as beyond repair need to be dismantled safely. As more maintenance required and non-durable solutions should not applied to restore structure. So where concrete is severely deteriorated and strengthening of structure is not economical it should be demolished as per demolition guidelines. Exposed corroded rebar shall be treated as beyond repair need to be dismantled safely.

Demolition of Non-structural members like Chhajjas (sunshades), parapet wall and Fins which are not intact with roof slab or main structural system should be demolished. Similarly all non-structural members which has lost its residual life and repairing cost is less than its support system costs like scaffoldings etc :-

Most of sunshade area exhibit exposed corroded rebar shall be treated as beyond repair need to be dismantled safely. As less maintenance and durable solutions Fibre sheet or stone sunshade should be installed. Parapet wall should be cast at same boundary place with interval anchorage column.

External façade (fins and chhajja and parapet wall) need to be removed or demolished completely and should be recast in-situ

- **DEMOLITION OF CHAJJAS (SUNSHADES) AND FINS**
- External façade (fins and chhajja), Most of sunshade area exhibit exposed corroded rebar shall be treated as beyond repair need to be dismantled safely and recast in-situ with same RCC materials/durable materials. As less maintenance and durable solutions Fibre sheet or stone sunshade should be installed.



Fins/Chhajja made of durable materials

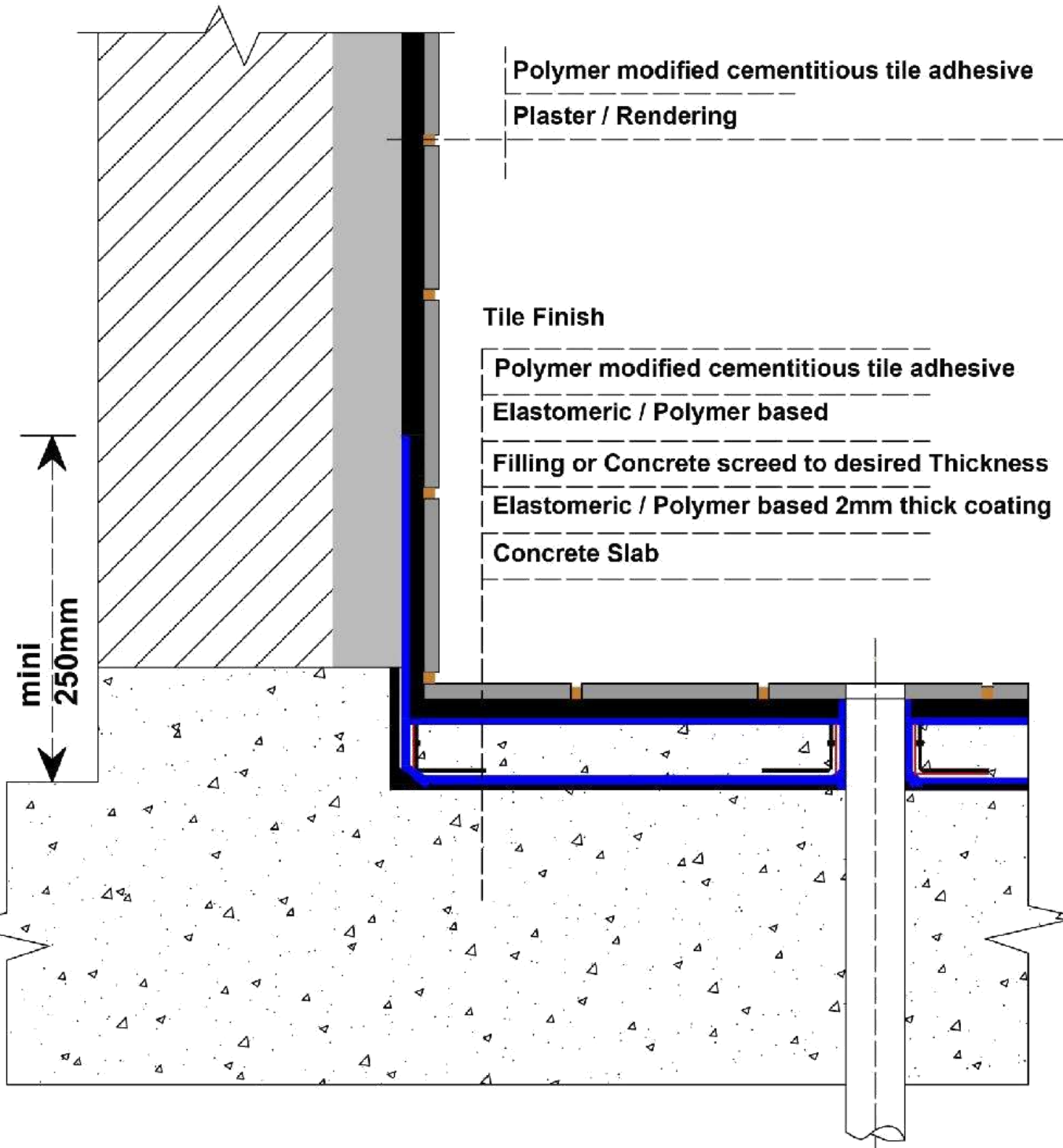
RCC Anchorage column at 2 meter interval in masonry parapet wall

Bathroom Repair
Technique which need
to be followed by
resident in individual
capacity

BATHROOM/TOILET/WATER LOGGING BODY IN HOUSES

Depressions are filled and leveled using PMC fillers. For the PMC filler the mixing ratio is 1 kg cement: 1.5 kg silica sand and 0.52 waterproofing materials. Application of one coat of waterproofing Polymer Modified Cementitious (PMC) slurry coating over the prepared concrete surface. The slurry shall be spread out over an area which can be covered with fiber glass fabric before the slurry dries out. Unroll the fibre glass fabric on to the wet slurry layer and impregnate with PMC slurry by pressing the fabric down so as to even out all wrinkles. Application of one coat waterproofing slurry coating over the glass fabric should be done so as to fill and over the fabric. Application of one coat waterproofing - PMC brush topping over the waterproofing slurry coating applied surface after the slurry coat has dried on the next day. Providing protective overlay of 25mm minimum thick screed concrete / plaster to slope of (1 in 100) admixed with Integral Cement Waterproofing compound after curing of PMC brush top coating.

NOTE: Polymer is mixed with neat cement in the ratio of 100 kg cement: 52 kg of waterproofing materials. The mix has to be stirred thoroughly until no air bubbles remain in the mix and lump found in the mix, should be removed.



ACRYLIC WATERPROOFING OF BATHROOM

Periodic Maintenance

There are two ways to execute periodic maintenance :

1. Protective Coating :
 - a. using existing site specifications
 - b. following alternate protective measures (explained below)
2. Crystalline Crack Healing (Cracks in Paint (coating) i.e. crack limited to paint thickness) after removal of paint.
3. Expansion Joint

• **PERIODIC MONITORING SCHEDULE OF STRUCTURE :**

Inspection should be done systematically, taking notes to identify the nature of problems observed as well as their severity and location. Structure can be kept intact and integral up to its service life by maintaining only surface protection such plaster, protection coating, waterproofing and patch repair time to time. At the time interval of 5 years health assessment of structure should be done to ensure the serviceability as well as safety of existing structure.

GENERAL COMMENTS

- Are records of pervious inspections available? Have they been reviewed?
- Are there previous engineering reports available? Have they been reviewed?

ISOLATION JOINTS AND EXPANSION JOINT S

- Are there any leaks through isolated joint seals and expansion joint seals?
- Are leaks related to failure of seals adjacent concrete?
- What type isolation joint or expansion joint seal is installed?
- Consult the manufacturer for repair recommendations if applicable?

JOINT SEALANTS

- Are there any signs of leakage, loss of elastic properties, separation from adjacent substrates or cohesive failure of the sealant?
- If bearing pads have been used under beams, are they present and in good condition? Are bearing pads squashed, bulging out of place, or missing?

EXPOSED STEEL

- Is there any exposed embedded reinforcing steel or connections due to the spalling or chipping of concrete cover?
- Is rust visible?
- Is it surface rust or is there significant loss of section?
- Is repainting required?
- What is the condition of attachment point and surrounding concrete?

PREVIOUS REPAIRS

- Are previous repairs performing satisfactorily?
- Are the edges of pervious patens tight?
 - Does the patch sound solid when tapped?

- **STRATEGY FOR PROTECTION IN FUTURE**

Repair of all concrete where rebar corrosion and carbonation has occurred is suggested. It is necessary to ensure effective water proofing of all exposed concrete structural members and concrete slabs to protect the rebar against corrosion process. A repair method is suggested and such a repair method is effective only, when the same is done to near perfection. The application of treatment is equally important as the material of treatment. It is worth mentioning at this stage that timely repair can save the repair cost significantly. Life of the repair is expected to be at least 15-20 years when properly executed. Protective coating should be applied on the concrete surfaces to minimize the penetration of carbonation/moisture ingress inside pour of concrete.

If moisture ingress is continue then patch repair becomes ineffective and same type of spalling and crack will appear within the year. So, **external surface treatment is required** along with patch repair. The most sever deterioration from these corrosive occurs on the exposed wall and the slab underside surface (in contact with soil) at and above the flow line. Released hydrogen sulfide from waste water is converted into sulfuric acid by aerobic microbial oxidation. These sulfuric acid attack on concrete causes abrasion as well as easily erosion of aggregate and cement mortar.

Product Data Sheet
 Edition 16/07/2007
 Identification no:
 02 08 01 01 014 0 000000
 Friazinc® R

Friazinc® R

Epoxy based zinc rich primer for steel

Product Description	Two component, low solvent, zinc rich epoxy resin based primer for steel.
Uses	Used as protective coating or as primer Specially suitable for objects which are subjected to mechanical wear, e.g, weirs, interior of pressure pipe line, gates, steel liner of penstocks and tanks etc.
Characteristics / Advantages	Easy to apply Fast application High mechanical properties Good adhesion to substrate Fast curing Resistance to weathering
Product Data	
Form	
Appearance / Colours	Part A: grey liquid Part B: light brown liquid
Packaging	Part A: 1.88 kg x 2 containers Part B: 0.12 kg x 2 containers Part A+B: 2.00 kg x 2 ready to use units
Storage	
Storage Conditions / Shelf-Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging, in dry conditions at temperatures between +5°C and +35°C. Protect from frost
Technical Data	
Chemical Base	Epoxy resin



Density	Part A: ~ 2.37kg/l Part B: ~ 0.96kg/l Mixed resin: ~ 2.28 kg/l All density values at +27°C
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Solid Content	~76% (by weight)
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Application Temperature	Min 8 ⁰ C, Max 30 ⁰ C
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Mechanical / Physical Properties

Resistance

Thermal Resistance

Exposure*	Dry heat
Permanent	+ 50 °C

*No simultaneous chemical and mechanical exposure.

System Information

System Structure	With out Top coat: 2 x Friazinc [®] R Priming under Top coat: 1 x Friazinc [®] R * For the application onto gypsum plaster boards, please refer to 'Notes on Application / Limitations'.
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Application Details

Consumption / Dosage

Coating System	Product	Consumption
Primer	Friazinc [®] R	~ 0.15 -0.25 kg/m ²

These figures are theoretical and do not allow for any additional material due to surface porosity, surface profile ,variations in level and wastage etc.

Substrate Quality	The substrate must be clean, dry and free of all contaminants such as dirt, oil, grease, coatings and surface treatments, etc. If in doubt apply a test area first.
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Substrate Preparation	Steel must be Blast cleaned to Sa 2 1/2 according to EN ISO 12944, Part 4. Blast cleaning is the best. If cleaned by alternate means, substrate should be free from rust.
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Application Conditions / Limitations

Substrate Temperature	+8°C min. / +35°C max.
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Ambient Temperature	+8°C min. / +35°C max.
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Substrate Moisture	≤ 4% moisture content.
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Content	Test method: Sika [®] Tramex meter, CM - measurement or Oven-dry-method. No rising moisture according to ASTM (Polyethylene-sheet).
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Relative Air Humidity	75% r.h. max.
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Application Instructions

Mixing	Part A : Part B = 94 : 6 (by weight)
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Mixing Time	Fraizinc [®] R is supplied in two parts. Stir Part A well to remix any settled material. Add Part A to Part B in the ratio of 94 : 6. Then mix thoroughly for about 3 to 5 minutes until a smooth and even consistency is achieved.	
Mixing Tools	Fraizinc [®] R must be thoroughly mixed using a low speed electric stirrer (300 - 400 rpm) or other suitable equipment.	
Application Method / Tools	The surface to be coated should be prepared well before mixing of the two components of the Fraizinc [®] R. The mixed material should be applied by appropriate brush and should be consumed within two hours after mixing at 30°C.	
Cleaning of Tools	Wash all the tools with Sika [®] Colma Cleaner immediately after use. Hardened material can only be removed mechanically.	
Potlife	2 kg mass	
	Temperature	Time
	30° C	~2 hours
Waiting Time / Overcoating	Fraizinc [®] R on Fraizinc [®] R	
	Temperatures	Time
	+10°C	~ 240 minutes
	+20°C	~ 120 minutes
	+30°C	~ 60 minutes
	Top coat on Fraizinc [®] R	
	Temperatures	Time
	+10°C	~ 480 minutes
	+20°C	~ 240 minutes
	+30°C	~ 120 minutes

Curing Details

Applied Product ready for use

Temperature	Tack free time	Full cure
+10°C	~ 8 hours	~ 10 days
+20°C	~4 hours	~ 7 days
+30°C	~ 2 hours	~ 7 days

Value Base

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

Health and Safety Information

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.

Legal Notes

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Sika India Pvt. Ltd.
Commercial Complex II
620, Diamond Harbour Road
Kolkata, 700 034, India

Phone +91 33 2447 2448/2449
Telefax +91 33 2468 8688/2665
www.sika.in
info@in.sika.com

Product Data Sheet
 Edition 01/01/2014
 Identification no:
 02 06 01 00 006 0 000012

Sika[®] Rustoff 100

Rust remover cum passivator

Product Description	Sika [®] Rustoff 100 is a single component liquid that removes rust and prevents further rusting of steel structures by providing a passivating coat.
Uses	Sika [®] Rustoff 100 removes rust and prevents further rusting of: New or old reinforcement steel in construction Embedded steel in repairable structures Various steel structures like tanks, water pipelines, effluent pipelines, trusses, purlins, rafters etc. Ball bearings, valves, tools etc. Ideal for protecting reinforcements with insufficient cover or in thin sections
Characteristics / Advantages	Removes rust Prevents further rusting by providing a passivating coat To be applied with brush, cotton waste swab or spray gun on the affected metal surface Easy to apply since it is in liquid form For repairable structures when applied with brush /spray gun can reach even the most difficult rusted areas with congested reinforcements
Product Data	
Form	
Appearance / Colours	Clear liquid
Packaging	250g, 500g, 1kg, 5kg, 20kg
Storage	
Storage Conditions/ Shelf-Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging in dry conditions at temperatures between +5°C and +35°C.
Technical Data	
Density	1.01 kg/l at 30°C
System Information	
Application Conditions / Limitations	



Substrate Temperature	+5°C min. / +50°C max.
Application Details	
Consumption / Dosage	1kg covers 3- 5 sqm in 2 coats (depending on the diameter of the rods) 0.120 to 0.150 kg/ sqm per coat depending on extent of rusting and nature of substrate.
Substrate Quality	Substrate should be free from oil, dirt and grease. For concrete remove cement skin, loose particles etc. Cavities, pin holes should be levelled.
Substrate Preparation	For heavily rusted surface, first clean mechanically by wire brushing, sand blasting etc. depending on the extent of corrosion.
Application Instructions	
Application Method / Tools	Apply Sika [®] Rustoff 100 by brush, cotton waste swab or spray on the effected metal surface. Leave it in contact with the surface till the reddish colour of the corroded surface has changed to nearest original black. Excess application may sometime give whitish black surface. After a minimum 24 hours remove the loose rust particles by brush. After the removal of loose rust any reddish rusted surface still left has to be re-treated with Sika [®] Rustoff 100. After the surface dries up totally (within 48 hours). Clean the surface with water jet and allow it to dry. Apply a preventive coating like Sika [®] Rustop.
Cleaning of Tools	Wash tools with Sika [®] Colma Cleaner immediately after use. Hardened material can only be removed mechanically
Notes on Application / Limitation	The surface should be dry before application of Sika [®] Rustoff 100.
Value Base	All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.
Health and Safety Information	For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.
Legal Note	The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.



Sika India Pvt. Ltd.
Commercial Complex II
620, Diamond Harbour Road
Kolkata, 700 034, India

Phone +91 33 2447 2448/2449
Telefax +91 33 2468 8688/2665
ind.sika.com
info.india@in.sika.com

Product Data Sheet
 Edition 27/12/2007
 Identification no:
 02 04 02 03 001 0 000000
 Sikadur[®]-32

Sikadur[®]-32

Epoxy resin bonding agent

Product Description	Sikadur [®] -32 is a solvent-free, two component bonding agent, based on selected epoxy resins. Complies with ASTM C 881-78 type II, Grade 2 Class B+C
Uses	Sikadur [®] -32 provides a bond of far greater strength than the tensile strength of the concrete itself. Therefore it is suitable for use as a structural bonding agent for : New to existing concrete Mortar Steel, Iron
Characteristics / Advantages	Easy to mix and apply Solvent free Unaffected by moisture Highly effective even on damp surface Workable at low temperatures High tensile strength
Tests	
Approval / Standards	Conforms to ASTM C 881-78, Type II, Grade 2, Class B+C.
Product Data	
Form	
Colours	Part A: white Part B: black Part A+B mixed: light grey
Packaging	3 kg (A+B) Prebatched unit Part A: 2 kg plastic container Part B: 1 kg plastic container
Storage	
Storage Conditions / Shelf Life	12 months from date of production if stored properly in original unopened, sealed and undamaged packaging, in dry conditions at temperatures between +5°C and +40°C. Protect from direct sunshine.
Technical Data	
Chemical Base	Epoxy resin.
Density	1.70 kg/l (Part A+B mixed) (at +27°C)
Change of Volume	Shrinkage / Creep: Hardens without shrinkage.



Mechanical / Physical Properties

Compressive Strength

(According to ASTM C 881)

Curing time	+30°C
7 days	40 N/mm ²

Flexural Strength

(According to IS 9162-1979)

Curing time	+30°C
10 days	30 - 35 N/mm ²

Tensile Strength

(According to ISO 527)

Curing time	+30°C
14 days	18 - 20 N/mm ²

Bond Strength

(According to ASTM C 882)

Curing time	Temperature	Substrate	Bond strength
14 days	+30°C	Concrete dry	2.5 - 3 N/mm ² *

Strength Development

Confirm the strength development by producing cubes on site and testing them for compressive and flexural strength.

System Information

Application Details

Substrate Quality

Mortar and concrete must be older than 28 days (dependent on environment and strength).

Verify the substrate strength (concrete, mortar).

The substrate surface (concrete, mortar) must be clean and free from frost standing water.

Steel substrate must be de-rusted similar to Sa 2.5.

Concrete substrate must be sound and all loose particles must be removed.

Substrate Preparation

Concrete, mortar:

Substrates must be sound, dry, clean and free from laitance, ice, standing water, grease, oils, old surface treatments or coatings and all loosely adhering particles to achieve a laitance and contaminant free, open textured surface. Cement laitance must be removed and the surface to be treated must be mechanically roughened

Steel:

Must be cleaned and prepared thoroughly to an acceptable quality i.e. by blastcleaning and vacuum.

Application Conditions / Limitations

Substrate Temperature +25°C min. / +40°C max.

Ambient Temperature +25°C min. / +40°C max.

Material Temperature Sikadur[®]-32 must be at a temperature of between +10°C and +40°C for application.

Substrate Humidity When applied to mat moisture concrete, brush the adhesive well into substrate.

Application Instructions

Mixing Part A : Part B = 2 : 1 (by weight)

Mixing Time



Pre-batched units
 Mix parts A+B together for at least 3 minutes with a mixing spindle attached to a slow speed electric drill (max. 600 rpm) until the material becomes smooth in consistency and a uniform grey colour. Avoid aeration while mixing. Then, pour the whole mix into a clean container and stir again for approx. 1 more minute at low speed to keep air entrapment at a minimum. Mix only that quantity which can be used within its potlife.

Application Conditions / Limitations

After mixing, apply directly to the prepared substrate by brush, roller or spray. On damp surfaces, ensure that it is well brushed in.
 Pour new concrete within specified open time, as long as material is still tacky.

Coverage

0.3 – 0.8 kg/m², depending on substrate condition

Cleaning of Tools

Clean all tools and application equipment with Sika[®] Colma Cleaner immediately after use. Hardened / cured material can only be mechanically removed.

Potlife

(According to EN ISO 9514)

Temperature	Sikadur [®] -32
30°C	25 min

The potlife begins when the resin and hardener are mixed. It is shorter at high temperatures and longer at low temperatures. The greater the quantity mixed, the shorter the potlife. To obtain longer workability at high temperatures, the mixed adhesive may be divided into portions. Another method is to chill parts A+B before mixing them (not below +5°C).

Open time

Temperature	Sikadur [®] -32
30°C	50 minutes

Notes

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

Health and Safety Information

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.

Transportation Class

Users shall refer to the most recent Material Safety Data Sheet

Legal Notes

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Sika India Pvt. Ltd.
 Commercial Complex II
 620, Diamond Harbour Road
 Kolkata, 700 034, India

Phone +91 33 2447 2448/2449
 Telefax +91 33 2468 8688/2665
 www.sika.in
 info@in.sika.com

Product Data Sheet
Edition 05/05/2012
Identification no:
02 02 01 01 006 0 000008
SikaRep® Microcrete-4

SikaRep® Microcrete-4

Ready to use non-shrink, cementitious micro concrete

Construction

Product Description	SikaRep® Microcrete-4 is factory designed pourable, non shrink, repair concrete with selected cement, aggregate and other chemicals. Recommended water and coarse aggregate to be added at site as per requirement.
Uses	SikaRep® Microcrete-4 is mainly recommended for the repair of damaged concrete structures e.g. Columns Beams Slabs, etc. It is also recommended for grouting of large gaps.
Characteristics / Advantages	A properly designed concrete which can be pumped or poured into restricted Placement without any vibration. Expansion system compensates for shrinkage settlement in plastic stage. Easy to mix and apply, high flow characteristic, rapid strength development, good bond with old concrete Contains no added chloride

Product Data

Form

Appearance / Colour Grey powder

Packaging 30 kg bags.

Storage

Storage Conditions / Shelf-Life 6 months from date of production if stored properly in undamaged and unopened, original sealed packaging, in dry conditions at temperatures between +5°C and +40°C. Protect from moisture, direct sunlight and frost.

Technical Data

Bulk Density 1.2 kg/l (of fresh mortar) at 27 °C

pH Value 11 - 13.5 when mixed with water (ready to pour).

Mechanical / Physical Properties



Compressive Strength	(According to ASTM C 1107 – 99)	
	Curing Time	Curing Temperature (30°C)
	1 day	> 25
	3 days	>3 5
	7 days	>4 5
28 days	≥65	

Flexural Strength	(According to ASTM C 293 – 79)	
	Curing Time	Curing Temperature (30°C)
	7 days	>4. 0
28 days	≥5.0	

Tensile Strength	(According to ASTM D 412 – 87)	
	Curing Time	Curing Temperature (30°C)
	7 days	>2. 0
28 days	≥3.0	

Note The above mentioned values are based on concrete produced by mixing SikaRep[®] Microcrete-4 and 10mm down aggregate in proportion of 2:1 (by weight).

System Information

Application Details

Consumption	1760 kg of powder/ cubic metre of concrete
Productiveness	1 bag yields approximately 13.5 litres of mortar.
Substrate Preparation	All concrete surfaces should be clean, sound and free from loose particles, oil, grease, etc. Metal surfaces should be scale, rust, oil and grease.

Application Instructions

Mixing	4.2 to 4.8 l of water per 30 kg bag dependent on the desired flow.
Mixing Time	SikaRep [®] Microcrete-4 can be mixed both in paddle type and slow speed grouting mixture or drum type concrete mixer. In both the cases the powder SikaRep [®] Microcrete-4 is to be added to water and mix till a pourable consistency is obtained with recommended water – powder ratio as per technical data. Do not mix more Microcrete that can be used within 15 minutes. DO NOT ADD ANY EXTRA WATER. For field mixing Sika technical department may be consulted.
Application Method/ Tools	Pour the SikaRep [®] Microcrete-4 after mixing into the area to be covered /filled. During filling if required, ensure proper air displacement.
Cleaning of Tools	Clean all tools and application equipment with water immediately after use. Hardened / cured material can only be removed mechanically.
Notes on Application / Limitations	When ready to pour SikaRep [®] Microcrete-4 is workable for 20 minutes after mixing at +30°C).

Value Base All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

Health and Safety Information For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.

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Sika India Pvt. Ltd.
Commercial Complex II
620, Diamond Harbour Road
Kolkata, 700 034, India

Phone +91 33 2447 2448/2449
Telefax +91 33 2468 8688/2665
www.sika.in
info@in.sika.com

Product Data Sheet

Edition 12/12/2012
 Identification no:
 02 03 02 04 003 0 000100
 SikaTop®-122 HS

SikaTop®-122 HS

Polymer modified one component repair mortar for hand and machine application

Product Description	SikaTop®-122 HS is a pre-batched one component polymer modified repair mortar.
Uses	Repair of spalling and damaged concrete in buildings, bridges, infrastructure and superstructure works
Characteristics / Advantages	Easy to use (only to be mixed with water) Structural and cosmetic repairs Can be applied up to 40 mm thick in vertical layers Good adhesion Suitable for hand and machine application by wet spray application

Product Data

Form	
Appearance /Colour	Grey powder
Packaging	30 kg bag

Storage

Storage Conditions/ Shelf-Life	6 months from date of production if stored properly in undamaged original sealed packaging, in dry conditions at temperatures between +5°C and +40°C.
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Technical Data

Chemical Base	Portland cement, polymer redispersable powder, selected aggregates and additives.
Density	Fresh mortar density: ~ 2.1 kg/l at 27 °C
Grading	2.36 mm down

Mechanical / Physical Properties

Compressive Strength	(According to ASTM C109)	
	1 day	~ 20 N/mm ²
	7 days	~ 45 N/mm ²
	28 days	~ 60 N/mm ²



Flexural Strength

(According to ASTM C293-79)

7 days	~ 3 N/mm ²
28 days	~ 5 N/mm ²

System Information**Application Details**

Consumption Dependent on the substrate profile and the thickness of the layer applied. As a guide, ~ 1.9 kg of powder per m² per mm thickness.

Productiveness 1 bag yields ~16 litres of mortar.

Substrate Quality

Concrete:
The concrete shall be free from dust, loose or friable material, surface contamination or other materials which reduce bond or prevent suction or wetting by repair materials.

Steel Reinforcement:
Rust, mill scale, mortar and concrete residues, dust and other loose or friable material which reduces bond or contributes to corrosion shall be removed to a standard equivalent to SA2.5.

Substrate Preparation

Concrete:
Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable mechanical or very high pressure water-blasting techniques (up to 110 MPa).

Tie wire fragments, nails and other metal debris embedded in the concrete should be removed.

The edges around areas of concrete removal should be angle cut at a minimum of 90° to avoid undercutting and a maximum angle of 135° (with the top surface of the adjacent sound concrete), to reduce the possibility of de-bonding. They should then be roughened sufficiently to provide a mechanical key between the original material and SikaTop®-122 HS repair mortar.

Ensure sufficient concrete is removed from around embedded or exposed steel reinforcement to allow application of the anti corrosion coating when required and adequate compaction of the repair material.

Steel reinforcement:
Surfaces should be prepared using abrasive blast cleaning techniques or high pressure water-blasting techniques (up to 60 MPa).

Where exposed reinforcement is contaminated with chlorides or other material which may cause corrosion, the reinforcement should also be cleaned by low pressure water-blasting (up to 18 MPa)

Bonding primer:
On a well prepared and roughened substrate a bonding primer is generally not required. When a bonding primer is not required pre-dampen the surface to a saturated surface dry condition. The surface should not be allowed to dry before application of the concrete repair mortar. The surface should have a darkened matt appearance without glistening and the surface should not have free-standing water.

When a bonding primer is necessary, apply Sika® Latex modified bond coat - (Refer to the relevant Product Data Sheet). Pressed well on to the substrate. In all cases, subsequent application of the repair mortar should be done 'wet on wet'.

Measured 'pull off' values - Structural Repairs minimum value 1.2 - 1.5 MPa; Non Structural repairs minimum value 0.7 MPa (Dependent on the strength of the concrete being repaired)..

Application Conditions / Limitations

Substrate Temperature +5°C min. / +40°C max.

Ambient Temperature +5°C min. / +40°C max.

Application Instructions	
Mixing	~ 3.9 litres of water for 30 kg powder
Mixing Time	Pour the water in the correct proportion into a suitable mixing container. While stirring slowly, add the powder to the water. Mix thoroughly for at least for 3 minutes to the required consistency.
Mixing Tools	SikaTop [®] -122 HS should be mixed with a low speed (< 500 rpm) hand drill mixer or for machine application, using a forced action mixer with 2 to 3 bags or more at once dependent on the type and size of mixer. In small quantities, SikaTop [®] -122 HS can also be mixed manually by hand.
Application Method / Tools	SikaTop [®] -122 HS can be applied either manually using traditional techniques or mechanically using wet spray equipment. When a bonding bridge is required, ensure it is still 'tacky' when the repair material is pressed on ('wet on wet' technique). When applied manually, press the repair mortar firmly with a trowel, pushing it well on to the substrate. Finishing with both hand and machine application, can be done with as soon as the mortar has started to stiffen.
Cleaning of Tools	Clean all tools and application equipment with water immediately after use. Hardened material can only be removed mechanically.
Potlife	+20°C : ~ 30 minutes
Notes on Application / Limitations	Avoid application in direct sun and/or strong winds. Do not add water over recommended dosage. Do not add additional water during the surface finishing as this will cause discoloration and cracking. Cure freshly applied material correctly and protect from freezing etc.
Curing Details	
Curing Treatment	Protect the fresh mortar from excess evaporation from the surface and early dehydration using the relevant curing method.
Value Base	All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.
Health and Safety Information	For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.
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Sika India Pvt. Ltd.
Commercial Complex II
620, Diamond Harbour Road
Kolkata, 700 034, India

Phone +91 33 2447 2448/2449
Telefax +91 33 2468 8688/2665
www.sika.in
info@in.sika.com

EMACO™ S46 T

Dual-shrinkage compensated, micro-concrete for concrete repairs

Description

EMACO S46 T repair micro-concrete is a dual shrinkage-compensated, high flow, high strength formulation for structural concrete repairs. EMACO S46 T is suitable for placing in nominal thickness of 25mm to 200 mm.

When mixed, applied and cured in accordance with the manufacturer's instructions, EMACO S46 T provides a durable, strong structural repair fully compatible with host concrete.

Uses

EMACO S46 T is the ideal material for vertical or horizontal structural repairs wherever the thickness of repair is more than 25mm thick and use of pourable mortar is preferable to hand or machine applied repair systems. Typical applications are:

- Extensive repairs to beams, columns and other structural elements.

- Repair of structural members subjected to repetitive loading.

Repairs to industrial structures

- Repair of structural members subjected to repetitive loading.

- Jacketing of beams, columns and other structural elements for strengthening.

Advantages

Dual shrinkage compensated.

One component – only addition of water

- Quality controlled – Uniform, predictable results
- No additional bonding agent required

Impermeable to aggressive elements.

Pourable mortar – faster and easier placing

Typical Properties

Appearance	: Grey powder
Water/powder ratio, by weight	: 0.14
Fresh wet density	: 2250 kg/m ³
Compressive strength,	: 15 MPa at 1 Day
(ASTM C109, 7cm cube)	: 25 MPa at 3 Days
	: 35 MPa at 7 Days
	: 40 MPa at 28 Days

Specification Clause

The dual shrinkage-compensated, cementitious micro-concrete shall be EMACO S46 T, high flow, single component cementitious formulation. The repair micro-concrete shall have compressive strength minimum of 25 MPa at 3 day and 40 MPa at 28 days. The repair mortar shall not require polymer bonding agent as primer.

Directions for use

Surface Preparation

Correct substrate preparation is critical for optimum performance.

The prepared surface should be structurally sound and free from contaminants. Remove concrete that has been saturated with oil or grease. Simple light sandblasting will not provide a sufficient profile for most repairs.

Depending on the substrate condition and environmental requirements, use an effective method for removal of weak concrete such as, wet grit blasting, high pressure water jetting and needle scaling.

Saw cut the boundary of repair area perpendicular to the surface to at least 20 mm depth and remove concrete within the saw-cut boundary at least to that depth. Where saw cutting is not possible, after material removal, prepare the edge of the repair area vertical.

Prepare the final surface free from dust and debris and to a rough profile with at least 5 mm level difference between surface troughs and peaks.

Where rebars are corroded, cut back the concrete to at least 20 mm behind rebars. Grit blast around the rebars to remove corrosion products. Replace the affected part of rebar if the diameter after grit blasting is found reduced by more than 20% of the original diameter.

Note: It is recommended that the decision on replacement of rebars is taken based on the advice of the structural engineer responsible for the works. For superior protection from corrosion in aggressive environments, coat the rebars with CONCRETE ZRi – the zinc rich primer or with STRUCTURITE PRIMER in environments not laden with chlorides. Saturate the prepared surface with clean water for at least one to two hours before applying the mortar.

Formwork

Proper design of formwork is essential for effective repair.

The forms must be of good quality, treated with a chemical release agent such as RHEOFINISH 202 for smooth release, provided with water drain holes, strong and well braced to withstand the fluid pressure of the mortar until it hardens. If required, consult BASF representative for advice.

Mixing

Mechanical mixing is necessary. Use a slow speed electric drill fitted with a spiral paddle for 1-2 bags mixing. For larger batch size, use a pan type mixer, or a tilting drum type mixer.

Place approximately 80% of the water in the mixer. Keeping the mixer running, add EMACO S46 T slowly.

Mix for 3-4 minutes or until a lump free mix is obtained. Add the remaining water while continuing to mix until the desired consistency is achieved.

Water requirement

Consistency	Min. water content per 25 kg	Max. water content per 25 kg
Sprayable or Trowelable	13% (3.25L)	15% (3.75L)

If ambient temperature is $>30^{\circ}\text{C}$, use chilled water and condition the bagged product in an air-conditioned store prior to use. Maximum mixed temperature should be no more than 35°C . EMACO S46 T can be used when the ambient temperature is between 5 and 40°C .

Placing

Place the mixed mortar within 20 minutes by pouring or pumping. Place continuously into the pouring hopper of the formwork until completion. Do not vibrate EMACO S46 T.

Strike off the formwork after 1 - 3 days.

For repairs beyond 100 mm in thickness, extend EMACO S46 T with up to 25 kg of 5-12 mm sized, washed, saturated surface-dry(SSD), graded, low absorption, high density aggregates. Please consult your local BASF representative for advice.

Subsequent protective finishes:

Depending on the environment of the structure, protect the entire structure with MASTERSEAL 200 H or PROTECTOSIL BH N protective systems. Where it is necessary for aesthetic reasons to retain natural concrete background the use of MASTERSEAL 550 is recommended.

Curing

Apply a uniform coat of MASTERKURE 181 (see separate data sheet) by roller or low-pressure spray immediately after striking formwork.

Cleaning

Clean all tools and equipments with water immediately after use. Hardened material can be removed using mechanical means.

Coverage

Each bag of EMACO S46 T when mixed with 3.5L of water yields approximately 12.5L.

4 bags of 25kg will be sufficient to cover 1m^2 area at an average 50mm thickness.

Packaging

EMACO S46 T is supplied in 25kg bags.

Storage and Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Shelf life is 6 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

Safety precautions

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs (which can also be tainted with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use. Do not reuse containers for storage of consumable item. For further information refer to the material safety data sheet. MSDS available on demand or on BASF construction chemicals web site.

Note

All BASF Technical Data Sheets are updated on regular basis; it is the user's responsibility, to obtain the most recent issue.

Field services where provided, does not constitute supervisory responsibility, for additional information contact your local BASF representative.

Disclaimer

Whilst any information contained herein is true, accurate and represents our best knowledge and experience, no warranty is given or implied with any recommendations made by us, our representatives or distributors, as the conditions of use and the competence of any labour involved in the application are beyond our control.

TDS Ref. no.: EmcxS46T/02/1206

BASF Construction Chemicals (India) Private Limited

C-68, MIDC, Thane Belapur Road, Turbhe, Navi Mumbai - 400

613 India

Tel: +91 22 27619992/3, Fax: +91 22 27619242

e-mail: basfcc@vsnl.net www.basf-cc.co.in

Page 2 of 2



MBT RUSTKLEEN

Rust converter for rusted steel reinforcement in concrete repair situations

Description

MBT RUSTKLEEN is an effective rust converter that when applied over rusted rebars, chemically converts the rust layer into black, protective iron phosphate.

Uses

To eliminate the harmful rust from the steel reinforcement and to enable application of an appropriate protective primer while repairing corrosion damaged concrete.

Advantages

- Works even in wet conditions
- Forms tough protective iron phosphate layer
 - Improves bond strength with reinforcement protection primers
 - Reduces the time and labour required for mechanical cleaning
- Easy to use in less accessible situations

Typical Properties

Aspect	: Pale yellow liquid
Mixed density	: 1.45 kg/litre
Drying time	: 20 minutes
Over coating time	: 18 hours

Specification Clause

Treat all the rusted reinforcement using MBT RUSTKLEEN, single component, water based, rust converter before treating with anti-corrosive primer. The rust converter shall be capable of forming tough protective layer of iron phosphate.

Directions for use

Surface Preparation

Remove dirt and contaminants on steel using detergent and water.

Mask the area surrounding the steel to be treated using polyethylene sheet and masking tape. Also mask any seams or depressions that could collect MBT RUSTKLEEN during treatment of rebars.

If steel is corroded heavily, remove the corrosion products on steel using wet sand blasting or wire brushing.

Mixing

Mix MBT RUSTKLEEN with clear water in the ratio 1:3. Distilled water gives the best result.

Apply MBT RUSTKLEEN onto the affected steel using, nylon scrub pad, spray or other such convenient tools. Allow to dry.

Clean all the splashes and traces with clean water. Apply CONGRESIVE ZRi or THORO STRUCTURITE PRIMER as corrosion protection primer.

Coverage

One litre of diluted (1:3) solution shall be sufficient for 10 m² area.

Packaging

MBT RUSTKLEEN is supplied in 5 kg pack.

Storage and Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Shelf life is 12 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

Safety precautions

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs (which can also be tainted with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use. Do not reuse containers for storage of consumable item. For further information refer to the material safety data sheet. MSDS available on demand or on BASF construction chemicals web site.

Note

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Disclaimer

Whilst any information contained herein is true, accurate and represents our best knowledge and experience, no warranty is given or implied with any recommendations made by us, our representatives or distributors, as the conditions of use and the competence of any labour involved in the application are beyond our control.

TDS Ref. no. : Rtkxxxxx/02/1206

BASF Construction Chemicals (India) Private Limited

C-68, MIDC, Thane Belapur Road, Turbhe, Navi Mumbai - 400 613

India Tel: +91 22 27619992/3, Fax: +91 22 27619242

e-mail: basfcc@vsnl.net www.basf-cc.co.in

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CONCRESEIVE[®] 1414

Long open time epoxy bonding agent

CONCRESEIVE 1414 is a two component epoxy system which on mixing yields an adhesive for internal or external bonding of renderings, granolithic toppings, and new concrete to old concrete. It tolerates a degree of moisture before and during curing. The ultimate bond strength is greater than the tensile strength of concrete. CONCRESEIVE 1414 does not shrink and provides an even and stress-free bond.

CONCRESEIVE 1414 is recommended for bonding:

- Fresh concrete to set concrete
- Repair mortar to concrete or mortar

- High bond strength
- Sufficient time to apply the overlay
- Moisture tolerant
- Effective transfer of stresses at bond line
- Resistant to chemical attack
- Effective barrier to migration of chlorides
- Supplied in pre – weighed units

Typical

Aspect	: Grey viscous dispersion
Mixed density	: 1.48 kg/litre
Mixed Viscosity	: 2450±450 cps at 25°C
Mixing Ratio, by weight	: 83(Base) : 17(Hardener)
Compressive Strength	: 65 MPa at 7 Days
Tensile Strength	: 25 MPa at 7 Days
Adhesive bond strength to concrete (ASTM D4541)	: > 2.5 MPa (substrate failure)
Slant Shear bond Strength (BS 6319, Part 4)	: > 11 MPa (concrete failure)
Pot life	: 2 Hours at 25°C
	: 1 Hours at 40°C
Overlay time (Open time)	: 8 Hours at 25°C
	: 6 Hours at 40°C
Setting time	: 150 minutes at 25°C
Full cure	: 7 days

ASTM C881 Type 2, Grade 2, Class B & C.

The structural grade bonding agent shall be CONCRESEIVE 1414, a two component, solvent less epoxy resin based. It shall be formulated to meet the requirement of ASTM C881 Type 2, Grade 2, Class B & C. The Bonding agent shall exhibit minimum open time of 6 hours and shall exceed the tensile strength of

concrete in terms of its adhesive bond strength. It shall be fully compatible with EMACO Range of repair mortars.

Temperature
Substrate temperatures: 15°C – 35°C

Very low or very hot temperatures will make application more difficult and careful consideration should be given to storage of materials. In the cold weather conditions, pre-condition materials by keeping it in a heated room. In hot weather conditions, some form of air-conditioned storage is required. Pre-conditioned materials at 20-25°C will reduce the possibilities of flash/slow setting and other defects.

All surfaces must be thoroughly cleaned and prepared. All loose particles, laitance, dust, curing compounds, floor hardeners, oil, grease, fat, bitumen and paint must be removed if good bond strength is to be achieved. Gloss surfaces must be abraded.

If oil, grease, fat, etc. are present, they should be removed before starting any other form of preparation. All laitance weak or friable concrete should be removed by chipping, grit blasting, or scrubbling until a sound base is obtained.

All laitance should be removed by mechanical scarification, grit blasting, or by acid etching. Visible signs of mould growth, lichen, or algae, should be removed and treated with a fungicidal wash.

New concrete should have cured until the shrinkage and moisture movement is low. Surfaces heavily impregnated with mould oil should be degreased and grit blasted or mechanically scarified to remove the contaminated surface. All curing compounds should have disintegrated or be removed and application carried out only onto a clean, dust free surface.

Carefully transfer the entire Hardener to the Base and thoroughly mix, using a stout palette knife or a slow running drill with a paint mixing paddle until uniformity is achieved. This normally takes about three minutes. Avoid part mixing at site to achieve best performance.

Apply CONCREACTIVE 1414 evenly across the whole surface with a clean, short haired paint brush.

Apply the screed overlay within 45-50 mins to achieve best performance.

For bonding fresh concrete to old concrete ensure to place the fresh concrete within the overlay time depending upon the ambient temperatures, in case exceeded re-apply the bonding agent and place the concrete.

It is important to protect applied CONCREACTIVE 1414 from contamination, especially in horizontal surfaces, until overlay is placed

Although CONCREACTIVE 1414 is self curing, it will cure slowly at low temperatures. The reaction stops at below 5°C.

Equipment

Use CLEANING SOLVENT NO. 2 to clean tools when CONCREACTIVE 1414 is still wet or tacky. Once CONCREACTIVE 1414 has set hard, it can only be removed by chipping or burning.

2 - 2.7 m²/kg dependent on substrate profile.

CONCREACTIVE 1414 is available in 1 kg & 3kg units consisting of base and hardener.

Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Shelf life is 12 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs (which can also be tainted

with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use. Do not reuse containers for storage of consumable item. For further information refer to the material safety data sheet. MSDS available on demand or on BASF construction chemicals web site.

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TDS Ref. no. : Ccrx1414/02/1206

BASF Construction Chemicals (India) Private Limited C-68,
MIDC, Thane Belapur Road, Turbhe, Navi Mumbai - 400 613 India

Tel: +91 22 27619992/3, Fax: +91 22 27619242
e-mail: basfcc@vsnl.net



CONCRESlVE[®] ZRi

Two component epoxy based zinc rich primer for steel

Description

CONCRESlVE ZRi is a two component, solvent borne zinc rich epoxy primer, providing active galvanic protection to steel. It is a thick grey liquid of paint-like consistency, recommended for use where chloride induced attack on steel is likely.

Uses

- As a protective coating to steel reinforcing bars in concrete.
- As a touch-up primer for damaged galvanised metal.
- As a primer for steel substrates prior to suitable top coating.

Advantages

- Provides positive protection of steel components against corrosion.
- Excellent adhesion to steel.
- Short overcoating time.

Typical properties

Aspect	: Thick grey suspension
Mixed density	: 2.3 kg/litre
Volume Solids, %	: 50 ± 3
Mixing Ratio, by weight	: 96(B) : 04(H)
Pot Life	: > 2 Hours at 25°C
Tack free time	: 20 Minutes at 25°C
	: 5 Minutes at 40°C
Recoat time	: 5 Hours at 25°C
	: 2 Hours at 40°C
Total zinc content in dry film	: >90% by volume
D.F.T. per coat	: > 50 microns
Application temperature	: minimum 10°C
	: maximum 40°C

Standards

CONCRESlVE ZRi is formulated to meet the scope of BS 4652, Type 2

Specification Clause

The primer shall be CONCRESlVE ZRi, a two component, epoxy zinc rich. It shall be formulated to meet the requirement of BS 4652 Type 2. The primer shall be an active type having zinc content of greater than 90% in dry film state which is capable of negating the generation of incipient anodes in the areas surrounding the repairs. The product shall have mix density not less than 2.25 kg/litre. It shall be fully compatible with EMACO Range of repair mortars.

Directions for use

Surface preparation

The steel surfaces should be grit blasted or wire brushed to remove all traces of corrosion. Ensure no oil, grease or dust is present. Surfaces should be dry.

Mixing:

Stir each component of CONCRESlVE ZRi. Add Hardener to Base and mix using a drilling machine fitted with a mixer.

Application:

Apply CONCRESlVE ZRi immediately after completion of preparation to prevent any contamination. Do not leave blasted or prepared steel uncoated.

Brush the CONCRESlVE ZRi onto the prepared substrate, ensuring uniform and full coverage, particularly on the back face of reinforcement. In case of doubt on achieving continuous film in one coat apply second coat immediately after the drying of the first coat. Please consult BASF representative for advising the numbers of coats necessary. Repair mortars can be applied as soon as the CONCRESlVE ZRi is dry.

CONCRESlVE ZRi is not designed as a finished coating. Although protection to the steel will be provided for some time, overcoating should be carried out as soon as possible, particularly in aggressive environments.

Equipment care

Tools should be cleaned with CLEANING SOLVENT NO. 2 immediately after use.

Coverage

Each 1 litre pack can cover 8 - 10 m²/coat on smooth substrates. On rebar approximate coverage shall be as under:

Diameter of rebar (in mm)	Coverage Running meter/litre/coat
8	210 ~ 265
12	140 ~ 175
16	105 ~ 135
25	85 ~ 115
32	55 ~ 65

Packaging

CONCRESlVE ZRi is a two component system, supplied in 1 litre combined unit.

Storage and Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Shelf life is 12 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

Safety precautions

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TDS Ref. no. :CcrxxZRI/03/1206

BASF Construction Chemicals (India) Private Limited C-68,
MIDC, Thane Belapur Road, Turbhe, Navi Mumbai - 400 613
India

Tel: +91 22 27619992/3, Fax: +91 22 27619242

e-mail: basfcc@vsnl.net www.basf-cc.co.in

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EMACO™ S48C T

Single component, fibre reinforced, thixotropic repair mortar

Description

EMACO S48C T repair mortar is a one-component thixotropic, dual shrinkage-compensated, fibre-reinforced formulation for structural concrete repairs. EMACO S48C T can be applied vertically or overhead by low-pressure wet-spraying or hand trowelling.

EMACO S48C T is reinforced with specially designed bean shaped, alkali resistant synthetic fibres for exceptional resistance to cracking.

Uses

EMACO S48C T is recommended for repair situations requiring application of mortar up to 50mm thickness in one layer, such as:

- Extensive repairs to beams, columns and other structural elements.

- Repair of structural members subjected to repetitive loading.

- Repairs to industrial structures

Advantages

- Dual shrinkage compensated.

- One component – only addition of water

 - Quality controlled – Uniform, predictable results
 - No additional bonding agent required

- Sprayable, Virtually no rebound.

- Impermeable to aggressive elements.

Typical properties

Aspect	: Grey powder
W/P ratio, by weight	: 0.16
Fresh wet density	: 2250 kg/m ³
Compressive strength, (ASTM C109, 7cm cube)	: 15 MPa at 1 day
	: 25 MPa at 3 days
	: 35 MPa at 7 days
	: 45 MPa at 28 days

Specification Clause

The dual shrinkage-compensated, cementitious patch repair mortar shall be EMACO S48C T, single component mortar modified with fibres. The repair mortar shall exceed compressive strength of 35 MPa at 7 day and 45 MPa at 28 days. The repair mortar shall not require polymer bonding agent as primer and shall be thixotropic consistency, capable of applying 50mm thick in single layer.

Directions for use

Surface preparation

Correct substrate preparation is critical for optimum performance.

The prepared surface should be structurally sound and free from contaminants. Remove concrete that has been saturated with oil or grease. Simple light sandblasting will not provide a sufficient profile for most repairs.

Depending on the substrate condition and environmental requirements, use an effective method for removal of weak concrete such as, wet grit blasting, high pressure water jetting and needle scaling.

Saw cut the boundary of repair area perpendicular to the surface to at least 10 mm depth and remove concrete within the saw-cut boundary at least to that depth. Where saw cutting is not possible, after material removal, prepare the edge of the repair area vertical.

Prepare the final surface free from dust and debris and to a rough profile with at least 5 mm level difference between surface troughs and peaks.

Where rebars are corroded, cut back the concrete to at least 20 mm behind rebars. Grit blast around the rebars to remove corrosion products. Replace the affected part of rebar if the diameter after grit blasting is found reduced by more than 20% of the original diameter.

Note: It is recommended that the decision on replacement of rebars is taken based on the advice of the structural engineer responsible for the works.

For superior protection from corrosion in aggressive environments, coat the rebars with CONCRETE ZRi – the zinc rich epoxy primer or with STRUCTURITE PRIMER in environments not laden with chlorides.

Saturate the prepared surface with clean water for at least one to two hours before applying the mortar.

Mixing

EMACO S48C T must be mixed mechanically. Use a heavy-duty, slow speed drill with spiral mixing paddle or a Pan type mixers etc. Mixers attached to spray units such as, MEYCO DEGUNA are suitable.

Place approximately 80% of the water in the mixer. Keeping the mixer running, add EMACO S48C T slowly. Mix for 3-4 minutes or until a lump-free mix is obtained. Add from the balance 20% water, while continuing to mix, until the desired consistency is achieved.

Water requirement

Consistency	Min. water content per 25 kg	Max. water content per 25 kg
Sprayable or Trowelable	15% (3.75L)	17% (4.25L)

If ambient temperature is >30°C, use chilled water and condition the bagged product in an air-conditioned store prior to use. Maximum mixed temperature should be no more than 35°C. EMACO S48C T can be used when the ambient temperature is between 5 and 40°C.

Placing

EMACO S48C T has been formulated for placing both by trowel and spray application, depending on the size and location of the repair area.

For best results, before application by trowel, apply the first layer by gloved hand including packing behind the rebars, and then firmly trowel on the rest to required thickness.

When applying by hand force EMACO S48C T tightly onto the substrate to ensure intimate contact with the pre-wetted substrate.

If applying by spray, for best results, utilise the services of an experienced nozzle-man.

Finish the final surface smooth using a wood, plastic or synthetic sponge faced trowel. When the material has stiffened to the point where finger pressure lightly marks the surface, give a final firm trowelling using a steel float.

Curing

Good curing is essential. Particular care is required in hot and/or windy conditions. Cure either by a single coat of MASTERKURE 181 curing membrane, which is compatible with most subsequent protective coatings or by covering the work with plastic sheet fixed over wet hessian or wet foam rubber.

Coverage

One 25kg bag of EMACO S48C T mixed with 4 litres water will yield approximately 12.8 litres.

Approximately four bags of 25kg are needed per 1 m²

Packaging

EMACO S48C T is available in 25kg bags.

Storage and Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the

product must be stored in an air-conditioned environment.

Shelf life is 6 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

Safety precautions

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TDS Ref. no.: EmcS48CT/02/1206



Zincrich Plus

constructive solutions

Single component zinc primer for use with Renderoc repair system

Uses

Nitoprime Zincrich Plus is the recommended anti-corrosion primer for exposed steel reinforcement for use with Fosroc concrete repair mortars.

It is fully compatible with all Renderoc mortars and fluid micro-concretes.

Advantages

- 'Active' zinc-rich system combats corrosion by electro-chemical means
- Formulated for use with Renderoc repair products
- Single component product — easy to use with no restrictive pot-life
- Economical — single component ensures almost no waste

Description

Nitoprime Zincrich Plus is supplied as a single component grey-coloured liquid based on metallic zinc.

Specification clauses

Steel reinforcement primer

The steel reinforcement primer shall be Nitoprime Zincrich Plus, a single-component zinc-rich liquid packed and supplied ready to use. An unbroken 40 microns thick coating shall be capable of providing 'active' galvanic protection. It shall be a suitable viscosity to enable the coating to penetrate imperfections and pits within the surface of corrosion-damaged steel bars.

The formulation of the primer shall be such that drying occurs to allow the application of the repair mortar to proceed after 2 hours at 20°C.

It shall be fully compatible with the Renderoc system of concrete repair.

Properties

Test method\	Typical result
Specific gravity:\	2.5
Recommended thickness per coat:\	40 microns (dry)
Application thickness per coat:\	100 microns (wet)
Drying times —\	@ 20°C\
Touch dry:\	2 hours
Fully dry/recoat:\	4 hours

Note: at temperatures below 20°C, the drying times will be slower.

Application instructions

Preparation

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.

Application

The application of Nitoprime Zincrich Plus must take place as soon as possible to a dry steel surface after completion of the preparation work but always within 3 hours. Although a single component product, it should be stirred thoroughly before use in order to redisperse any settlement.

Apply one full and unbroken coat of Nitoprime Zincrich Plus by suitable brush, making sure that the back of exposed steel reinforcing bars are properly coated. A small brush is generally more suitable for this purpose. Allow to dry fully before continuing. If any doubt exists about having achieved an unbroken coating, a second application should be made as soon as the first coat is fully dry (generally after 2 hours).

The primed surfaces should not be left exposed to the elements for longer than necessary before overcoating or application of the repair material. Nitoprime Zincrich Plus will, however, protect steel under clean interior exposure conditions for a period of several months. In non-aggressive exterior environments, a maximum interval of 14 days will be tolerated but in industrial and/or marine environments this interval should be reduced to the practical minimum.

The application of concrete repair materials should proceed as soon as the Nitoprime Zincrich Plus is touch dry (generally 2 hours — see under Properties).

Low temperature working

The minimum application temperature is 5° C. 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.

Cleaning

Nitoprime Zincrich Plus should be removed from tools, equipment and mixers with Fosroc Solvent 102 immediately after use.

Estimating

Supply

Nitoprime Zincrich Plus:¥	1.9 litre and 800ml cans
Fosroc Solvent 102 :¥	5 and 25 litre tins

Coverage

Nitoprime Zincrich Plus:¥	8 m ² / litre
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Note: this coverage figure is theoretical – due to wastage factors and the variety and nature of possible steel substrates, practical coverage figures will be reduced.

Limitations

Nitoprime Zincrich Plus should not be applied when the temperature is below 5° C or is 5° C and falling. If any doubts arise concerning temperature or application conditions, consult the local Fosroc office.

Storage

Store in dry conditions in the original containers. Nitoprime Zincrich Plus and Fosroc Solvent 102 have a shelf life of 12 months if kept in a dry store in the original, unopened containers.

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

Precautions

Health and safety

For further information refer to the appropriate Product Safety Data Sheet

Fire

Nitoprime Zincrich Plus and Fosroc Solvent 102 are flammable. Keep away from sources of ignition. No smoking. In the event of fire, extinguish with CO₂ or foam. Do not use a water jet.

Flash points

Nitoprime Zincrich Plus:¥	玲	41° C
Fosroc Solvent 102:¥	玲	33° C

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

Additional information

Nitoprime Zincrich Plus is the approved reinforcing steel primer for use with the Renderoc, Patchroc and Paveroc systems of concrete repair.

Fosroc and Nitoprime 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 it.

Fosroc Limited

Drayton Manor Business Park
Coleshill Road, Tamworth,
Staffordshire B78 3TL. UK

www.fosroc.com

telephone:\
+44 (0) 1827 262222\

fax:\
+44 (0) 1827 262444\

email:
enquiryuk@fosroc.com



Certificate number FM 610

Epoxy based concrete bonding agent

Uses

For bonding fresh wet cementitious materials to existing cementitious surfaces. For use on horizontal surfaces or on vertical surfaces where mortar or concrete can be supported by formwork. The long 'open' life makes it suitable for use with formwork or where additional steel reinforcement has to be fitted. The product is ideal for roads, bridges, pavements, loading bays and factories, and for bonded or granolithic floor toppings. Nitobond EP is equally suited to internal and external applications.

Nitobond EP may also be used as part of a repair system where a substrate/repair barrier is required or where the substrate is likely to remain permanently damp or wet.

Advantages

- Can be applied on to dry or damp substrates.
- Exhibits high mechanical strength.
- Positive adhesion - exceeds that of the tensile strength of the host concrete.
- Special 'slow-set' version available allowing time to erect steel reinforcement and formwork.
- Solvent-free - can be used in enclosed locations.

Description

Nitobond EP is based on solvent-free epoxy resins containing pigments and fine fillers. It is supplied as a two component material in pre-weighted quantities ready for on site mixing and use. The 'base' component is white and the 'hardener' component is green, providing visual evidence that adequate mixing has been achieved.

Technical support

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

Design criteria

Nitobond EP is designed to have an overlay time of 90 minutes at 20°C. A special 'slow-set' version is available with an overlay time of 24 hours at 20°C, 12 hours at 30°C or 8 to 10 hours at 35°C, making it more suitable for use where additional steel reinforcement and formwork has to be fitted or where temperatures are high. The minimum application temperature for Nitobond EP is 5°C. Consult the local Fosroc office for further information.

Properties

Test method	Typical result
Compressive strength (BS 6319 Part 2):	50 N/mm ²
Tensile strength (BS 6319 Part 7):	20 N/mm ²
Flexural Strength (BS 6319 Part 3):	35 N/mm ²
Shear strength (BS 6319 Part 4):	25 N/mm ²
Adhesive bond to concrete:	In general, the bond will always exceed the tensile strength of the host concrete.

The following properties were measured at 20°C:

	Standard set	Slow set
Pot life:	35 to 45 mins	5 to 7 hours
Initial hardness:	24 hours	48 hours
Full cure:	7 days	7 days
Maximum overlay time:	90 mins	24 hours

Note: At temperatures below 20°C, the cure rate will be slower. Conversely, at temperatures above 20°C, the cure rate will be faster.

Specification clause

Epoxy bonding agent

The bonding agent shall be Nitobond EP, a two-component solvent-free epoxy resin. The two components shall be differentially pigmented in order to ensure visually that correct mixing has taken place prior to the application. The product shall achieve 50 N/mm² compressive strength, 20 N/mm² tensile strength, 35 N/mm² flexural strength and 25 N/mm² shear strength. The adhesive bond to the concrete substrate shall exceed the tensile strength of the host concrete.

Application instructions

Preparation

Clean all surfaces and remove any dust, unsound material, plaster, oil, paint, grease, corrosion deposits or algae. Roughen the surfaces, remove any laitance and expose aggregate 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 and soundness of the substrate should then be assessed by a pull-off test.

Mixing

Any steel reinforcement and formwork should be prepared, cut to size and shape, and made ready for assembly before mixing commences.

Care should be taken to ensure that Nitobond EP is thoroughly mixed. The 'hardener' and 'base' components should be stirred separately before mixing to disperse any settlement. The entire contents of the 'hardener' tin should then be poured into the 'base' tin and the two materials thoroughly mixed using a suitable slow-speed drill and mixing paddle for 2 minutes until a fully uniform colour is obtained. The sides of the tin should then be scraped and mixing should continue for a further 2 minutes.

To facilitate mixing and application at temperatures below 20°C, the separate components should be warmed in hot water up to a maximum temperature of 25°C before beginning to mix. If heated to 25°C, the subsequently mixed material will need to be used more speedily as the pot-life will be reduced to 20 minutes for the 'standard' version and 4 hours for the 'slow-set' version. Alternatively, the material should be stored in an environment heated to 20°C and only removed immediately before use.

Application

Nitobond EP should be applied as soon as the mixing process has been completed. It should be brush or spray applied to the prepared surfaces.

In the case of the 'standard set' material, the new concrete or screed should be applied to the coated substrate within 90 minutes at 20°C or within one hour at 30°C.

In the case of the 'slow-set' material, the new concrete or screed may be applied to the coated substrate up to 24 hours after application at 20°C or up to 12 hours at 30°C or between 8 to 10 hours at 35°C. However, the coated substrate should be left for one hour before the new concrete or screed is placed.

Where Nitobond EP is to be used as part of a repair system to form a substrate/repair barrier, care should be taken to achieve an unbroken coating. One coat should be applied and allow to gel. A second coat should be applied and used as the bonding coat. In some situations (e.g. sprayed concrete repairs) it may be advantageous to scatter dust free sharp sand over this coat and leave to harden.

As soon as the Nitobond EP has been applied, any required steel reinforcement and/or formwork should be elected and fixed securely in place.

Low temperature working

The minimum application temperature is 5°C. In temperatures below 15°C, the separate components should be heated in warm water (up to 25°C) or stored in a heated environment for 12 hours before use. These measures will facilitate mixing and application. Normal precautions for

winter working with cementitious materials should then be adopted.

High temperature working

At ambient temperatures above 30°C, the materials should be stored in the shade or in an air-conditioned environment for 12 hours before use.

Cleaning

Nitobond EP should be removed from tools, equipment and mixers with Fosroc Solvent 102 immediately after use. Hardened material can only be removed mechanically.

Limitations

Nitobond EP should not be applied when the temperatures is below 5°C and falling. If any doubts arise concerning temperature or substrate conditions, consult the local Fosroc office.

Estimating

Supply

Nitobond EP:	5 kg and 1 kg packs
Nitobond EP Slow Set:	5 kg and 1 kg packs
Fosroc Solvent 102:	4 litre cans

Coverage

Nitobond EP:	5 m ² per kg
Nitobond EP Slow Set:	5 m ² per kg

Note: The coverage figures for Nitobond EP products are theoretical - due to wastage factors and the variety and nature of possible substrates, practical coverage figures will be reduced. Unless otherwise specified, Nitobond EP 'standard' set will be supplied. Where the 'slow-set' system is required, care should be taken to ensure that this is specifically requested.

UN packaging regulations

To comply with current regulations, all products of a hazardous nature which are subjected to a sea crossing as part of their delivery requirements, must be packed in UN approved receptacles.

When a known sea crossing is involved, whether locally or for export, Fosroc will supply in the correct UN packaging. Where Fosroc are requested to deliver within a mainland boundary but the Purchaser intends to onward ship, it is incumbent upon the Purchaser to specify that UN packaging is required at the time of placing the order. Otherwise, once received, responsibility rests with the Purchaser. The use of UN packaging may affect the selling price of products. Please consult the local Fosroc Area Manager or office.



Storage

Shelf life

Nitobond EP, Nitobond EP Slow Set, and Fosroc Solvent 102 have a shelf life of 12 months if kept in a dry store in the original unopened packs.

Storage conditions

Store in dry conditions in the original, unopened packs. If stored at high temperatures, the shelf life may be reduced.

Precautions

Health and safety

Nitobond EP, Nitobond EP Slow Set and Fosroc Solvent 102 should not come in contact with skin or eyes, or be swallowed. Ensure adequate ventilation and avoid inhalation of vapors. 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, 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

Nitobond EP and Nitobond EP Slow Set are non flammable. Fosroc Solvent 102 is flammable. Keep away from sources of ignition. **No smoking.** In the event of fire extinguish with CO₂ or foam. **Do not** use near open flames or smoke during use.

Flash point

Fosroc Solvent 102: 33°C

For further information, refer to the Product Material 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-concrete, chemical resistant epoxy mortars and a comprehensive package of protective coatings. In addition, a wide range of complementary products is available.

Fosroc has also produced several educational training videos which provide more details 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.

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 it.

Fosam Company Limited

Head Office
Post Box 11081
Jeddah – 21453
Saudi Arabia

www.fosroc.com



Telephone: +966 2 637 5345

Fax: +966 2 637 5891

email: fosam@fosroc.com

Regional Offices

Jeddah Sales Office	Tel: (02) 608 0999	Fax: (02) 638 0693	Yanbu	Tel: (04) 322 0000	Fax: (04) 331 2980
Jeddah Showroom	Tel: (02) 665 0187	Fax: (02) 667 4844	Makkah	Tel: (02) 542 0000	Fax: (02) 542 0869
Riyadh	Tel: (01) 482 9303	Fax: (01) 482 7562	Medinah	Tel: (04) 885 0091	Fax: (04) 855 0047
Dammam	Tel: (03) 814 1282	Fax: (03) 814 1581	Jubail	Tel: (03) 362 3904	Fax: (03) 362 3875
Khamis Mushayt	Tel: (07) 250 0469	Fax: (07) 250 0469	CSD	Tel: (02) 608 0999	Fax: (02) 638 0693

Registered Office: Industrial Area, Phase 4, Road No. 414, Street No. 407

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FO SA/NITOBOND EP/05/A



Reebaklens RR

Rust remover, cleaning and etching agent

Uses

Reebaklens RR is used as a rust remover from steel bars prior to encasing in concrete / microconcrete. It can also be used on other steel surfaces prior to coating with epoxy systems.

Advantages

Rapid action

Safe with metals (except zinc and galvanised steel), wood, glass, plastic and rubber. No corrosive action. Penetrates oil and grease.

Description

Reebaklens RR cleaning agent is a combination of acid based material, corrosion inhibitors and dispersing agents and is supplied as a clear green solution.

Technical Support

Fosroc provides a technical advisory service to specifiers, end-users and contractors as well as on-site technical assistance in locations all over the country.

Properties

Specific gravity : 1.16 - 1.22 @ 25°C

Application instructions

For rusted metal (iron base)

Apply Reebaklens RR with brush for complete wetting of rusted metal surface and allowed to react it for 16-24 hours. After 24 hours, a white layer will appear which will protect further corrosion of metal / steel for about 5-7 days. Before applying protective coating, the surface should be wire brushed and thoroughly cleaned for dust with dry cloth.

Removal of rust and mill scale

Prewet the floors, then using a stiff bristle broom, brush the affected areas with a solution of Reebaklens RR cleaning agent and water. Strength of the solution required will vary but should be between 1 : 1 and 1 : 4 (Reebaklens RR cleaning agent to water).

When the action has finished, wash down thoroughly with clean water. Wire brush again to remove remaining loose material and finish by thoroughly washing down with clean water. Repeat if necessary. High degree of rust or scale can be removed by soaking in the Reebaklens RR cleaning agent solution for 60 minutes.

Estimating

Coverage

Approx. 2.0 - 2.5 m²/L

Note coverage depends on the rusted area and the depth of deposition.

Packaging

Reebaklens RR cleaning agent is available in 1, 5 and 20 L containers.

Storage

Shelf life

At least 1 year in original sealed containers under normal warehouse conditions.

Precautions

Health & Safety instructions

Reebaklens RR cleaning agent is acid based and should be handled with care. It attacks zinc, aluminium and putty. If in doubt about its effect on a material, test a small area before application.

Avoid contact with skin. Rubber gloves and goggles should be worn. Wash spillages with plenty of water. Enclosed areas should be well ventilated. If contact with eyes occur, wash immediately with water and seek medical advice.

Fire

Reebaklens RR cleaning agent is non flammable.

Additional information

Technical data and guidance can be provided on a wide range of admixtures, concreting aids, grouts, repairs, Protective coatings and the Nitoflor range of industrial flooring systems which includes non metallic floor hardeners, epoxy floor coatings and self levelling floor toppings, epoxy heavy duty abrasion resistant screeds.

Separate datasheets are available on these products.

Reebaklens RR



Fosroc Chemicals (India) Pvt. Ltd.

Head Office

111/3, Hafeeza Chamber II Floor,
K H Road, PBNo. 2744, Bangalore 560027

www.fosroc.com

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telephone	fax	e-mail
++91 80-22240018/120	++91 80-22233474	india@fosroc.com



Regional Offices

Bangalore

Shankar House, IV Floor
1 & 18, RMV Extension
Bangalore 560 080
Ph:080-2361 3161/2361 2004
Fax : 080-2361 7454
email: Bangalore@fosroc.com

Mumbai

208/209, Persepolis
Sector 17, Vashi
Navi Mumbai 400 703
Ph:022-2789 6412/14
Fax: 022 - 2789 6413
email:Mumbai@fosroc.com

Delhi

First floor, 1/2 East Patel Nagar
Opp: Vivek Cinema, Main Patel Rd
New Delhi 110 008
Ph:011-25884903/4
Fax: 011- 25884422
email:Delhi@fosroc.com

Kolkata

30/B Jodhpur Park
Ground Floor
Kolkata 700 068
Ph: 033 2472 5482
Fax: 033-2472 9921
email:Kolkata@fosroc.com

Ahmedabad : (079) 26762799 Ankleshwar :(02646) 220704/224687 Bhubaneshwar : (0674) 2521176 Chennai (044) 24899949/24853383
Chandigarh : (0172) 2639360 Cochin : (0484) 2356668 Coimbatore : (0422) 2472966 Goa : (0832) 2542465 Guwahati (0361) 2548793
Hyderabad : (040) 27662324/27662425 Hubli (0836) 3402597 Indore : (0731) 504339/5061477 Jaipur : (0141) 2235349 Lucknow :(0522) 22239044
Nagercoil (04652) 2224849 Mangalore: (0824) 22272234 Visakhapatnam : (0891) 2564850 INDIA/2004/0210/A



Renderoc[®] RG

General purpose, non-shrink, cementitious micro-concrete

Uses

Renderoc RG is used for 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 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.
- Contains no chloride admixture.

Description

Renderoc RG 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 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 shall 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 can be applied in sections upto 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°C.

<u>Test</u>	<u>Typical result at 30°C</u>
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Compressive strength (N/mm²)			
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(Tested on 70.7mm cubes as per BS 4551-80)

1D	3D	7D	28D
10	30	40	50

Tensile strength	2.0N/mm ² @ 28 days
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Flexural strength (BS4551 - 80)	5N/mm ² @ 28 days
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Young's Modulus	25 kN/mm ²
------------------------	-----------------------

Expansion characteristics (ASTM C827 - 1987)	Unrestrained expansion 1 to 4%.
--	------------------------------------

Pressure to restrain Plastic expansion	Approx. 0.004N/mm ² .
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Coefficient of thermal expansion	10 - 12 x 10 ⁻⁶ / °C.
---	----------------------------------

Thermal conductivity	1.5 W/m°C
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Fresh wet density (Mixed density @27°C)	2100 - 2200 kg/m ³
---	-------------------------------

Specification clauses

Performance specification

The fluid micro-concrete repair material shall be 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.

Renderoc® RG

The micro concrete in the flowable consistency should achieve a compressive strength of not less than 10N/mm² after 24 hours, 40N/mm² after 7 days and 50 N/mm² after 28 days at 30°C. Most importantly, the cured microconcrete shall contain no metallic aggregates, or chlorides and shall be shrinkage compensated in the plastic state. The unrestrained expansion shall be between 1 - 4%. The flexural strength shall not be less than 5 N/mm² @ 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 kg/m³ at 27°C.

Supplier specification

All microcreting (specify details and areas of application) must be carried out using Renderoc RG, manufactured by Fosroc, applied strictly in accordance with the manufacturer's technical datasheet.

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 airventing. 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.

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.

Note : For repair sections generally deeper than 100mm it may be necessary to mix the Renderoc RG 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. The typical results with a few aggregate proportions, for various applications are furnished below for guidelines.

Typical results of Renderoc RG with graded coarse aggregates of maximum size 12mm.

Renderoc RG : Coarse aggregate (SSD) (By weight)
1 : 0.75

Water: Powder ratio	0.16
(By weight)	

Compressive strength (N/mm²)

1 D	3 D	7 D	28D
15	35	45	55

Workability	Flowable
-------------	----------

Note : W/P shall not be increased under any circumstances.

Estimating

Packaging

Renderoc RG is supplied in 25 kg moisture resistant bags.

Yield

Approximately 13.0 litres per 25 kg bag. Actual yield per bag will depend on the consistency of Renderoc RG and quantity of coarse aggregate added.

Storage

Shelf life

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.



Renderoc® RG

Precautions

Health & Safety instructions

Renderoc RG contains cement powders which, during normal use, have no harmful effect on dry skin. However, when Renderoc RG 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. Suitable gloves, eye protection and dust masks shall be worn. The use of barrier creams is recommended. In case of contact with skin, it shall be washed with clean water. In case of contact with eyes, it shall be rinsed immediately with plenty of clean water and medical advice shall be sought. If swallowed, medical attention shall be sought immediately - Vomiting should not be induced. Renderoc RG 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 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 on these products.



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Fosroc Chemicals (India) Pvt. Ltd.

Head Office

111/3, Hafeeza Chamber II Floor,
K H Road, PBNo. 2744, Bangalore 560027

www.fosroc.com

telephone

+ +91 80-22240018/120

fax

+ +91 80-22233474

e-mail

india@fosroc.com



Regional Offices

Bangalore

Shankar House, IV Floor
1 & 18, RMV Extension
Bangalore 560 080
Ph:080-2361 3161/2361 2004
Fax : 080-2361 7454
email: Bangalore@fosroc.com

Mumbai

208/209, Persepolis
Sector 17, Vashi
Navi Mumbai 400 703
Ph:022-2789 6412/14
Fax: 022 - 2789 6413
email:Mumbai@fosroc.com

Delhi

First floor, 1/2 East Patel Nagar
Opp: Vivek Cinema, Main Patel Rd
New Delhi 110 008
Ph:011-25884903/4
Fax: 011- 25884422
email:Delhi@fosroc.com



Kolkata

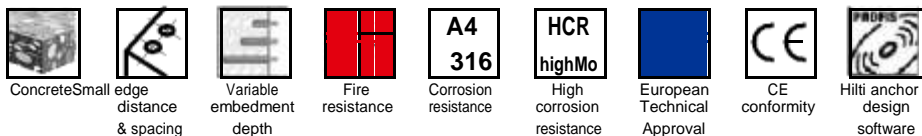
30/B Jodhpur Park
Ground Floor
Kolkata 700 068
Ph: 033 2472 5482
Fax: 033-2472 9921
email:Kolkata@fosroc.com

Ahmedabad : (079) 26762799 Ankleshwar : (02646) 220704/224687 Bhubaneshwar : (0674) 2521176 Chennai (044) 24899949/24853383
Chandigarh : (0172) 2639360 Cochin : (0484) 2356668 Coimbatore : (0422) 2472966 Goa : (0832) 2542465 Guwahati (0361) 2548793
Hyderabad : (040) 27662324/27662425 Hubli (0836) 3402597 Indore : (0731) 504339/5061477 Jaipur : (0141) 2235349 Lucknow : (0522)
22239044 Nagercoil (04652) 2224849 Mangalore: (0824) 22272234 Visakhapatnam : (0891) 2564850

INDIA/2004/0404/E

HIT-RE 500 with HIT-V / HAS rods

Injection Mortar System	Benefits
 <p>Hilti HIT-RE 500 330 ml foil pack (also available as 500 ml and 1400 ml foil pack)</p>  <p>Static mixer</p> <p><u>HAS rods</u> HAS-E (Zinc) HAS-E-F (Gal) HAS-E-R (A4-70) HAS-HCR rods</p> <p><u>HIT-V rods</u> HIT-V (Zinc) HIT-V-F (Gal) HIT-V-R (A4-70) HIT-V-HCR rods</p>	<ul style="list-style-type: none"> ■ suitable for non-cracked concrete C 20/25 to C 50/60 ■ high loading capacity ■ suitable for dry and water saturated concrete ■ under water application ■ large diameter applications ■ high corrosion resistant ■ long working time at elevated temperatures ■ odourless epoxy ■ varied embedment depths ■ small edge distance and anchor spacing possible



Basic loading data (for a single anchor)

All data in this section applies to

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Steel failure
- Base material thickness, as specified in the table
- One typical embedment depth, as specified in the table
- One anchor material, as specified in the tables
- Non cracked concrete $f_{c,cyl} = 32 \text{ MPa}$
- Temperature range I (min. base material temperature -40°C , max. long term/short term base material temperature: $+24^\circ\text{C}/40^\circ\text{C}$)
- Installation temperature range $+5^\circ\text{C}$ to $+40^\circ\text{C}$

Embedment depth and base material thickness for the basic loading data

Recommended loads

Anchor size	M8	M10	M12	M16	M20	M24	M30	M36
Typical embedment depth [mm]	80	90	110	125	170	210	270	330
Base material thickness [mm]	110	120	140	165	220	270	340	410

Recommended loads

Anchor size	Anchor HIT-V grade 5.8						Anchor HAS grade 8.8	
	M8	M10	M12	M16	M20	M24	M30	M36
Tensile $N_{rec} \setminus \setminus [\text{kN}]$	8.6	13.8	20.0	36.4	58.1	79.4	115.7	152.1
Shear $V_{rec} \setminus \setminus [\text{kN}]$	5.1	8.6	12.0	22.3	34.9	50.3	120.6	173.5

Note: For varied embedment depths please contact your local Hilti engineer for further details.

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval a)	DIBt, Berlin	ETA-04/0027 / 2009-05-20
Fire test report	IBMB, Braunschweig	UB 3565 / 4595 / 2006-10-29 UB 3588 / 4825 / 2005-11-15
Assessment report (fire)	warringtonfire	WF 166402 / 2007-10-26 & suppl. WF 172920 / 2008-05-27

a) All data given in this section according ETA-04/0027, issue 2009-05-20.

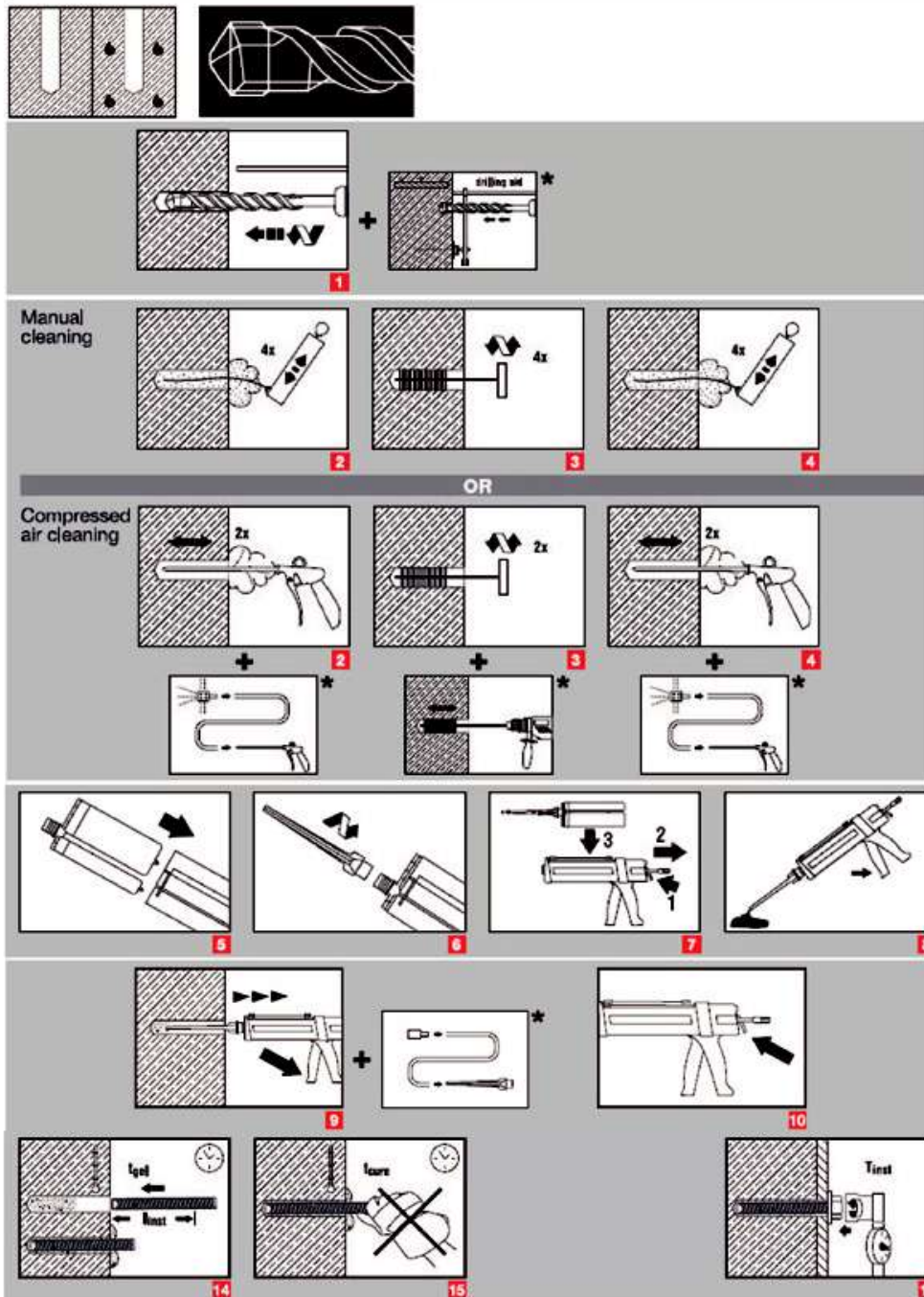
Curing time for general conditions

Data according ETA-04/0027, issue 2009-05-20		Additional Hilti technical data	
Temperature of the base material	Curing time t_{cure} before anchor can be fully loaded	Temperature of the base material	Working time t_{gel} in which anchor can be inserted and adjusted
40 °C	4 h	40 °C	12 min
30 °C to 39 °C	8 h	30 °C	20 min
20 °C to 29 °C	12 h	20 °C	30 min
15 °C to 19 °C	24 h	15 °C	1 ½ h
10 °C to 14 °C	48 h	10 °C	2 h
5 °C to 9 °C	72 h	5 °C	2 ½ h

Setting details

Anchor size		Data according ETA-04/0027, issue 2009-05-20								Additional Hilti technical data
		M8	M10	M12	M16	M20	M24	M30	M36	
Nominal diameter of drill bit	d_0 [mm]	10	12	14	18	24	28	35	40	
Effective anchorage and drill hole depth range a)	$h_{\text{ef,min}}$ [mm]	40	40	48	64	80	96	120	144	
	$h_{\text{ef,max}}$ [mm]	160	200	240	320	400	480	600	720	
Minimum base material thickness	h_{min} [mm]	$h_{\text{ef}} + 30 \text{ mm} \geq 100 \text{ mm}$			$h_{\text{ef}} + 2 d_0$					
Diameter of clearance hole in the fixture	d_f [mm]	9	12	14	18	22	26	33	39	
Minimum spacing	s_{min} [mm]	40	50	60	80	100	120	150	180	
Minimum edge distance	c_{min} [mm]	40	50	60	80	100	120	150	180	
Torque moment b)	T_{max} ^{b)} [Nm]	10	20	40	80	150	200	300	360	

Setting instructions



a)

Brush bore hole with required steel brush HIT-RB

a) **Note:** Manual cleaning only for hef ≤ 250 mm and anchor size ≤ M16

For detailed information on installation see instruction for use given with the package of the product.