DEFECT RECTIFICATION METHODOLOGY

Sr. No.	Defects	Impact	Remedies	Procedure for Remedies
1	Honeycombing	Major	1)Fiber reinforced, shrinkage compensated, thixotopic repair mortar 2)Non shrink grout/Micro concrete 3)Polymer Modified Rich Cement Mortar	**Ingredient:** i)Corrosion protective agent: Polyalk Fixoprime (Sunanda) / CONCRESIVE ZRI – zinc rich primer (O-BASF)/ Nitozinc primer-Fosroc ii)Bonding agent: Polyalk EP (Sunanda) / Concresive1414 iii)Repair mortar: EMACO S88C T (O-BASF)/ Polycrete A / Rendroc S2 iv)Grouting: Cement grouting (for major voids) **Surface Preparation:** i) Cut/Remove all the loose contaminated or damaged concrete till hard dense concrete obtained in such a way that geometrical shape preferably achieved. ii) if reinforcement is exposed then remove concrete around reinforcing steel, to leave a gap minimum 20mm behind steel. iii) Remove all corrosion products from the steel by mechanical wire brushing. IV) Use blower to remove fine dust or cement from the surface. v)Apply CORROSION PROTECTIVE AGENT in single coat (should be zinc rich primer) **Bonding Coat:** i) Prior to application of the bonding agent, the substrate should be soaked with the copious amounts of clean water for minimum period of 1 hour ii)Remove standing surface water from the substrate iii) Apply BONDING AGENT using long brush IV) Apply Repair mortar while the primer is steel wet or tacky.(maximum 30 minutes) Reapply the bonding agent if it had gone dry.

				[1] Repair mortar: (with EMACO S88C T)- Applicable at location where steel is exposed (<u>Procedure for above M:40 Grade of Concrete)</u> i) Mixing dual shrinkage compensated, cementatious patch mortar modified with fibers/Polycrete A thoroughly. ii) Place approximately 80% of the water in the mixer & keeping the mixer running, add thixotropic repair mortar (EMACO S88C T) slowly. Iii) Mix for 3-4 minutes or until a lump-free mix obtained. iv) Add from balance 20% water, while continuing to mix, until the desired consistency is achieved. v)The total water should be in range of 13 to 15% by weight of dry powder (for 25kg dry powder 3.25 to 3.75 litre water) vi)EMACO S88C T can be placed both by trowel & spray application, depending upon the size & location of the repair area vii) For the 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. viii) Care should be taken when applying by the hand force repair mortar tightly onto the substrate to ensure intimate contact with the pre-wetted substrate. ix) Finish the final surface smooth using float/plastic or synthetic sponge faced trowel. x)fresh density – 2300kg/m3 & 7 days compressive strength -60MPA, Flexural strength -9MPA **[2]Repair Mortar: (with Polycrete A)- Applicable at location where shuttering to be done** 1) Mixing of Micro-concrete Polycrete A must be mixed thoroughly. 2) Place approximately 80% of the water in the mixer & keeping the mixer running. Add Micro-concrete powder slowly. 3) Mix for 3-4 minutes or until a lump free mix obtained. 4) Add from balance 20% water, while continuing to mix, until the desired consistency is achieved.

				5)The total water should be in range of 12 to 13% by weight of dry powder (for 25 kg dry powder 3.40 to 3.60 litre water) 6)Apply layer by layer with per layer approx. 15 to 20mm thickness, allow each layer to set (min. 3 to 4 hours) 7) Apply bonding coat (Polyalk EP) & build up thickness as mentioned earlier until the final finish achieved. 8) Watertight Formwork shall be prepared for bigger patches. 9) Use ice water in hot weather (temp. >30^{o}c) 10) Ensure wet mortar must be used within 30 minutes from mixing. 11)Fresh Density 2200kg/m3 & 7 days compressive strength 55 MPA, Flexural strength 7 MPA **[3]Polymer Modified Rich Cement Mortar – Applicable at location where depth is less than cover zone (<u>Procedure for up to M:30 Grade of Concrete</u>)** 1)Mixing proportion (1:5:15) – 1 Part Polyalk EP: 5 Part Silt free cleaned river sand(washed & screened sand /Gujarat sand / quartz sand) 2)Take specified proportion of screened sand & cement & dry mix it thoroughly (without addition of any water) preferably in a mechanical mixer, add gauged water with W/C 0.40 & polymer of specified quantity and mix till a soft mix of uniform consistency is formed. The consistency of mix should be stiff for initial plugging. Finish the side & surface with little higher consistency mortar. Ensure that all mortar slurry used in 30 minutes of time. 3)Yield: 20-21 kg of mix Yields 0.01M3 or 10 litre approximately **Curing:** Good curing is essential. Cure either by covering the work with plastic sheet fixed over wet hessian or by single coat of MASTERKURE 181 curing membrane

				Cement Grouting: (for major voids only) 1) Before starting grouting, clean all surfaces coming in contact with **MASTERGROUT CNS-50M**. All kinds of contaminations such as fat, oils, dust and cement slurry must be removed. 2) Before several hours prior to grouting the area should be wetted & saturated with fresh water & remove any free water present on the surface before grouting. 3) Ensure leak proof shuttering as **Master grout CNS-50M** is free flowing grout. This can be achieving by using foam rubber strip beneath the constructed formwork & between the joints. 4) Mix 5.4 liters of water per 30 Kg pack grout at water: powder ratio of 0.18, the water powder ratio may be varying depending upon climatic conditions & nature of grout consistency required. 5) Mix mechanically and ensure homogeneous mix. Place the grout within 20-25 min. to gain full benefit of expansion. 6) Exposed surfaces of **MASTERGROUT CNS-50M**should be cured like concrete. In order to avoid premature evaporation of the water, start curing as soon as the grout reaches its touch hard state. 7) Curing up to a minimum of 7 days is must. 8) While grouting with this grout up to approximately 3 hours later, strong vibrations of any kind should be avoided. Do not use vibrators, as **MASTERGROUT CNS-50M** is a free flowing grout which doesn't need any compaction. Never use **MASTERGROUT CNS-50M** after 30 minutes of mixing. 9) While grouting ensures that there is no air voids remain. The grout must have maximum contact area. 10) Material should be poured in one side only. Never add any other ingredients like cement. Sand, fiber, admixtures etc. to **MASTERGROUT CNS-50M** Pre-packed system. 11) Under any circumstances do not use more water than the specified water: powder ratio

2	Superficial defect, pin holes, blow holes, sand runs, surface dusting, discoloration, pour lines, contamination etc.	Minor		**Ingredients:** Profiling Mortar: EMACO R303 (BASF) **Surface Preparation:** i) Remove all the loose particles, dirt, oil, grease etc. with water jet & make concrete surface saturated. ii) Repair the honeycomb if any as per above procedures mentioned. iii) Concrete surface should be thoroughly soaked prior to application of EMACO R303, to ensure a saturated but surface dry condition. iv) Deeper voids should be filled prior to the application of cosmetic coating. v)Exposed reinforcement will be promptly cleaned with wire brush & apply protective coat of zink rich primer Concresive ZRI / Flexoprime or equivalent **[3]Mixing:** i) It is preferable to mix the materials in a mechanical mixer/slow speed; hand held electric mixer with suitable paddle can be used. ii) Over mixing should be avoided. Normal mixing time 2-3 minutes from the addition of water. iii) The powder should be placed in the mixing vessel/drum and mixing commenced. iv) Clean water to be added slowly of requisite quantity & mixing till required consistency is achieved. v) Maximum water range 5 to 5.50 liters per 25 kg of EMACO R303 depending on consistency required. **[4]Placing:** i) EMACO R303 should be applied to the complete area with of trowelling. ii) Leave for short period of 20-30 minutes before final trowelling, finishing may be aided by flocking a small amount of water onto surface, using a paintbrush before a final trowelling. iii) When use as scrap coat (if plastering to be done on later stage) EMACO R303 can be applied with brush or roller & then the excess scraped off with the edge of steel float.

				[5]Curing: Water curing for 07 days by using wet hessian cloth. The surface should be protected against hot and windy conditions. **[6]Yield:** 25Kg of EMACO R303 & 5.5 litre water yield approx. 17.50 litres & will cover 30 to 35 sq. ft. of avg. 5mm thickness.
3	Wooden piece	Minor / Major	Remove & finish with Polymer Mortar	Remove the wooden piece and Apply the paste of Polyalk EP & cement in proportion of 1: 1 on that portion and Finish the surface with polymer mortar. The procedure of polymer mortar as mentioned above. Curing up to 7 days is must.
4	Bulging	Minor / Major	Chip it & finish with Polymer Mortar	First chipping of the bulge portion of particular member shall be carried out within the cover zone. Apply the paste of Polyalk EP & cement in proportion of 1: 1 on that portion and rectify it with polymer mortar. The procedure of polymer mortar as mentioned above. Curing up to 7 days is must.
5	Deep Pocket	Major	Micro Concrete	Exposed steel surface should be applied with epoxy grout and the honeycombs should be rectified with micro concrete. The procedure shall be as per Manufacturer's specification. Curing up to 7 days is must.
6	Shrinkage Crack	Minor / Major	Cement Slurry with Bonding Agent	Cement slurry should be prepared with addition of Polyalk WP. Ponding (wata) should be carried out at the top surface of the slab where shrinkage cracks were observed and cement slurry with Polyalk WP should be poured into the ponding area. This process is carried out till the cracks get sealed.
7	Offset	Minor / Major	Grinding / chip it and finish with Polymer Mortar	First chipping of the offset portion of particular member shall be carried out. Apply the paste of Polyalk EP & cement in proportion of 1: 1 on that portion and rectify it with polymer mortar. The procedure of polymer mortar as mentioned above. If the offset is less than 3mm, then grinding shall be carried out to form uniform portion. Curing up to 7 days is must.

8	Cold joint	Minor / Major	Make V groove & Finish with polymer Mortar	Open out the cold joint by making V groove, Apply the grove with paste of Polyalk WP & Cement proportioning it 1:1 and then finish the groove with polymer mortar. The procedure of polymer mortar as mentioned above. Curing up to 7 days is must.
9	Tie road hole	Major	Non Shrink Grout	Clean all surface coming in contact with all kinds of contamination such as fat, oils, dust and cement slurry must be removed. The concrete surface should be thoroughly wetted and saturated, ensure leak proof shuttering. Mix 5.4 liters of water per 30kg pack of grout at water: powder ratio 0.18. Measure the above amount of water precisely, Mix mechanically and ensure homogeneous mix. Expose surface of MASTERGROUT CNS – 50 should be cured like concrete. In order to avoid premature evaporation of the water, start curing as soon as grout reaches its touch hard state. Curing up to 7 days is must.
10	Network Leakage Plugging (Construction joint Leakage, Slab Leakage, plastic cracks, crazing etc)	Minor / Major	Polymer waterproofing slurry	1) After completion of normal curing period of concrete (14 to 21 days), leakage location to be identified by water ponding. 2) Mark the affected portion in geometrical shape & clean the surface to free from dust, oil, grease etc. 3)Moisten the surface prior to commencement of work (about 1 hour before) 4)Prepare slurry of one part Polyalk WP and 2 part of cement by weight 5) Mixing the best done using a low speed stirrer but continuous hand mixing to a lump free consistency is also adequate. Keep the mix continuously stirred. 6) Apply the slurry by brush to the damp surface, if any crack observed can be filled by the thick slurry. 7) Apply two coat perpendiculars to other of similar slurry at 24 hours interval. 8)Prepare wata and cure the coating for minimum 5 days 9) Ensure the Leakage is plugged.

Prepared by QE Team