WATERPROOFING POLICY

INDEX

Sl.No.	Item	Pages	
		From	No.
01	**BASEMENT**	3	26
a	Below Raft / Footing	3	5
b	Grouting of construction joints in Raft	6	7
c	Pressure release pipes	8	9
d	Construction joint between raft & Retaining wall and joints in retaining wall (horizontal and vertical)	10	11
e	Sleeves for service penetrations in Retaining wall	12	12
f	Tie Rod Treatment along with honeycomb and weak concrete	13	13
g	Retaining wall	14	16
h	Underground water tank	17	18
i	Basement waterproofing material properties	19	26
202	**PODIUM**	27	38
A	Sunken areas – filling with Hard scape	27	31
B	Sunken areas – Filling with Landscape	32	32
C	Water bodies – Swimming Pool	33	35
D	Treatment around pipe taking water inside the basement	36	37
e	Expansion joint / Joint of podium & Building footprint	38	38
03	**TOILET**	39	45

a	Sunken areas	39	43
b	Flat areas (Under slung pipes)	44	45
04	**EXTERNAL WALLS**	46	54
a	Tie Rods / Holes due to bamboo scaffold / brackets of scaffold etc	46	46
b	Junction of Beam & Masonry wall	47	47
c	Punch windows	48	48
d	Groove in external plaster	49	49
e	Planter boxes	50	50
f	Window AC	51	51
g	Aluminium windows	52	52
h	Boxed Chajjas / Cupboard offsets	53	53
i	External horizontal soffits	54	54
05	**INTERNAL WALLS**	55	55
a	Behind Skirting	55	55
06	**SERVICE DUCTS**	56	57
a	Treatment around pipe entering the service ducts	56	57
b	Service ducts at Terrace	56	57
07	**TERRACE**	58	64
a	Conventional Terrace	58	62
b	Insulation Roof	63	63
c	Sloping Roof	64	64
08	**CONTRACTOR CLASSIFICATION**	65	65

09	**WHO WILL CHECK ?**	66	66
10	**DOs & DONTs of Waterproofing**	67	68

Note: The products mentioned in the policy are the preferred products, however on the basis of availability and cost competitiveness equivalent products with similar properties can be used.

BASEMENT

A) ELEMENT -BELOW RAFT / FOOTINGS

WHAT TO USE?

a. CASA Projects : External box type - Acrylic reinforced cementitious, flexible waterproof coating

b. ASPIRATIONAL Projects: External box type - Acrylic reinforced cementitious, flexible waterproof coating

c. HIGH END Projects: External box type - 2mm thick Single Ply PVC membrane system(Best in market)

d. LUXURY Projects: External box type - 2mm thick Single Ply PVC membrane system(Best in market)

HOW TO USE?

ACRYLIC REINFORCED CEMENTITIOUS FLEXIBLE WATERPROOFING

- The surface to be coated must be clean and sound. Remove all traces of formwork, release agents, previous coatings, laitance and any other contaminants that may affect the bond adversely. Suitable cleaning methods include high pressure water jetting and grit blasting. Mechanical wire brushing may be appropriate for small areas. After the above surface preparation, surfaces must be thoroughly washed with clean potable water to remove all dust and loose particles. Spalled concrete should be cut back to sound concrete and made good with a suitable cementitious repair mortar such as EMACO S48C T. All cracks and bolt holes must be cut out and filled solid with MASTERSEAL 505 or Emaco S48C

- MASTERSEAL 550 is supplied in premeasured units and should be mixed on site utilising clean containers. Slowly add the powder to the liquid and mix, using a slow speed drill fitted with a suitable paddle. Leave the mixed material to stand for 5 minutes to allow for full saturation to take place. Remix to restore the consistency. Do not mix more material than can be used in half an hour. DO NOT RE-TEMPER WITH WATER

- Always apply MASTERSEAL 550 to pre-dampened surface. High-suction substrates require more dampening then dense substrates. However, make sure there is no free-standing water. Apply by brush or broom. Mixed material must be used with in 30 -45 minutes, or less under hot weather conditions. Each square metre will require minimum of 0.9 Kg of mixed material per layer. The coverage rate for each layer will be strongly influenced by the roughness of the substrate. 1.8 kg / m² in two coats to achieve 1 mm thickness.

- First Coat: Brush or broom the mix firmly onto the pre-dampened, prepared surface. Care must be taken not to spread the material too thinly. When the material begins to drag or “ball”, do not add more liquid/water but dampen the surface again.

- Second Coat: Allow at least overnight to cure before applying subsequent coats. Dampen the first coat and remove excess moisture. Brush or broom the mix onto the surface (as above) finishing in the opposite direction to the first coat.

- MASTERSEAL 550 can be spray applied but should afterwards be brushed well into the substrate to ensure proper adhesion. To avoid this apply first coat by brush and second by spray application. Finally finish with sponge to get a uniform aesthetic appearance.

- Under hot or excessive drying conditions fog-spray after the initial set has taken place for as long as practicable. In cold, humid or unventilated areas it may be necessary to leave the application for a longer time curing period or to introduce forced air movement. Never use dehumidifiers during curing periods.

1) MEMBRANE TYPE WATERPROOFING

- Separation / Cushioning Layer: Providing and laying protective layer of 300 gsm geotextile laid over the top of the PCC surface with an overlap of 50 mm

- Waterproofing layer: Providing and loosely laying 2mm thick non-reinforced MASTERPREN BG/FR (PVC membrane) or equivalent brand. The PVC membranes shall be laid adjacent to each other with an overlap of at least 80mm. The two adjacent membrane sheets shall then be welded to each other using Hot Air gun as per manufacturer's specifications.

- Compartmentalization: Compartmentalization shall be in the range of 250 - 300 sqmt shall be carried out using PVC waterstop with necessary sleeves and piping that shall be left in the raft slab with junction box on the grade slab in such a way that a special hydro swellable resin can be injected through these pipes in future to arrest the leakage, if any as per manufacturer's specification and procedure.
- Protection/ Separation Layer: Providing and laying protective layer of 300 gsm geotextile laid over Masterpren BG/FR (PVC Membrane) or equivalent with an overlap of 50mm
- Protection Screed: Over the geo textile layer, 50mm thick protection concrete screed of M15 grade (with 10mm down nominal size aggregate) to be laid and leveled.

WHEN TO USE?

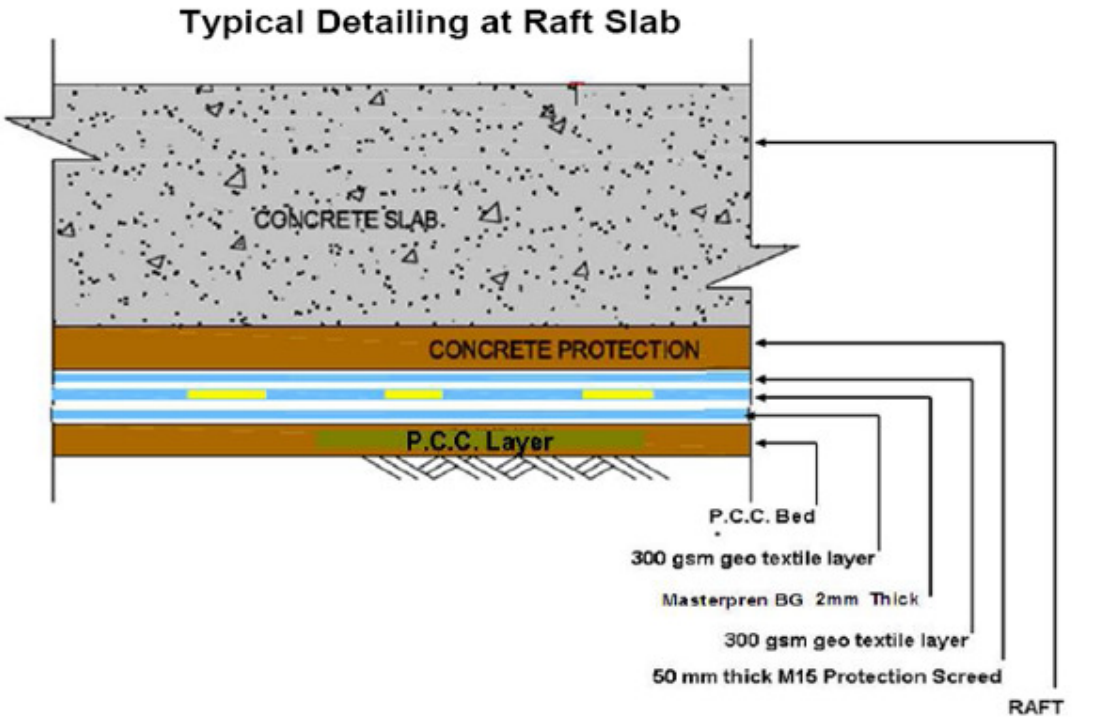
Membrane to be laid after PCC is cured and prior to laying of Rebar.

PRECAUTIONS

- Membrane needs to be covered with geotextile and screed as recommended by manufacturer prior to steel laying
- Joints need to be welded & tested for leakage
- Selection of membrane needs to be made on basis of its usability as per actual site conditions (wet or dry) since in most cases excavated basements will have ground water, membranes which can be used and welded in wet conditions should be used

SKETCH

BASEMENT RAFT WATERPROOFING - MEMBRANE



B) **Grouting of construction joints in raft**

WHAT TO USE?

a. CASA Projects : Grouting with cement slurry

b. ASPIRATIONAL Projects: Cement slurry with non shrink grout

c. HIGH END Projects: Water stopper

d. LUXURY Projects: water stopper along with Reinjectable hose

HOW TO USE?

- Providing & Drilling hole in concrete-drill dia – 13mm,fixing mechanical injection Packers using non shrink polymer mortar Emaco S 48 CT / Fast

setting compound. Spacing 300 mm centre to centre OR as per sitecondition.

- Injection grouting using Master flex 801, vinyl methaacrylate, Low viscosity, hydro-swelling, thermosetting resin - Using specialized injection pump Note: Mode of Measurement- actual quantity mixed, consumed & wastage.
- Crack Filling Treatment:-Removal of loose concrete and chipping the same with chisel and cleaning the same with wire brush & air blower & Making groove 25mm to 15 mm & filling with MasterEmaco S 348 – Repair Mortar
- **REINJECTABLE HOSE INSTALLATION**
    - Installation of Re – Inject able Hose at the Construction Joints:Providing and fixing MasterFlex 900 (Re – inject able hose), at the construction joints of raft and retaining wall to inject MasterFlex 801 metha – acrylate based resin have the curative measures property for treatment of the construction joints (As per the site construction planning for Raft and retaining wall).
    - Injecting MasterFlex 801 which is low-viscosity, hydro-swelling resin based on vinyl ester metha - acrylate chemistry through Masterflex 900 (Re-injectable Hose) to treat the construction joints.

WHEN TO USE?

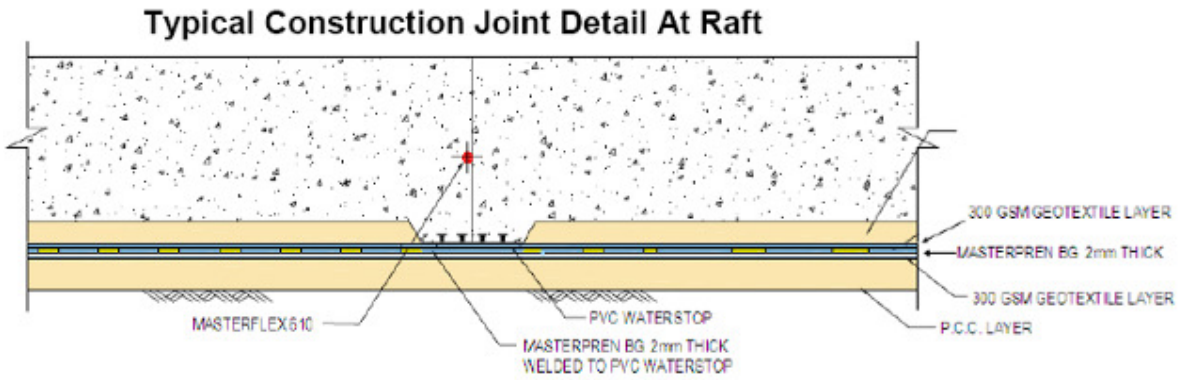
Grouting to be done after next part of raft is cast and cured

PRECAUTIONS

- Socket spacing and handling of grout material to be strictly as per manufacturer's specification
- Grouting of construction joints of lift wall and lift foundation is compulsory

SKETCH

TYPICAL CONSTRUCTION JOINT DETAIL AT RAFT



C) PRESSURE RELEASE PIPES

WHAT TO USE?

a. CASA Projects : 75 mm dia G.I. Pipe (A class) extending 1 meter above FFL of Raft . Spacing @ 2m x 2 m

b. ASPIRATIONAL Projects: 75 mm dia G.I. Pipe (A class) extending 1 meter above FFL of Raft . Spacing @ 2m x 2 m

c. HIGH END Projects: 75 mm dia G.I. Pipe (A class) extending 1 meter above FFL of Raft . Spacing @ 2m x 2 m

d. LUXURY Projects: 75 mm dia G.I. Pipe (A class) extending 1 meter above FFL of Raft . Spacing @ 2m x 2 m

HOW TO USE?

- TREATMENT OF 75MM DIA PRESSURE RELEASE PIPES PERIPHERY: Providing openings in 2mm thick Masterpren BG/FR (PVC membrane) at the pressure relief PVC pipe sleeve locations and then 2mm thick Masterpren BG/FR (PVC Membrane), shall be welded to the horizontal membrane with an overlap of 200mm by Hot Air gun as per manufacture's specifications. The PVC membrane shall be held in position using Jubilee Clips. The entire set up is encapsulated using 50mm thick MasterFlow 410 PCT (Low Exothermic, High strength impermeable epoxy mortar) or equivalent make upto a height of 300mm to ensure water tightness as per manufacturer's specifications.

- GROUTING OF PRESSURE RELEASE PIPES: Providing & Grouting the Pressure Release Pipe usingMasterFlow 928T,(a Dual Shrinkage Compensated Cementitious Precision Grout) till the top of Pressure Release Pipes. Note: If the water pressure is high then special injection grouting method needs to be adopted to arrest water from PRP.

WHEN TO USE?

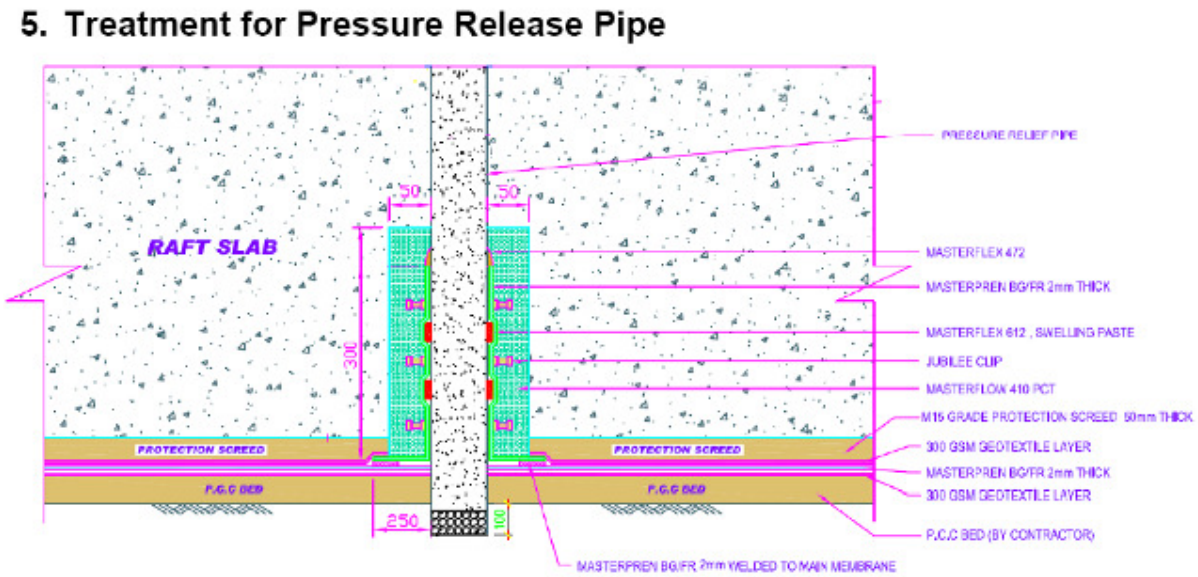
Pressure release pipes to be grouted and plugged only after the full counter weight as specified by structural consultant is superimposed on the Raft.

PRECAUTIONS

- **Pipe to be left open. Ensure that pipe does not get blocked**
- **Mapping of pipes & grout record to be maintained to ensure that each pipe is grouted**
- **Periphery of pipes needs to be treated as per above method**

SKETCH

PRESSURE RELEASE PIPE



D) CONSTRUCTION JOINT BETWEEN RAFT & RETAINING WALL / JOINTS IN RETAINING WALL (HORIZONTAL AND VERTICAL)

WHAT TO USE?

a. CASA Projects : Grouting with cement slurry

b. ASPIRATIONAL Projects: Cement slurry with non shrink grout

c. HIGH END Projects: Water stopper

d. LUXURY Projects: Water stopper & Reinjectable hose

HOW TO USE?

- Providing & Drilling hole in concrete-drill dia – 13mm,fixing mechanical injection Packers using non shrink polymer mortar Emaco S 48 CT / Fast setting compound. Spacing 300 mm centre to centre OR as per sitecondition.

- Injection grouting using Master flex 801, vinyl methaacrylate, Low viscosity, hydro-swelling, thermosetting resin - Using specialized injection

pump Note: Mode of Measurement- actual quantity mixed, consumed & wastage.

- Crack Filling Treatment:-Removal of loose concrete and chipping the same with chisel and cleaning the same with wire brush & air blower & Making groove 25mm to 15 mm & filling with MasterEmaco S 348 – Repair Mortar

- **REINJECTABLE HOSE INSTALLATION**

    - Installation of Re – Inject able Hose at the Construction Joints:Providing and fixing MasterFlex 900 (Re – inject able hose), at the construction joints of raft and retaining wall to inject MasterFlex 801 metha – acrylate based resin have the curative measures property for treatment of the construction joints (As per the site construction planning for Raft and retaining wall).

    - Injecting MasterFlex 801 which is low-viscosity, hydro-swelling resin based on vinyl ester metha - acrylate chemistry through Masterflex 900 (Re-injectable Hose) to treat the construction joints.

WHEN TO USE?

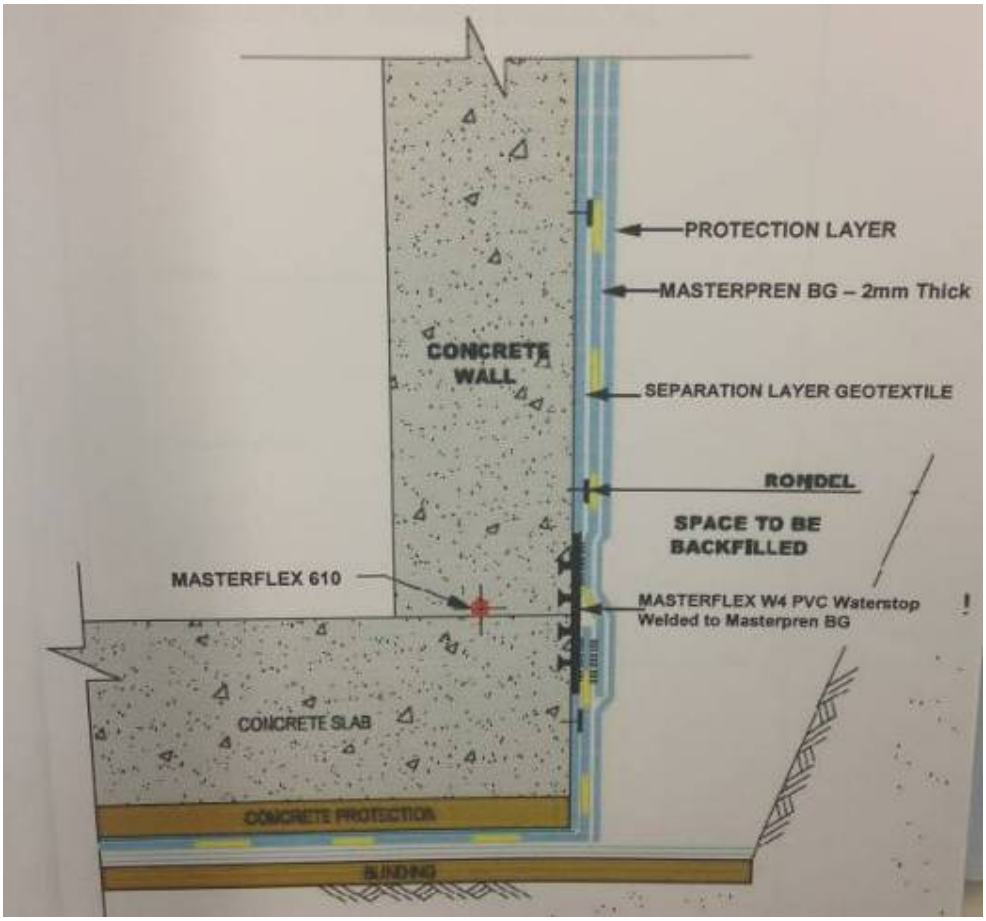
- Grouting to be done after retaining wall above is cast and cured
- Water stopper to be laid prior to raft casting in a manner such that half width is embedded in raft and remaining half is in the wall

PRECAUTIONS

- Socket spacing and handling of grout material to be strictly as per manufacturer's specification
- Joints in the water stopper are knife welded by suing specials to connect these stoppers in vertical or horizontal joints of retaining wall
- water stopper joints to be placed as per location of planned construction joint
- All construction joints need to be mapped on a drawing and checklist to be used for joint grouting.

SKETCH

RETAINING WALL TREATMENT



E) SLEEVES FOR SERVICE PENETRATION IN RETAINING WALL

WHAT TO USE?

a. CASA Projects : Galvanized puddle flange

b. ASPIRATIONAL Projects: Galvanized puddle flange

c. HIGH END Projects: Galvanized puddle flange

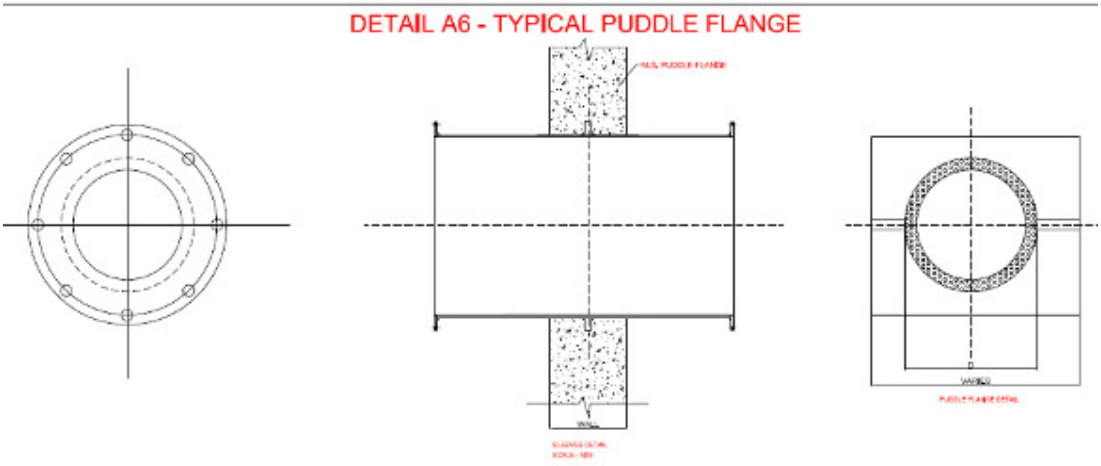
d. LUXURY Projects: Galvanized puddle flange

HOW TO USE?

- Drawing showing location of puddle flange must be provided by design team to site
- Galvanized puddle flange to be placed during placing of reinforcement works
- Services team must sign the location of galvanized puddle flange prior to start of concrete on the pour card
- Any pipe carrying services into the basement must be made watertight or sealed with Masterflex 612 paste (hydroswelling gasket) or equivalent and confined between layers of MasterEmaco S 348 / MasterEmaco S346
- Workmanship must be accurate for application of Masterflex 612 paste all around the pipe circumference and sealing the gap with MasterEmaco S348 / MasterEmaco S 346

SKETCH

TYPICAL PUDDLE FLANGE DETAILS



F) TIE ROD TREATMENT ALONG WITH TREATMENT TO HONEYCOMBING AND WEAK CONCRETE

WHAT TO USE?

a. CASA Projects: Usage of tie rods without sleeve. In case of tierods use Cebex-100 grout chemical OR Grouting using cement slurry or micro concrete CNS 50

b. ASPIRATIONAL Projects: She bolt with crimp pins or "Ghughu" bolt as per availability.. Bolts to be used during shuttering. Crimple pin remains in Concrete after deshuttering. In case of tierods use Cebex-100 grout chemical OR Grouting using cement slurry or micro concrete CNS 50

c. HIGH END Projects: She bolt with crimp pins or "Ghughu" bolt as per availability.. Bolts to be used during shuttering. Crimple pin remains in Concrete after deshuttering. In case of tierods use Cebex-100 grout chemical OR Grouting using cement slurry or micro concrete CNS 50

d. LUXURY Projects: She bolt with crimp pins or "Ghughu" bolt as per availability.. Bolts to be used during shuttering. Crimple pin remains in Concrete after deshuttering. In case of tierods use Cebex-100 grout chemical OR Grouting using cement slurry or micro concrete CNS 50

HOW TO USE?

- PVC cap shall be removed from the tie rod holes
- Tie rod hole portion shall be cleaned using water pressure
- In clean tray 225 gms (One Sachet) of Cebex-100 to 1 bag cement and 20 litres water shall be mixed to prepare paste of dough like consistency and uniform colour.This material shall be filled in holes using tie rods to plug the holes carefully from both sides.Excess material on surface shall be cleaned thoroughly
- Curing shall start after 8 hrs and surface shall be kept wet for 7 days or curing compound shall be used.

PRECAUTIONS

- Grout both ends after deshuttering

- All tie rods to be grouted prior to start of plaster.

G) RETAINING WALL

WHAT TO USE?

a. CASA Projects : External box type - Polymer modified elastic and flexible cementitious waterproof coating

b. ASPIRATIONAL Projects: External box type - Polymer modified elastic and flexible cementitious waterproof coating

c. HIGH END Projects: External box type - 2mm thick Single Ply PVC membrane system(Best in market)

d. LUXURY Projects: External box type - 2mm thick Single Ply PVC membrane system(Best in market)

HOW TO USE?

POLYMER MODIFIED FLEXIBLE CEMENT BASED WATERPROOFING

- Prepare the surface to requirements i.e. cleaning the dust particles, neat cement slurry smooth film surface hacking and clean with water etc.
- Chased open the construction joints, junctions cracks and honey combs and grouting them with cement slurry grout admixed with Cebex 100 or equivalent expandable grout additive @ 225 gm/bag of cement to full saturation using gravitational pressure as per judgment at site.
- Polymer modified elastic and flexible cementitious waterproof coating of Hydrocem or equivalent shall be applied in two coats on the floor and on the walls for a height of upto 300 mm above F.F.L. including fibreglass

reinforcing mesh as a sandwich layer between two coats at the junction of floor and walls.

- Ponding shall be done for 3 days to test water tightness.
- Protective screed / plaster consisting of plaster of average 20mm thick in cement mortar (1:4) is laid, While preparing the mortar Plastocrete Plus / Proofsol LWP integral water proofing compound is added @ 100ml per bag of cement. Coving at the junction of floor and walls will be made and surface should be kept rough to receive further finishing.
- Curing shall be done for minimum 7 days.

MEMBRANE TYPE WATERPROOFING (RETAINING WALL)

- SEPARATION/CUSHIONING LAYER: Providing and laying protective layer of 300 gsm geotextile laid on the external side of the retaining wall with an overlap of 50 mm.
- WATERPROOFING LAYER OVER RETAINING WALL: 2mm thick non-reinforced MASTERPREN BG/FR (PVC membrane), shall be loosely laid directly over the geo textile layer on retaining wall without stretching and it should be hot air welded to PVC Roundels by Hot air gun. The PVC Roundels shall be fixed at the retaining wall at spacing of 1000 mm in both directions to avoid vertical sagging or hogging due to self-weight of the membrane. Masterpren BG/FR (PVC membranes), shall be laid with a minimum overlap of 80mm. The two adjacent PVC membrane sheets shall then welded to each other using Hot Air gun. Top end of the membrane shall be terminated using Aluminium Strip and the then sealed by MasterFlex 472/ 474 (Single Component Polyurethane Sealant) as per manufacturer's specification.
- COMPARTMENTALIZATION: Compartmentalization shall be in the range of 250 - 300 sqmt shall be carried out using PVC waterstop on the retaining wall.

- SEPARATION/PROTECTION LAYER:Providing and laying a layer of 300 gsm geotextile over the loosely laid over Masterpren BG/FR (PVC membrane) with a minimum overlap of 50 mm.
- PROTECTION BOARD: Providing & Laying Delta Board over the Masterpren BG/FRto protect the membrane from physical damage during backfilling operation.

WHEN TO USE?

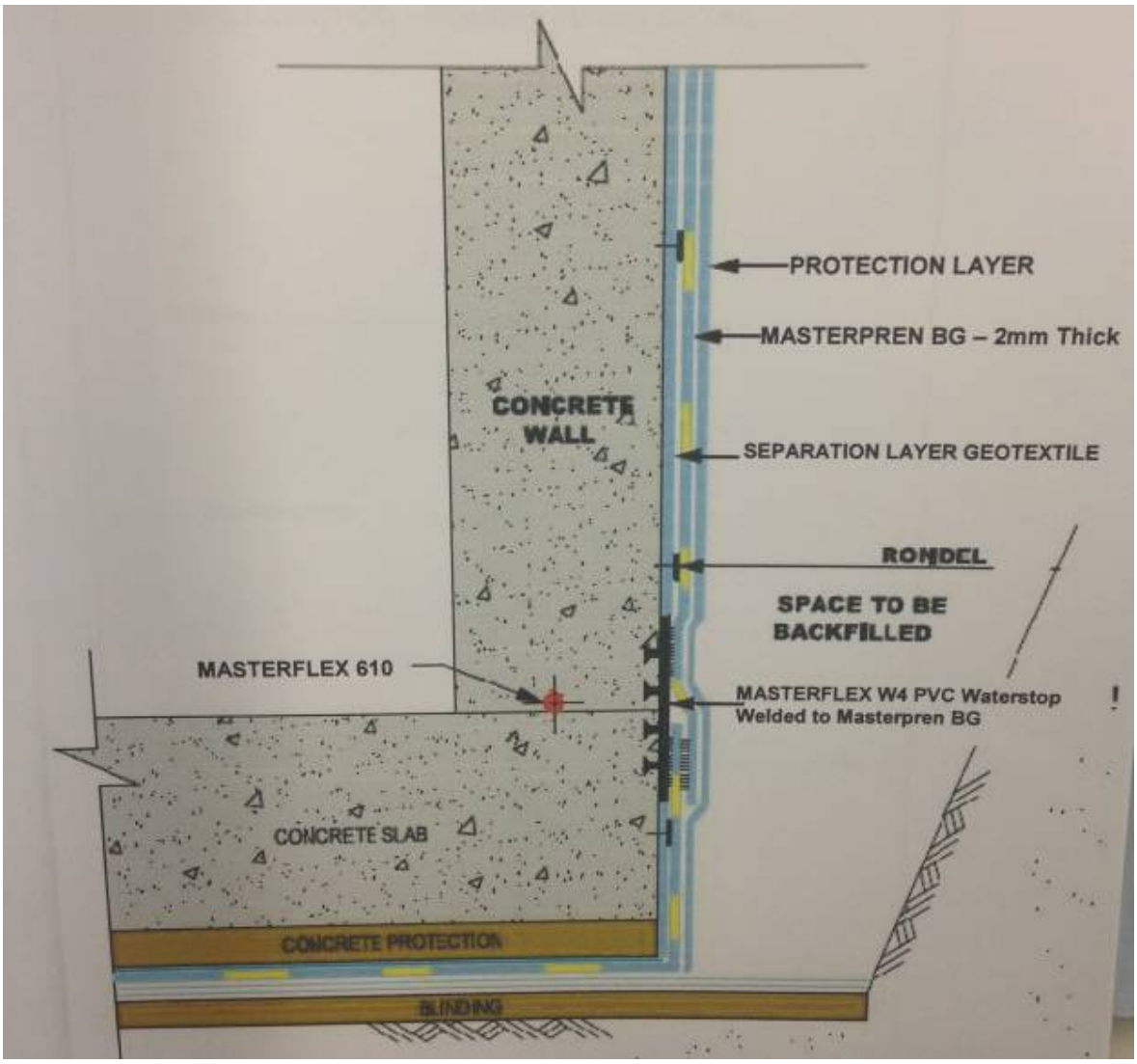
- After deshuttering and curing of concrete but prior to backfilling

PRECAUTIONS

- Joints needs to be welded & tested for leakage
- Membrane protection with bitumin boards or as per manufacturers recommendation prior to backfilling
- Membrane to be terminated min. 1 feet above the ground level
- Membrane to be compatible with waterproofing to be done over podium

SKETCH

RETAINING WALL TREATMENT


PROTECTION LAYER
MASTERPREN BG – 2mm Thick
CONCRETE WALL
SEPARATION LAYER GEOTEXTILE
RONDEL
SPACE TO BE BACKFILLED
MASTERFLEX 610
MASTERFLEX W4 PVC Waterstop Welded to Masterpren BG
CONCRETE SLAB
CONCRETE PROTECTION
BLINDING

H) UNDERGROUND WATERTANK

WHAT TO USE?

a. CASA Projects : cement based coating. Waterstopper to be used at joints. To be waterproofed from inside as well as outside

b. ASPIRATIONAL Projects: cement based coating. Waterstopper to be used at joints. To be waterproofed from inside as well as outside

c. HIGH END Projects: cement based coating. Waterstopper to be used at joints. To be waterproofed from inside as well as outside

d. LUXURY Projects: cement based coating. Waterstopper to be used at joints. To be waterproofed from inside as well as outside

HOW TO USE?

- Installation Of Metal Packer: Fill the water tank to check the water tightness of the RCC prior to waterproofing treatment. Mark the leaking points and install non – returnable metal packer by drilling the hole and fixing the nozzles using fast setting compound or polymer mix mortar.

- Grouting using Special Resin: Providing and injection grouting the leaking cracks. Any leaking cracks or joint in the RCC of the pool prior to the waterproofing treatment shall be grouted and sealed with MasterFlex 801 is low-viscosity, hydro-swelling, thermosetting resin based on vinyl ester metha-acrylate chemistry for injection of fine cracks. The Injection resin shall have re-swelling capacity up to 2.5 times by volume in potable water. The injection resin shall contain accelerator to regulate the setting times and shall not of expanding foaming type product or non-swelling formulation.

- Waterproofing Coating: Providing and applying acrylic reinforced cementitious, flexible waterproof coating, MasterSeal 550, a two component reactive polymer composite to be applied in two - three coat on to RCC surface, slab & vertical surface above F.F.L. Consumption shall

be @ of 3.9 Kg/Sqmt, including surface preparation, crack filling, tie rod filling, coving, ponding etc complete.

- Protection Layer For Vertical Surface: Providing and applying waterproof plaster of average 10 to 15mm thick in C.M. (1:3) in 2 coats on the walls mixed with MasterPel 707 (waterproofing compound) as per specification, including surface preparation, curing etc. complete as directed
- Protection Layer For Horizontal Surface Providing and applying waterproofing screed concrete of average 25 -50 mm thick in C.C. (1:1.5:3) mixed with MasterPel 707 (Waterproofing Compound) on the floor as per specification, including surface preparation, curing etc. complete as directed.
- Cut Out Treatment: Providing and applying MASTERFLEX 612 is a one component hydro-swelling gasket in paste form. It's suitable for the permanent sealing of construction joints in concrete structures to be kept confined between MasterEmaco S 346/MasterEmaco S 348.
- In case outer face of UG tank is retaining wall then the same to be treated with methodology of retaining wall external face treatment
- In case outer face of UG tank is not retaining wall then cement coating based waterproofing treatment detailed above to be followed for both inside and outside too.

PRECAUTIONS

- All sleeves need to in form of puddle flanges placed in forms prior to concreting

I) BASEMENT WATERPROOFING MATERIAL SPECIFICATIONS

The following products from their respective manufacturer for each type of product meet the specified key properties.

S N	Type of product	Approved products	Manufacturer
1	2mm thick Single Ply PVC membrane system	• Masterpren BG/FR •	• BASF •
2	Re-injectable hose system	• MasterFlex 900 •	• BASF •
3	Low-viscosity, hydro – swelling, thermosetting resin based on vinyl ester metha-acrylate chemistry for construction joint treatment, injection grouting	• MasterFlex 801 •	• BASF •
4	Single component P.U. form for special injection at PRP.	• MasterRoc MP 355 1K •	• BASF •
5	Low to medium modulus polyurethane joint sealant	• MasterFlex 472 •	• BASF •
6	High modulus polyurethane joint	• MasterFlex 474	• BASF

	sealant	•	•
7	Re-swellable polymeric paste for treatment of rock anchor and pressure release pipe sleeve	• MasterFlex 612	• BASF
8	Dual Shrinkage compensated high strength Precision Grouts for grouting of pressure release pipes	• MasterFlow 928 T	• BASF
9	High Strength Impermeable Epoxy Mortar for Encapsulation	• MasterFlow 410 PCT	• BASF
10	Acrylic reinforced cementitious, flexible waterproof coating	• Masterseal 550	• BASF

1. PVC MEMBRANE WATERPROOFING SYSTEM

The synthetic PVC twin colour membrane with signal layer, it shall have light green upper surface and lower surface in black colour for visual quality check, manufactured by co-extrusion in a UNI EN ISO 9001: 2000 and UNI ENI 14001:2004 certified plant, shall be thickness **2mm**, roll width of **2.10 meters**, with the physical and chemical properties as mentioned below:

Sr No	Properties	Test Method	Results
1	Thickness	UNI EN 1849 -2	2mm
2	Fire Behaviour	EN ISO 11925-2	Class E
3	Puncture resistance	DIN 16726 - 5.12	≥1100 mm
4	Impact strength	DIN 16726 - 5.12	≥ 750 mm
5	Elongation a) Transverse b) Longitudinal	 UNI EN ISO 527-3 UNI EN ISO 527-3	 310%(-30%) 310%(-30%)
6	Ultimate Tensile Strength a) Transverse b) Longitudinal	UNI EN ISO 527-3 UNI EN ISO 527-3	16.4 N/mm2 (-1.5 N/mm2) 16.7 N/mm2 (-1.5

			N/mm2)
7	Specific weight	UNI EN 1849 -2	2.6 kg/m2
8	Hydrostatic Pressure resistance (6 hours at 5 bar)	UNI EN 1928 meth. B	Waterproof
9	Resistance to static punching	UNI EN ISO 12236	> 2300N
10	Root Resistance	CEN TS 14416	No Penetration

The membrane shall be double seam welded which shall be subject to a pneumatic test at **2 bar** pressure for a period of **10 minutes**. The drop the pressure must not be more than **20%** to ensure water tightness of that joint.

The material shall be capable of being welded to the surface PVCwater stop with welding fins, to compartmentalize the structure at the construction joints. The slip membrane under and above the membrane shall be a geo textile manufactured from virgin polypropylene and shall be with a specific weight of minimum **500 gsm and 300gsm** respectively. The physical property of the geo textile layer is as below:-

Physical Property of 300 gsm geo textile

Sr. No	Properties	Test Standard	Values
1	Weight	ASTMD 5261	300 gsm
2	Tensile Strength	ASTMD4595	12 KN/m
3	Elongation	ASTMD4595	50-75 %
4	Grab strength	ASTMD4632	700 N
5	CBR Puncture	ASTMD4261	1850 N
6	Tear Strength	ASTMD4533	250 N

The vertical protection shall be with DELTA BOARDS at unconfined areas

The horizontal protection over the membrane shall be minimum 50 mm thick screed of **M15 grade**with 10mm down aggregates, to facilitate the installation and tying of reinforcement bars for casting of raft.

2. ENCAPSULATION OF INTERFACE JUNCTION OF PVC MEMBRANE AND ROCK ANCHOR AND PRESSURE RELEASE PIPES

The rock anchor and pressure release pipe interface with PVC Membrane shall be treated as shown in the section details by applying 2 layers of re-swelling polymeric paste on the external periphery of the PVC sleeve covering it with PVC waterproofing membrane and sealing the mouth of the mouth waterproofing Membrane and PVC sleeve by P.U. sealant. The entire setup is held in position using 3 jubliee clips and is then encapsulated by high strength epoxy grout material.

The properties of Swellable polymeric paste that shall be applied on external periphery of PVC sleeve are as below:-

Sr No	Properties	Results
1	Base	Hydro swelling polymeric paste
2	Mix Density	1.5 Kg/ Litre
3	Re-swelling capacity	> 80% in potable water
4	Setting time	4 – 6 Hours

The properties of P.U. sealant to close the mouth of waterproofing membrane between PVC sleeve around the periphery of PVC sleeve are as below:-

Sr No	Properties	Results	Results
1	Base		Single component P.U. Sealant
2	Elongation at break	ISO 8339	600%
3	Density		1.3 gms/cm3
4	Recoverability		80%

The encapsulation is done using Epoxy Grout having the following properties:

Sr No	Properties	Test Method	Results
1	Compressive Strength	BS 6319, part 2	45 MPa at 1 Day 70 MPa at 3 Days 80 MPa at 7 Days
2	Flexural Strength	BS 6319, part 3	20 MPa at 7 Days
3	Tensile Strength	BS 6319, part 7	10 MPa at 7 Days

3. REPROFILING OF PILE HEADS

The reprofiling of the pile heads shall be done using Dual Shrinkage Compensated free flow Micro Concrete having the following Physical Properties

Sr No	Properties	Test Method	Values
1	Fresh Wet Density		2250 Kg/m^3
2	Compressive Strength	ASTM C 109, 7mm cube	15 MPa at 1 Day 25 MPa at 3 Days 35 MPa at 7 Days 40 MPa at 28 Days
3	Water/Powder Ratio by Weight		0.14

4. ENCAPSULATION OF INTERFACE JUNCTION OF PVC MEMBRANE AND PILE HEAD

The pile head or pressure release pipe interface with PVC Membrane shall be treated as shown in the section details along with epoxy grout material by encapsulation methodwith the following properties:

Sr No	Properties	Test Method	Results
1	Compressive Strength	BS 6319, part 2	45 MPa at 1 Day 70 MPa at 3 Days 80 MPa at 7 Days
2	Flexural Strength	BS 6319, part 3	20 MPa at 7 Days
3	Tensile Strength	BS 6319, part 7	10 MPa at 7 Days

5. CONSTRUCTION JOINT TREATMENT USING RE - INJECTABLE HOSE

i. The hose should be of a re-injectable nature and be capable of re-injection several times over the life of the structure. The hose shall be cleaned by vacuuming and not flushing
ii. Installation should be seamless and without cuts and joints when installed at multiple bends / corners / circular paths in congested heavily reinforced concrete.
iii. The hose shall be capable of following infinite changes in direction and turn corners with ease.
iv. Valves shall be enclosed in a retaining mesh to avoid displacement of these during pressure testing and injection.
v. The injection resin should be of a re-swellable type made of an acrylate hydrogel, capable of being vacuumed out of the hose with water (not flushed), before it gels. The injection resin should be of a low viscosity 40 CPS to enable maximum penetration of very narrow fissures.
vi. The system shall be placed in 10-12 meter lengths with entry port and vent ends Terminating in a junction box and shall offer the user the option of vacuuming and reinjection (should this be necessary). The junction box shall be placed in vertical elements adjacent to the joint. Should this not be possible the junction box and its cover should be installed flush with the floor level and should be able to tolerate vehicular traffic.
vii. The system should be used to seal off the construction joints permanently thus providing protection to the steel reinforcement. Where indicated, all construction joints (vertical and horizontal) shall have Re-injectable Hoseinstalled. The Re-injectable Hosesystems shall be injected at least once, prior to switching off the dewatering with a vinyl ester methacrylate based re-swellable injection resin.
The properties of the Re-injectable hose shall be as below

Sr No	Properties	Values
1	Outer Diameter	19mm
2	Longitudinal injection hole diameter	6mm
3	Discharge open diameter	3mm

The property of metha-acrylate re-swellable resin used for injecting for treating construction joints through re-injectable are as below:-

Sr No	Properties	Values
1	Chemical Base	Acrylate Polymer
2	Mixed Density	6mm
3	Viscosity	< 40 CPS @ 20º C
4	Setting time	1 -2 Hours

6. GROUTING OF PRESSURE RELEASE PIPES

The grouting of Pressure Release pipes shall be with Dual Shrinkage compensated precision grout. The properties of the grout shall be as below:-

Sr No	Properties	Test Method	Results
1	Compressive Strength	ASTM C 109, 70mm cube	35 MPa at 1 Day 55 MPa at 3 Days 65 MPa at 7 Days 75 Mpa at 28 days

2	Water Powder Ratio	By weight	0.15 (Flowable)
3	Mixed Density (Flowable)		2200 Kg/m3
4	Pull out Bond strength		>17 MPa at 7 days
5	Flexural Strength	ASTM C 78	9 MPa at 28 days

If the water pressure is high then grouting of Pressure Release Pipes using Cementitious Grouting will not ensure water tightness. In that case special resin needs to be injected to ensure water tightness.

The product system shall be installed by an experienced specialist applicator, certified by BASF with experience of more than three years with Masterpren membrane waterproofing system only.

Acrylic reinforced cementitious, flexible waterproof coating

Mixed Density	: 1800 kg/m^3
Mixing Ratio, by weight	: 3:1 (powder: Liquid)
Pot Life	: 120 Minutes at 25^{o}C
	: 30 Minutes at 40^{o}C
Recoatable	: 8 – 12 Hours
% elongation	: >5% (unbonded)

Abrasion Resistance, (ASTM D4060, CS17 wheel)	: 45 mg/1000 cycles
Water penetration (DIN 1048)	: 7 bars - no leakage (at 2mm DFT)
Toxicity	: Non-toxic
Water vapour co-efficient	: >3.64 x 10^{-4} cm^2/s
Initial surface absorption	: >95% reduction against control
CO_2 diffusion resistance (Tested by Taywood Engineering, UK)	: R > 357m, Sc > 89cm (1mm DFT), Sc – equivalent concrete thickness
Chloride ion diffusivity	: Zero penetration at 90 days
Chloride ion diffusion co-efficient	: 1.04 x 10^{-7} cm^2/s

Oxygen diffusion co-efficient (DO_2) 7.6×10^{-6} cm²/s

All exposed concrete surfaces are to be coated with MASTERSEAL 550, a two component reactive polymer composite. The product shall be applied in minimum two coats to achieve total DFT of 1mm. The product shall resist 7 bars pressure when tested as per DIN 1048 at 2mm DFT. The cured coating shall have the following diffusion co-efficient.

Carbon dioxide	4.21×10^{-7} cm²/s
Oxygen	7.60×10^{-6} cm²/s
Chloride ion	1.04×10^{-7} cm²/s

PODIUM

A) SUNKEN AREAS – HARDSCAPE

WHAT TO USE?

a. CASA Projects : Polymer modified elastic and flexible cementitious waterproof coating followed by brick bat coba laid to slope (1:300) and finished with cementitious waterproof coating and screed

b. ASPIRATIONAL Projects: Polymer modified elastic and flexible cementitious waterproof coating follwed by brick bat coba laid to slope and finished with cementitious waterproof coating and screed

c. HIGH END Projects: Membrane type waterproofing. 2mm thick Single Ply PVC membrane system(Best in market)

d. LUXURY Projects: PU Based waterproofing

HOW TO USE?

POLYMER MODIFIED CEMENTITIOUS WATERPROOF MEMBRANE

- Installation Of Metal Packer: Fill the area to check the water tightness of the RCC prior to waterproofing treatment. Mark the leaking points and install non – returnable metal packer by drilling the hole and fixing the nozzles using fast setting compound or polymer mix mortar.

- Grouting using Special Resin: Providing and injection grouting the leaking cracks. Any leaking cracks or joint in the RCC of the pool prior to the waterproofing treatment shall be grouted and sealed with MasterFlex 801 is low-viscosity, hydro-swelling, thermosetting resin based on vinyl ester metha-acrylate chemistry for injection of fine cracks. The Injection resin shall have re-swelling capacity up to 2.5 times by volume in potable water. The injection resin shall contain accelerator to regulate the setting times and shall not of expanding foaming type product or non-swelling formulation.

- Waterproofing Coating: Providing and applying acrylic reinforced cementitious, flexible waterproof coating, MasterSeal 550, a two component reactive polymer composite to be applied in two - three coat on to RCC surface, slab & vertical surface above F.F.L. Consumption shall be @ of 3.9 Kg/Sqmt, including surface preparation, crack filling, tie rod filling, coving, ponding etc complete.

- Protection Layer For Vertical Surface: Providing and applying waterproof plaster of average 10 to 15mm thick in C.M. (1:3) in 2 coats on the walls mixed with MasterPel 707 (waterproofing compound) as per specification, including surface preparation, curing etc. complete as directed

- Protection Layer For Horizontal Surface Providing and applying waterproofing screed concrete / brick bat coba of average 25 -50 mm thick in C.C. (1:1.5:3) mixed with MasterPel 707 (Waterproofing Compound) on the floor as per specification and laid to slope of 1:300, including surface preparation, curing etc. complete as directed. A layer of geotextile to be laid over this prior to carrying out filling in sunken areas.

- Cut Out Treatment: Providing and applying MASTERFLEX 612 is a one component hydro-swelling gasket in paste form. It's suitable for the permanent sealing of construction joints in concrete structures to be kept confined between MasterEmaco S 346/MasterEmaco S 348.

MEMBRANE BASED WATERPROOFING: Please refer membrane waterproofing treatment to Basement - Below Raft (section A) and for Retaining wall (Section G)

PU BASED WATERPROOFING METHODOLOGY

- Waterproofing of Landscape Area With Spray Applied P.U. membrane:

- Supply and installation of BBA Approved Spray Applied BASF's CONIROOF 2113 waterproofing membrane system, a multi-layered system comprising of a series of substrate sealers, primers, waterproofing membranes, for podium/ hardscape area that is to be covered with a slope built-up layer with with a concrete screed/ brick bat coba/ pavers etc. The seamless, monolithic waterproofing obtained from the CONIROOF systems requires several application stages:

- Cleaning and Surface Preparation: The cleaning and preparation of the substrate to which the CONIROOF system is applied must be carried out thoroughly to leave a sound base for the application. Any laitance present on the surface must be removed mechanically. Grinding the unsound and undulated concrete surface to make it a fairly smooth surface. Surface defects exposed during surface preparation such as shrinkage cracks, minor honey combing, minor damage to joint arises, and etc. shall be filled with MasterSeal P 2525 mixed with MasterTop SRA No:3. Wider patches if any shall be treated with MasterEmaco S 348 (Patch Repair Mortar).

- Primer Coat: The primer shall be MasterSeal P 2525depending on the substrate. The primer shall form effective bond on the substrate. The primer shall exhibit excellent bond strength. The material storage, mixing, application and coverage should be as per manufacturers latest technical datasheet.

- Sand Broadcasting For Mechanical Key: Dried, graded sand is immediately and evenly spread over the entire wet surface by hand or mechanically at the rate of 1 Kg/Sqmt. When sufficiently cured the surface is vacuumed to remove any loose sand

- Waterproofing Coat: The waterproofing membrane shall be CONIPUR M 800/ M 810, which is a spray applied, solvent free, two component P.U. waterproofing membrane.

- U.V. Stable Top Coat(Only For Exposed Parapet Walls/ Pedestals): The top sealer for use on exposed areas shall be Conipur TC 459, is a pigmented, single component, moisture curing, UV and weather resistant, protective top sealer. It is based on high quality aliphatic polyurethane prepolymers. It should be should be stirred well and applied evenly by roller, brush or by spray. Consumption shall be @ 0.2 Kg/ Sqmt

- Protection Cum Slope Built – Up Layer . Laying slope built-up cum protection layer of M20 grade concrete screed and working out a smooth finish to protect the waterproofing membrane from mechanical damage. The screed shall have a thickness of 50 -75mm at the lower end and shall be laid in slope of 1:100 as per the site requirement. The screed shall be cured by ponding it for a minimum of 7 days.

- For any location if spray is not possible, waterproofing shall be done using Conipur 2160 Hand Applied P.U. Waterproofing System:

PROPERTIES OF P.U. BASED WATERPROOFING

CONIROOF 2113 system consists of the following components:

i. **Primer (hand applied)** suitable as per the substrate.
For concrete substrate the primer shall be **MasterSeal P 2525** (Epoxy Based Primer) having the following properties. The primer is required only for surface where no insulation is applied

Sr No	Property	Test Method	Results
1	Density		1.09 + 0.05 at 25ºC
2	Flexural strength	ASTM C-580-02	35 MPa at 7 days
3	Tensile strength	BS:6319 pt 7	22 MPa at 7 days
4	Compressive Strength	ASTM C 579	70 MPa at 1 Day 75 MPa at 3 Days 80 MPa at 7 Days
5	Adhesive bond strengthto concrete	ASTM D4541	> 1.5 MPa at 25ºC (Concrete failure)

ii. **Waterproofing Membrane** - **CONIPUR M800** (fast curing, spray applied polyurethane membrane)

Property	Test Method	Results
Solids Content	DIN 53213	100%
Density	DIN 53213	0.9-1.0 g/cm3
Ready for Light Traffic	DIN 53213	Max. 60 seconds
Tensile Strength	DIN 53504	8 – 10 MPa

Elongation at break	DIN 53504	400 – 500%
Tear propagation resistance	DIN 53515	12 kN/m
Crack Bridging	EN 10204	> 6mm
Dynamic Crack Bridging (1000 cycles, heat ageing at 70ºC)	ZTV-SIB 90	28days,no change
Shore Hardness	DIN 53505	75
Taber Abrasion Resistance	DIN 53516	150mg
Vapour Permeability	BS 3177	19.21 g/m2/day
Water Absorption	BS2782:Part 3	2.98%
Water tightness	DIN 1048	10 bar (100m) back pressure
Resistance to Water Pressure	MOAT No. 27	No Leaks

iii. UV Top Coatusing Conipur TC 459 in Desired **Colour (Only for exposed areas like Parapet walls/ Pedestals etc.)**

The top coat shall be a pigmented, single component, moisture curing, UV and weather resistant, protectivetop sealer. It is based on high quality aliphatic polyurethane pre-polymers having the following technical parameters.

Properties	**Test Method**	**Results**
Density		1.2 g/cm^3
Solid Content	By Volume	58 %
Viscosity	4mm DIN Cup	75 Sec
Colour		Available in Range of

		Colours
UV Stability	ASTM G 154:06	Stable

Kindly consult BASF India Limited, Construction Chemicals Division for the technical literature. BASF Construction Chemicals also provides design and specification services and it is recommended that they are consulted early in the design stage.

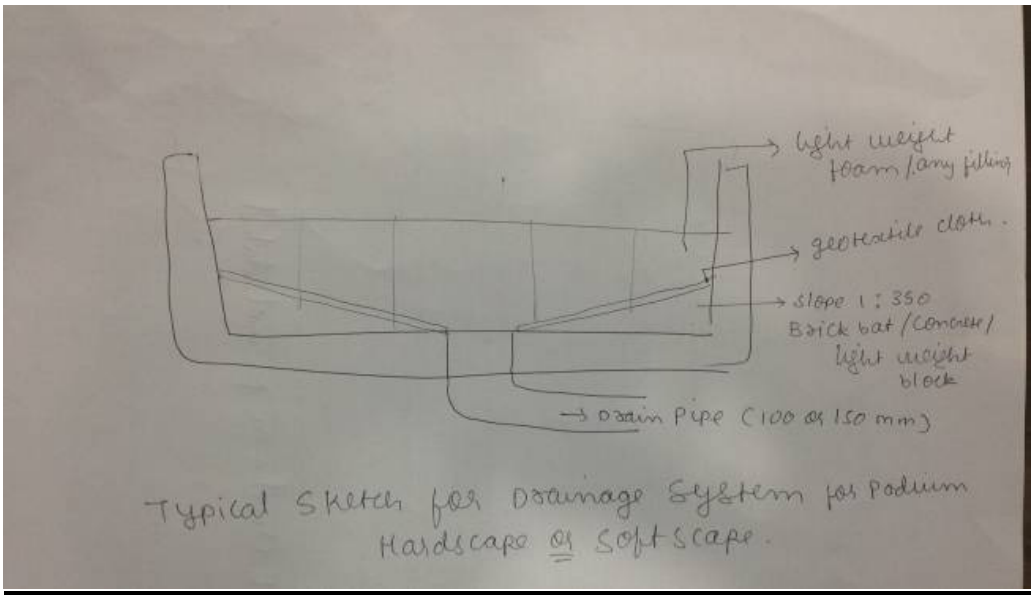
WHEN TO USE:

Fill the water body to check the water tightness of the RCC sunken slab prior to waterproofing treatment. Mark the leaking points and start grouting

PRECAUTIONS:

- Proper design of drainage needs to be done so that water does not stagnate inside the filling
- Joint between slab and vertical walls need to be grouted properly prior to starting of waterproofing treatment

SKETCH:



B) SUNKEN AREAS – LANDSCAPE WORKS

WHAT TO USE?

a. CASA Projects : Polymer modified elastic and flexible cementitious waterproof coating followed by antiroot barrier, follwed by brick bat coba laid to slope and finished with cementitious waterproof coating and screed

b. ASPIRATIONAL Projects: Polymer modified elastic and flexible cementitious waterproof coating followed by antiroot barrier, follwed by brick bat coba laid to slope and finished with cementitious waterproof coating and screed

c. HIGH END Projects: Membrane type waterproofing with antiroot. 2mm thick Single Ply PVC membrane system(Best in market)

d. LUXURY Projects: PU Based waterproofing

For methods please refer Section A – Sunken areas – Hardscape

PRECAUTIONS:

- Proper design of drainage needs to be done so that water does not stagnate inside the filling

- Joint between slab and vertical walls need to be grouted properly prior to starting of waterproofing treatment
- Antiroot treatment needs to be done so that waterproofing is not affected by roots to be laid over waterproofing layer
- Drain cells along with Geotextile to be used to channelize the water towards drains
- Only localized sunks to be provided for planters and tree pits.

C) Water bodies / Swimming pool

WHAT TO USE?

a. CASA Projects : Homogeneous (walls and slab cast together) RCC water bodies with cement based coating. Waterstopper to be used at joints. RCC slab needs to be designed for uncracked section

b. ASPIRATIONAL Projects: Homogeneous (walls and slab cast together) RCC water bodies with cement based coating. Waterstopper to be used at joints. RCC slab needs to be designed for uncracked section

c. HIGH END Projects: Homogeneous (walls and slab cast together) RCC water bodies with cement based coating. Waterstopper to be used at joints. RCC slab needs to be designed for uncracked section

d. LUXURY Projects: Homogeneous (walls and slab cast together) RCC water bodies with cement based coating. Waterstopper to be used at joints. RCC slab needs to be designed for uncracked section

HOW TO USE?

- Installation Of Metal Packer: Fill the swimming pool area to check the water tightness of the RCC sunken slab prior to waterproofing treatment. Mark the leaking points and install non – returnable metal packer by drilling the hole and fixing the nozzles using fast setting compound or polymer mix mortar.

- Grouting using Special Resin: Providing and injection grouting the leaking cracks. Any leaking cracks or joint in the RCC of the pool prior to the waterproofing treatment shall be grouted and sealed with MasterFlex 801 is low-viscosity, hydro-swelling, thermosetting resin based on vinyl ester metha-acrylate chemistry for injection of fine cracks. The Injection resin shall have re-swelling capacity up to 2.5 times by volume in potable water. The injection resin shall contain accelerator to regulate the setting times and shall not of expanding foaming type product or non-swelling formulation.

- Waterproofing Coating: Providing and applying acrylic reinforced cementitious, flexible waterproof coating, MasterSeal 550, a two component reactive polymer composite to be applied in two - three coat on to RCC surface, slab & vertical surface above F.F.L. Consumption shall be @ of 3.9 Kg/Sqmt, including surface preparation, crack filling, tie rod filling, coving, ponding etc complete.

- Protection Layer For Vertical Surface: Providing and applying waterproof plaster of average 10 to 15mm thick in C.M. (1:3) in 2 coats on the walls mixed with MasterPel 707 (waterproofing compound) as per specification, including surface preparation, curing etc. complete as directed.

- Protection Layer For Horizontal Surface Providing and applying waterproofing screed concrete of average 25 -50 mm thick in C.C. (1:1.5:3) mixed with MasterPel 707 (Waterproofing Compound) on the floor as per specification, including surface preparation, curing etc. complete as directed.

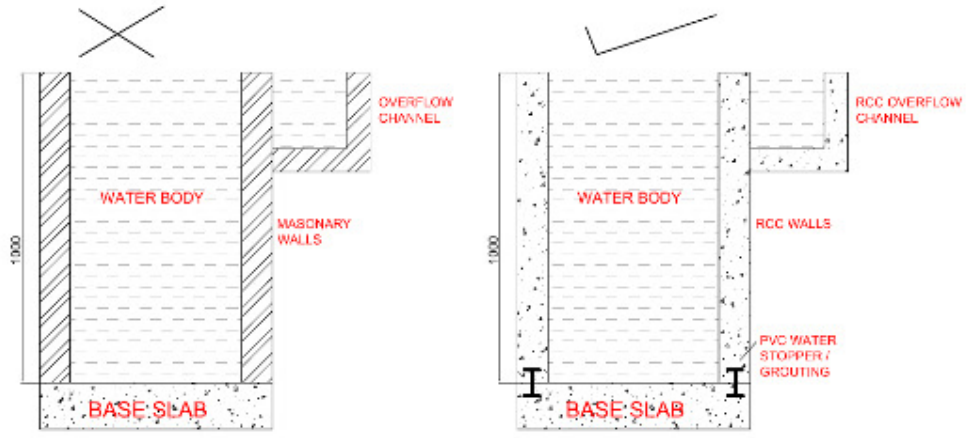
- Cut Out Treatment: Providing and applying MASTERFLEX 612 is a one component hydro-swelling gasket in paste form. It's suitable for the permanent sealing of construction joints in concrete structures to be kept confined between MasterEmaco S 346/MasterEmaco S 348.

PRECAUTIONS

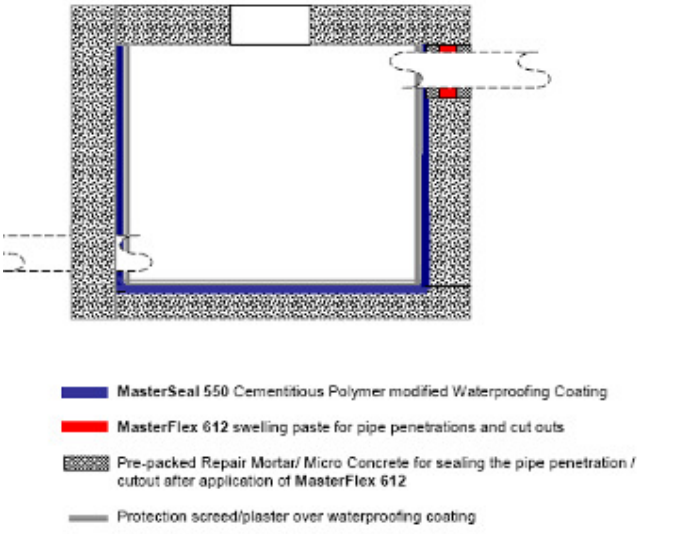
- Care must be taken that walls and slab of RCC water bodies are cast together. This will avoid any cold joint which is a potential source of leakage. In case of sunken areas where beam and slab are being cast together the beam must be filled with concrete first and then the slab portion to be cast in the same pour
- Fill the water body to check the water tightness of the RCC sunken slab prior to waterproofing treatment. Mark the leaking points and start grouting
- No chiselling of water bodies for services like lights, conduits, water pipes after waterproofing treatment is done
- All sleeves need to in form of puddle flanges placed in forms prior to concreting
- Water stopper to be provided at joints of base raft and walls. In absence of water stopper the junction to be grouted properly
- Crystalline waterproofing method to be avoided as it is found to be totally ineffective

SKETCH

A-4 RCC DETAIL FOR SWIMMING POOL AND WATER BODIES



Schematic Layout of Waterproofing System



D) TREATMENT AROUND PIPES CARRYING WATER INSIDE THE BASEMENT

WHAT TO USE?

a. CASA Projects : 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete

b. ASPIRATIONAL Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete

c. HIGH END Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete

d. LUXURY Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete

HOW TO USE?

- Any pipe carrying services into the basement must be made watertight or sealed with Masterflex 612 paste (hydroswelling gasket) or equivalent and confined between layers of MasterEmaco S 348 / MasterEmaco S346
- Workmanship must be accurate for application of Masterflex 612 paste all around the pipe circumference and sealing the gap with MasterEmaco S348 / MasterEmaco S 346

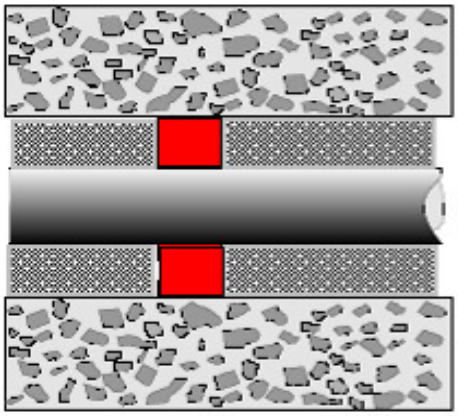
PRECAUTIONS

- If Gap around openings is more than required then it must be filled with microconcrete & "M-Seal". Use silicon sealant in case gap is neglibile

SKETCH

c) Treatment for Cut Outs

i. Any pipe penetrations of Cutouts for services must be made watertight or sealed with use of **MasterFlex 612** paste and confined between layers of **MasterEmaco S 348/ MasterEmaco S 346**. (Workmanship must be accurate for application of **MasterFlex 612** all around the pipe circumference and sealing the gap with **MasterEmaco S 348/ MasterEmaco S 346.**





E) Expansion joint / Joint of podium & Building footprint

WHAT TO USE?

a. CASA Projects : Bitumin impregnated joint filler to be Shalitex board / Jolly board. No thermocol to be used as joint filler. Joint to be sealed with 2 part polyurethane sealant or silicon sealant. Continuity of sealant is very important. After sealing , the joint needs to be covered with RCC capping in such a manner that both the structures can move independently

b. ASPIRATIONAL Projects: Bitumin impregnated joint filler to be Shalitex board / Jolly board. No thermocol to be used as joint filler. Joint to be sealed with 2 part polyurethane sealant or silicon sealant. Continuity of sealant is very important. After sealing , the joint needs to be covered with RCC capping in such a manner that both the structures can move independently

c. HIGH END Projects: Bitumin impregnated joint filler to be Shalitex board / Jolly board. No thermocol to be used as joint filler. Joint to be sealed with 2 part polyurethane sealant or silicon sealant. Continuity of sealant is very important. After sealing , the joint needs to be covered with RCC capping in such a manner that both the structures can move independently

d. LUXURY Projects: Bitumin impregnated joint filler to be Shalitex board / Jolly board. No thermocol to be used as joint filler. Joint to be sealed with 2 part polyurethane sealant or silicon sealant. Continuity of sealant is very important. After sealing , the joint needs to be covered with RCC capping in such a manner that both the structures can move independently

PRECAUTIONS:

If possible the waterproofing treatment to expansion joint must be done only in season having temperature 20 degrees or less (in winters).

TOILETS

A) SUNKEN AREAS

WHAT TO USE?

a. CASA Projects : Chemical coat with protective screed laid to slope, followed by light weight concrete filling having density 1100 kg per cum, followed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried up to 600 mm height over the walls.

b. ASPIRATIONAL Projects: Chemical coat with protective screed laid to slope, followed by light weight concrete filling having density 1100 kg per cum, followed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried up to 600 mm height over the walls.

c. HIGH END Projects: Chemical coat with protective screed laid to slope, followed by light weight concrete filling having density 1100 kg per cum, followed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried up to 600 mm height over the walls. In case tiles are used for flooring and dado then the joints need to be grouted with "Laticrete" or equivalent

d. LUXURY Projects: Chemical coat with protective screed laid to slope, followed by light weight concrete filling having density 1100 kg per cum, followed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried up to 600 mm height over the walls. In case tiles are used for flooring and dado then the joints need to be grouted with "Laticrete" or equivalent

HOW TO USE

Pre Waterproofing Procedures:

1) It shall be ensured that toilet plumbing lines are installed in masonry and chases are rendered with non-shrink grout prior to cleaning activity of sunk is undertaken.

2) Cleaning of sunk slab base and sides of beams shall be carried out as regards all those materials, mortar, oil, grease etc. thoroughly by wire brush and the area shall be washed clean and surface should be wet.

3) Injection grouting at all major honeycombed portions shall be carried out, if necessary, after physical observation of the sunk.

4) Sunk slab shall be cured for at least 2 days by ponding, to test for leakages and to serve water hungry concrete surface.

5) In case of major leakage, gravity grouting or pressure grouting shall be resorted to, to stop leakages.

6) Holes for PVC and other outlet pipes shall be marked clearly for size and locations. Outer surface of PVC pipes shall be roughened for better bonding. Diameter of hole shall not exceed pipe diameter.

7) Levels of water-proofing shall be clearly marked on the toilet walls with slope towards outlet, as specified in drawing or minimum 1:100 otherwise.

During Waterproofing Procedures:

1) Application of chemical waterproofing coat (crystalline / elastometric / polymer) can be done, if required to entire sunk portion before base coat.

2) Base coat using cement mortar in proportion 1:4 or as specified by QA Department with approved water-proofing compound shall be applied over top of base slab of sunk. Maximum thickness of base coat shall be 25 mm at upper end of slope.

3) Proper slope shall be given to base coat as per drawing towards drain spout and drain spout to be fitted simultaneously with the base coat, as an additional precaution to take care of seepage, if any. Base coat shall also be applied to the sides of the toilet sunk up to one foot above the finished floor level (F.F.L) of the adjacent floor.

3) Drain spout shall be 20 mm / 25mm diameter GI / UPVC, fixed so as to project at least 4” beyond wall surface. Drain spout mouth shall be cut to the shape of half nozzle

by cutting at 30º angle to facilitate water dropping in the form of a projectile. Holes for drain pipes should be done before starting any type of waterproofing.

4) Drain pipe mouth shall be fitted with PVC grating or filter media form inside and chicken mesh / wire mesh from outside.

5) Curing of base coat shall be done by ponding for 3 days and checked against leakage. Leakage, if observed, shall be rendered with reapplication of base coat to ensure no leakage.

6) Floor traps and other plumbing lines shall be installed in brick masonry after application of base coat.

7) Slope of 1:100 shall be provided for toilet piping and water proofing. Floor trap shall be fixed with respect to finished floor level (F.F.L) of the toilet.

8) Rendering of holes shall be done using compatible bonding agents; SBR based expansive grouts, waterproofing compounds and M15 grade concrete.

9) All internal drain lines shall be erected as per layout given on the drawing and shall be pressure tested.

10) Application of brick bat coba shall be started, once plumbing lines are satisfactory pressure tested.

11) Bricks selected for using as Brick Bat Coba shall be either full brick or $3/4^{th}$ brick made out of one complete brick by breaking into required size, using mallets.

12) Brick bat shall not be stored in the form of a heap at one place and soaked thoroughly for about 15 minutes prior to their placing.

13) Use of plasticizer in mortars is recommended to increase workability. Mortar mixed shall be used within 1 Hour of preparation.

14) Presoaked brick-bats shall then be laid in straight / radial, by inserting brickbats to a depth of about 15mm by light tamping with the help of mallets. Thickness between adjacent layers of brickbats shall not exceed 25mm.

15) Application of brick-bats shall proceed from one corner and shall be laid in radial pattern / straight pattern to drain of any water which has seeped through. Thiyyas for the same shall be given by Site Engineer, considering into account adequate slope.

16) Edge roundings shall be done simultaneously at corners. (Junction of slab & wall)

17) The brickbat Layer shall then be cured for minimum 3 days by ponding

18) After curing is over, the surface shall be applied with a finishing coat of cement sand mortar in the proportion 1:3 with water-proofing compound till top of brick-bats.

19) Top coat shall be of neat cement slurry of adequate consistency and shall be monolithic with brick-bats.

20) Finished surface shall then be cured for at least 7 days by ponding and then tested for leakages, if any.

Post Waterproofing Procedures:

Date of finishing shall be marked on the surface for curing by ponding for about 7 days.

Important

1) Water-proofing once done, shall not be broken or pierced. If water proofing is to be punctured, due care shall be taken to limit the damage to the restricted area. The cracks due to hammering shall not spread over the large area.

2) Repairing of the punctured area shall be done by using bonding agent and expansive grouts.

WHEN TO USE?

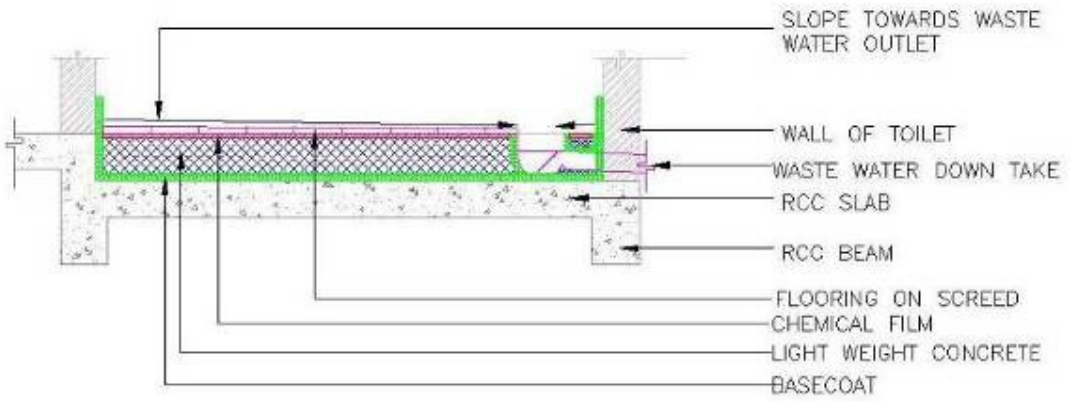
To be done after sunk area is cast and cured. Water ponding to be carried out prior to usage

PRECAUTIONS

- Junction between pipe and nahani trap to be properly sealed
- In case of multiple inlet nahani trap, all inlets to be properly closed

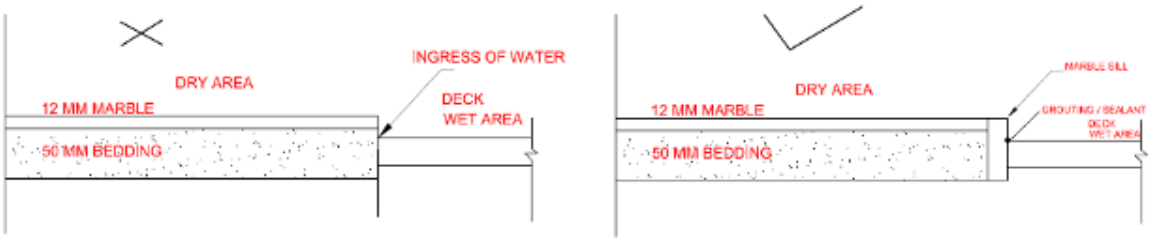
- Smoke test in soil and waste pipes compulsory prior to filling and flooring
- Drop pipe provided above nahani trap up to Finished floor level (FFL)to be properly jointed and not just kept on top of nahani trap
- concealed plumbing Dry fixing + removing assembly + Final fixing to be followed for all concealed plumbing as jointing of pipes in laid condition is very difficult and not done as per required quality
- Vertical marble cill to be provided as a separator between the dry and wet area. Joint of dry and wet area to be grouted / sealed to prevent Ingress of water under floor tiles (from floor bedding) where tile drop is provided as separation of dry and wet areas. E.g. (Kitchen utility area, bedroom and toilet floor junction, external deck and living / bedroom junction)
- Openings in external walls for service penetrations need to be closed properly . To be filled & grouted with non shrink grout

SKETCH



1A. INDICATIVE SECTION THROUGH TOILET (RESIDENTIAL BUILDINGS ONLY)

A 7 JUNCTION BETWEEN DRY AND WET AREAS



B) FLAT AREAS (UNDERSLUNG PIPING)

WHAT TO USE?

a. CASA Projects : Liquid applied waterborne flexible and elastic waterproof membrane. Membrane to be compatible with PVC, Metal, concrete, wood, grouting compound for fixing tiles. Membrane to be usable in dry and wet conditions .membrane must have crack bridging capacity

b. ASPIRATIONAL Projects: Liquid applied waterborne flexible and elastic waterproof membrane. Membrane to be compatible with PVC, Metal, concrete, wood, grouting compound for fixing tiles. Membrane to be usable in dry and wet conditions .membrane must have crack bridging capacity

c. HIGH END Projects: Liquid applied waterborne flexible and elastic waterproof membrane. Membrane to be compatible with PVC, Metal, concrete, wood, grouting compound for fixing tiles. Membrane to be usable in dry and wet conditions .membrane must have crack bridging capacity

d. LUXURY Projects: Liquid applied waterborne flexible and elastic waterproof membrane. Membrane to be compatible with PVC, Metal, concrete, wood, grouting compound for fixing tiles. Membrane to be usable in dry and wet conditions .membrane must have crack bridging capacity

HOW TO USE?

- Main Contractor to handover smooth trowel finished surface of concrete for waterproofing treatment
- Prepare the surface to requirements i.e. cleaning the dust particles, all high points and protrusions to be ground off, etc

- For RCC slab: Chase open the construction joints, junctions, cracks and honeycombs and grouting them with cement slurry grout admixed with Hydrogrout non shrink polymer modified crystalline grout material @ 250 gm / bag of cement, to full saturation using gravitational or grout pump pressure, as per our judgement.
- If the surface required leveling then apply Solvent Free Epoxy putty to level the undulations.
- Applying Seal 'N' Flex-1 Polyurethene / Silicon sealant of M/s.Bostik or Ms.Wacker or equivalant to the Junction of Dry Wall and RCC surface of Toilet to fill the Gap. Applying Cromproof Polyfab BB bond breaker strip of 100 mm width at the junctions of floor and wall etc. complete embedded between 2 coats of Cromproof wetite poly fab strip of 100 mm wide at junction of dry wall panels and around periphery of plumbing fittings in walls.
- Applying Powerflex primer of M/s.Crommelin followed by 2 Coats of Cromproof Wetite of M/s. Crommelin waterborne flexible and elastic SBR waterproof membrane at a total consumption of 1.00 Litre/ Sq.Mt., on floor and on walls upto 1 mtr from FFL and upto full height for shower area.
- Allow to Dry the 2nd Coat of Cromproof Wetite for 3 days before the application of a Protective screed for horizontal area or the commencement of Tiling Work for Vertical area.
- If Pond testing is required, allow to dry for 7 days (dependant on weather conditions) to ensure adequate curing.
- Ponding shall be done for 24 hours to a depth of 25mm to test water tightness

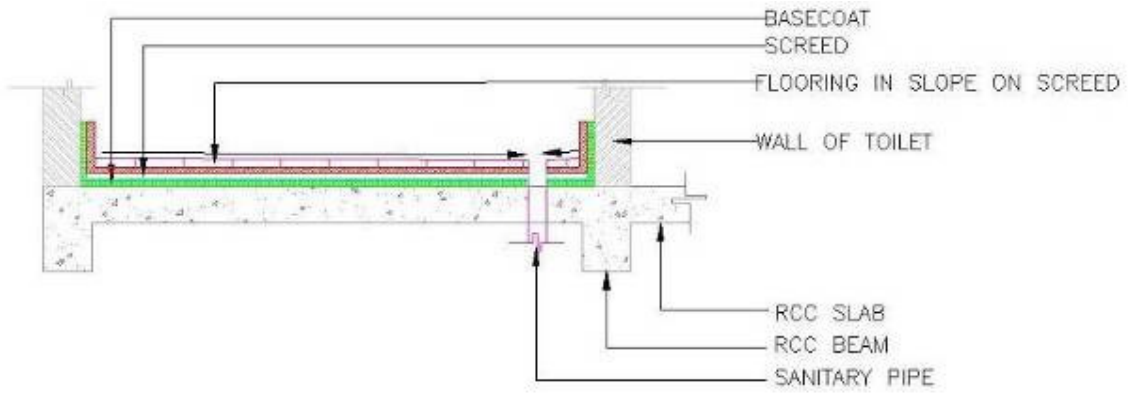
WHEN TO USE?

To be done after flat area is cast and cured. Water ponding to be carried out prior to usage

PRECAUTIONS

- Sleeves to be left for pipes into the slab prior to casting
- proper waterproofing treatment to be done around the pipes (Refer PODIUM SECTION D- TREATMENT OF PIPES CARRYING WATER INSIDE THE BASEMENT)

SKETCH



EXTERNAL WALLS

A) Tie Rods / Holes due to bamboo scaffold / brackets of scaffold etc

WHAT TO USE?

a. CASA Projects : grouting using Cebex 100 or equivalent (non shrink grout)

b. ASPIRATIONAL Projects: grouting using Cebex 100 or equivalent (non shrink grout)

c. HIGH END Projects: grouting using Cebex 100 or equivalent (non shrink grout)

d. LUXURY Projects: grouting using Cebex 100 or equivalent (non shrink grout)

HOW TO USE?

- PVC cap shall be removed from the tie rod holes.Tie rod hole portion shall be cleaned using water pressure.
- In clean tray 225 gms (One Sachet) of Cebex-100 to 1 bag cement and 20 litres water shall bemixed to prepare paste of dough like consistency and uniform colour.
- This material shall be filled in holes using tie rods to plug the holes carefully from both sides.
- Excess material on surface shall be cleaned thoroughly Curing shall start after 8 hrs and surface shall be kept wet for 7 days or curing compound shall be used.

WHEN TO USE?

Work permit required along with checklist of sub-strata prior to start of external plaster

PRECAUTIONS:

- Avoid holes by supporting bamboo scaffold through balconies etc.

B) Junction of Beam & Masonry wall

WHAT TO USE?

a. CASA Projects : Cement slurry with non shrink grout

b. ASPIRATIONAL Projects: Cement slurry with non shrink grout

c. HIGH END Projects: Cement slurry with non shrink grout

d. LUXURY Projects: Cement slurry with non shrink grout

HOW TO USE?

- Providing & Drilling hole in concrete-drill dia – 13mm,fixing mechanical injection Packers using non shrink polymer mortar Emaco S 48 CT / Fast setting compound. Spacing 300 mm centre to centre OR as per sitecondition.

- Injection grouting using Master flex 801, vinyl methaacrylate, Low viscosity, hydro-swelling, thermosetting resin - Using specialized injection pump Note: Mode of Measurement- actual quantity mixed, consumed & wastage.

- Crack Filling Treatment:-Removal of loose concrete and chipping the same with chisel and cleaning the same with wire brush & air blower & Making groove 25mm to 15 mm & filling with MasterEmaco S 348 – Repair Mortar

WHEN TO USE?

Work permit required along with checklist of sub-strata prior to start of external & internal plaster

PRECAUTIONS

- Grouting of joints between beam and block work to be done by water proofing contractor.

C) Punch windows

WHAT TO USE?

a. CASA Projects : Chajjas over punch windows and to be properly treated using cement based waterproofing

b. ASPIRATIONAL Projects: Chajjas over punch windows and to be properly treated using cement based waterproofing

c. HIGH END Projects: Chajjas over punch windows and to be properly treated using cement based waterproofing

d. LUXURY Projects: Chajjas over punch windows and to be properly treated using cement based waterproofing

PRECAUTIONS:

Avoid 'L' shape windows on south and western sides

D) Groove in external plaster

WHAT TO USE?

a. CASA Projects : Groove in the external plaster needs to be placed in such a manner that they do not overlap masonry and RCC building/columns. Normally 3 coats of plaster are required where grooves need to be provided.

b. ASPIRATIONAL Projects: Groove in the external plaster needs to be placed in such a manner that they do not overlap masonry and RCC building/columns. Normally 3 coats of plaster are required where grooves need to be provided.

c. HIGH END Projects: Groove in the external plaster needs to be placed in such a manner that they do not overlap masonry and RCC building/columns. Normally 3 coats of plaster are required where grooves need to be provided.

d. LUXURY Projects: Groove in the external plaster needs to be placed in such a manner that they do not overlap masonry and RCC building/columns. Normally 3 coats of plaster are required where grooves need to be provided.

E) Planter boxes

WHAT TO USE?

a. CASA Projects : planter boxes need to be large enough to afford sufficient working space for waterproofing masons to work.

b. ASPIRATIONAL Projects: planter boxes need to be large enough to afford sufficient working space for waterproofing masons to work.

c. HIGH END Projects: planter boxes need to be large enough to afford sufficient working space for waterproofing masons to work.

d. LUXURY Projects: planter boxes need to be large enough to afford sufficient working space for waterproofing masons to work

F) Window AC

WHAT TO USE?

a. CASA Projects : Gap between window Acs & surrounding wall joints. Gaps need to be minimum and to be filled with silicon sealent from outside. Subframe with exact window AC size opening with EPDM gaskets all around to be provided..

b. ASPIRATIONAL Projects: Gap between window Acs & surrounding wall joints. Gaps need to be minimum and to be filled with silicon sealent from outside. Subframe with exact window AC size opening with EPDM gaskets all around to be provided..

c. HIGH END Projects: Gap between window Acs & surrounding wall joints. Gaps need to be minimum and to be filled with silicon sealent from outside. Subframe with exact window AC size opening with EPDM gaskets all around to be provided..

d. LUXURY Projects: Gap between window Acs & surrounding wall joints. Gaps need to be minimum and to be filled with silicon sealent from outside. Subframe with exact window AC size opening with EPDM gaskets all around to be provided.

G) Aluminium windows

WHAT TO USE?

a. CASA Projects : Gaps between aluminium windows and jambs. Need to provide stepped cill or proper aluminium subframe which facilitates draining the water away from window. Gaps need to be min. and sealed with silicon weather sealant..

b. ASPIRATIONAL Projects: Gaps between aluminium windows and jambs. Need to provide stepped cill or proper aluminium subframe which facilitates draining the water away from window. Gaps need to be min. and sealed with silicon weather sealant..

c. HIGH END Projects: Gaps between aluminium windows and jambs. Need to provide stepped cill or proper aluminium subframe which facilitates draining the water away from window. Gaps need to be min. and sealed with silicon weather sealant..

d. LUXURY Projects: Gaps between aluminium windows and jambs. Need to provide stepped cill or proper aluminium subframe which facilitates draining the water away from window. Gaps need to be min. and sealed with silicon weather sealant.

H) Boxed Chajjas / Cupboard offsets

WHAT TO USE?

a. CASA Projects : Cement based waterproofing. Joints at base & top to be grouted with non shrink grout. For cupboard min. wall thickness to be same as external wall . Supporting slab to thick enough so that it does not deflect under load. wall to be constructed in 1 meter height so that settlement does not happen

b. ASPIRATIONAL Projects: Cement based waterproofing. Joints at base & top to be grouted with non shrink grout. For cupboard min. wall thickness to be same as external wall . Supporting slab to thick enough so that it does not deflect under load. wall to be constructed in 1 meter height so that settlement does not happen

c. HIGH END Projects: Cement based waterproofing. Joints at base & top to be grouted with non shrink grout. For cupboard min. wall thickness to be same as external wall . Supporting slab to thick enough so that it does not deflect under load. wall to be constructed in 1 meter height so that settlement does not happen

d. LUXURY Projects: Cement based waterproofing. Joints at base & top to be grouted with non shrink grout. For cupboard min. wall thickness to be same as external wall . Supporting slab to thick enough so that it does not deflect under load. wall to be constructed in 1 meter height so that settlement does not happen

I) EXTERNAL HORIZONTAL SOFFITS

WHAT TO USE?

a. CASA Projects : Drip mould to be provided for all horizontal projects in soffit

b. ASPIRATIONAL Projects: Drip mould to be provided for all horizontal projects in soffit

c. HIGH END Projects: Drip mould to be provided for all horizontal projects in soffit

d. LUXURY Projects: Drip mould to be provided for all horizontal projects in soffit

INTERNAL WALLS

A) Behind Skirting

WHAT TO USE?

a. CASA Projects : Adequate cement backing. Junction between flooring and skirting needs to be grouted with white cement

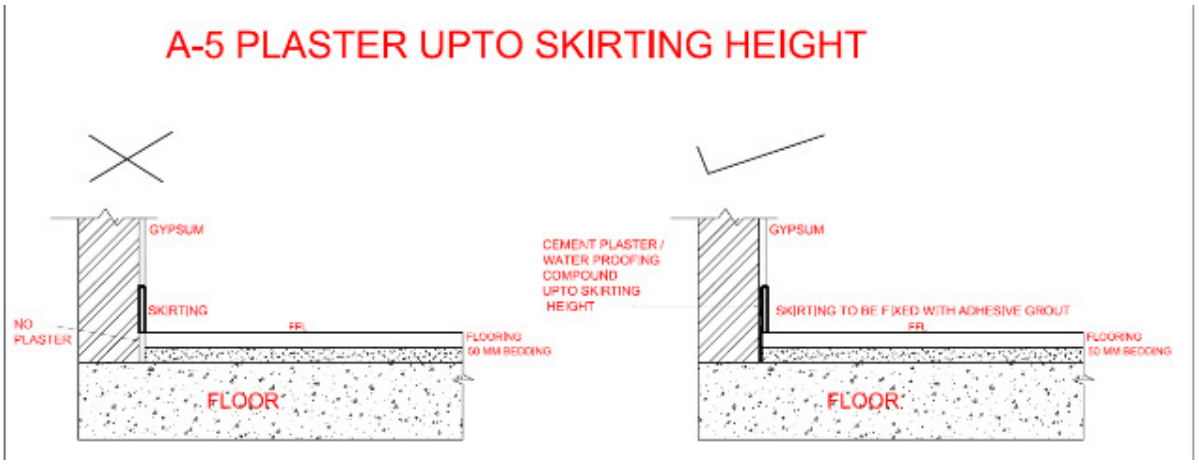
b. ASPIRATIONAL Projects: Adequate cement backing. Junction between flooring and skirting needs to be grouted with white cement

c. HIGH END Projects: Adequate cement backing. Junction between flooring and skirting needs to be grouted with white cement

d. LUXURY Projects: Adequate cement backing. Junction between flooring and skirting needs to be grouted with white cement

PRECAUTIONS

Cement backing behind skirting to be uniform so that no hollow gaps are left



SERVICE DUCTS

A) Treatment around pipe entering the service ducts

B) Service ducts above terrace

WHAT TO USE?

a. CASA Projects : 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete. Shafts to be covered from top at terace. Ventilation opening to be kept at sides with netting for preventing ingress of rodents / mosquitoes. All service duct walls (non RCC) to be min. thickness 6"

b. ASPIRATIONAL Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete. Shafts to be covered from top at terace. Ventilation opening to be kept at sides with netting for preventing ingress of rodents / mosquitoes. All service duct walls (non RCC) to be min. thickness 6"

c. HIGH END Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete. Shafts to be covered from top at terace. Ventilation opening to be kept at sides with netting for preventing ingress of rodents / mosquitoes. All service duct walls (non RCC) to be min. thickness 6"

d. LUXURY Projects: 2 side tape which bonds with PVC pipe and Concrete surface followed by Hydroswelling gasket around the pipe. The gasket must adhere to PVC pipe and Concrete. Shafts to be covered from top at terace. Ventilation opening to be kept at sides with netting for preventing ingress of rodents / mosquitoes. All service duct walls (non RCC) to be min. thickness 6"

HOW TO USE?

- Any pipe carrying services into the basement must be made watertight or sealed with Masterflex 612 paste (hydroswelling gasket) or equivalent and confined between layers of MasterEmaco S 348 / MasterEmaco S346

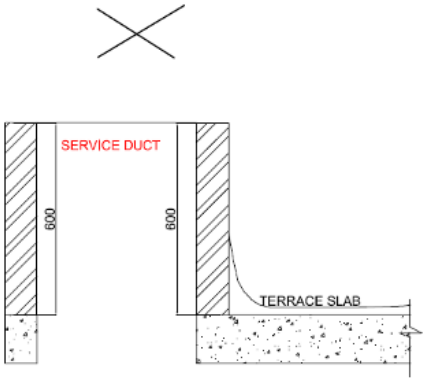
- Workmanship must be accurate for application of Masterflex 612 paste all around the pipe circumference and sealing the gap with MasterEmaco S348 / MasterEmaco S 346

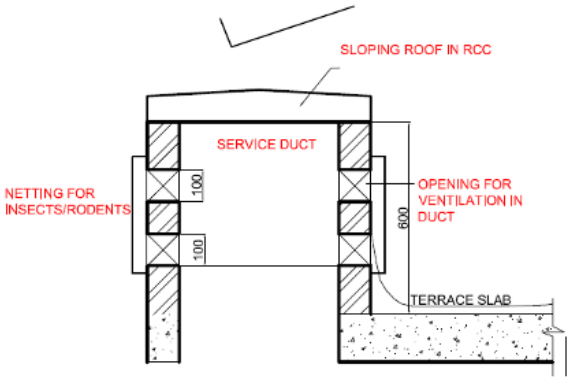
PRECAUTIONS

- If Gap around openings is more than required then it must be filled with microconcrete & "M-Seal". Use silicon sealant in case gap is neglibile
- Smoke test mandatory for Joints of pipes inside service ducts
- Bonding tape must adhere to PVC and concrete surface
- Service shafts need to have minimum length and width so as plastering work can be carried out inside. Minimum dimension therefore should not be less than 900 mm
- Access to shafts needs to be safe and secure for maintenance
- Openings in service shafts above terrace to be at least 2 ft. above the finished terrace and to have chajjas on the top.

Sketch

A-3 TOP OF TERRACE SHAFT





TERRACE

A) CONVENTIONAL TERRACE

WHAT TO USE?

a. CASA Projects : Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried over the parapet walls

b. ASPIRATIONAL Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried over the parapet walls

c. HIGH END Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried over the parapet walls

d. LUXURY Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Finishing to follow. Also chemical coating needs to be carried over the parapet walls

HOW TO USE?

Pre Waterproofing Procedures:

1) All surfaces to be waterproofed shall be cleaned off all loose materials, mortar, oil, grease, if any, thoroughly by wire brush. It shall be ensured that parapet plasters are completed prior to cleaning activity is undertaken. Plaster shall be cut at one level, i.e. 1' above terrace slab top.

2) Injection grouting shall be adopted at all major honeycombed portions, if necessary, after physical observation of slab.

3) Terrace slab shall be cured for at least 2 days by ponding to test for leakages and to serve water hungry concrete surface.

4) Ponding shall be done in areas of 5 sq. m each by forming bunds of 2" in height and cast in cement mortar 1:10 approx.

5) In case of major leakages, gravity grouting or pressure grouting shall be resorted to, to stop leakage.

6) Levels of water-proofing shall be clearly mark on concrete surface, clearly defining ridge line and valley lines with level pads underneath, minimum slope being 1:100 or as that mentioned in drawing.

7) Holes for outlet pipes shall be marked clearly for size & locations and chasing shall be done thereafter. Hole diameter shall not exceed pipe diameter. Rendering of holes shall be executed using compatible bonding agents, (SBR based) expansive grouts, waterproofing compound and M15 grade concrete.

8) Rain water pipes shall be fixed at the required locations as per drawing. In case of PVC pipes, surface of pipes shall be roughened and applied with sand for proper bonding and P.V.C. grating shall be provided at the pipe mouths.

9) It shall be ensured that no water carrying pipes are running over the slab, which is to be water-proofed.

10) Materials required for only 2 days of water-proofing works shall be carried to avoid unnecessary loading of terrace slab.

During Waterproofing Procedures:

1) Bricks selected for using as Brick Bat Coba shall be either full brick, or 3/4th brick made out of one complete brick by breaking into required size, using mallets.

2) Brick bat shall not be stored in the form of a heap at one place.

3) They shall be soaked thoroughly for about 15 minutes prior to their placing.

4) Glazed tile pieces for **China Mosaic Type Water-proofing** shall be soaked for about 15 minutes before fixing.

5) After cleaning the slab, a thin layer of cement slurry shall be laid on cleaned slab prior to laying of brick bats.

6) Over this, maximum 40 mm thick layer of cement sand mortar in the proportion 1:3 mixed with compatible water-proofing compound shall be laid.

7) Mortar shall be preferable mixed in mechanical mixer only. Also use of plasticizer is recommended to increase workability. Mortar prepared shall be used within 1 Hour of preparation.

8) Presoaked brick-bats shall then be laid in radial, by inserting brick-bats to a depth of about 15mm by light tamping with the help of adjacent layers of brickbats shall not exceed 25mm.

9) Application of brickbats shall proceed from one corner and shall be laid in radial pattern to drain of any water which has seeped through. Thiyyas for the same shall be given by Site Engineer, considering into account adequate slope. For this purpose line doris shall be fixed at every 3' to define the slope. Brick-bats shall be laid accordingly.

10) Edge roundings shall be done simultaneously so that bottom edge of parapet wall plaster serves as drip mould (Kani).

11) The entire brick bat layer should be cured of minimum 3 days.

11) After curing is over, the surface shall be applied with a finishing coat of cement sand mortar in the proportion 1:3 with water-proofing compound.

12) Top coat shall be of neat cement slurry of adequate consistency and shall be monolithic with brick-bats. Surface shall be finished with 3' long float, polish patra and line dori to mark grids of 1 X 1 sq. ft. markings.

13) Finished surface is then tested for leakage by ponding. Ponding is done making mortar bunds of height 1" at every 5 feet. Testing shall be carried out for 7 days.

For China Mosaic Type water-proofing, following procedure shall be adopted:

1) After curing of finishing coat (which is roughened) a layer of cement sand mortar 1:3 in proportion and 20mm thk mixed with approved water proofing compound shall be laid over it.

2) While the bed mortar is fresh, white/colored glass pieces shall be set closely by hand with glazed side keeping exposed.

3) Wooden mallets shall be used for tamping China Mosaic tile pieces into place.

4) Ponding (Wattas) shall be made with mortar bedding with glazed tile pieces on top.

5) Surface of tiles shall be lightly rolled with wooden roller taking care that no hollow pockets are left underneath glazed tile pieces.

6) Top surface shall be cleaned with saw dust or cotton waste and if necessary with weak acid solution to remove stains of cement. Due care is taken to see to it that cement in the joints does not dissolve in the acid solution.

7) Slope of finished top shall be 1:100 or as mentioned on the drawing.

8) Finished surface shall be cured for at least 7 days by flooding and checked for leakages/dampness, if any.

Post Waterproofing Procedures:

Date of finishing shall be marked on the surface for curing by ponding for about 7 days.

Important

1) Waterproofing once done, shall not be broken, or pierced. If waterproofing is to be punctured, due care shall be taken to limit the damage to the restricted area. The cracks due to hammering shall not spread over the large area.

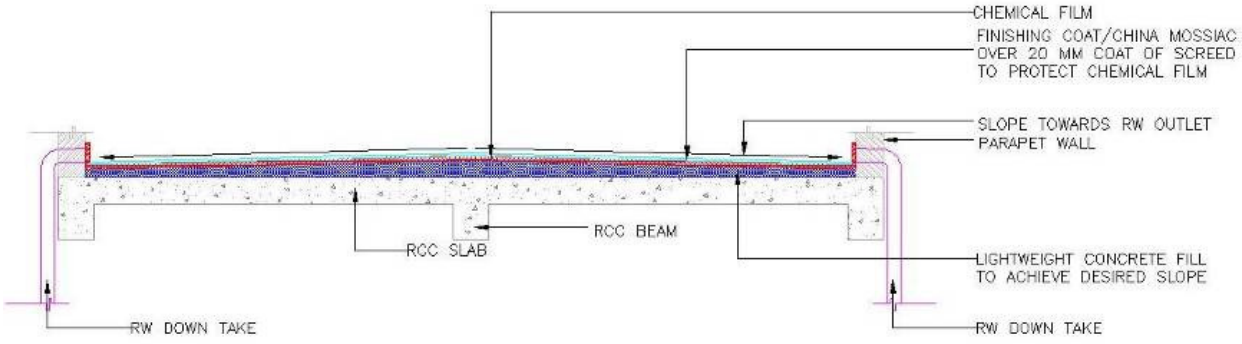
2) Repairing of the punctured area shall be done by using bonding agent and expansive grout.

PRECAUTIONS

- Construction joints to be grouted prior to waterproofing. Entire slab to be cast as single pour so that cold joints are avoided
- Embeddments in waterproofing to be avoided

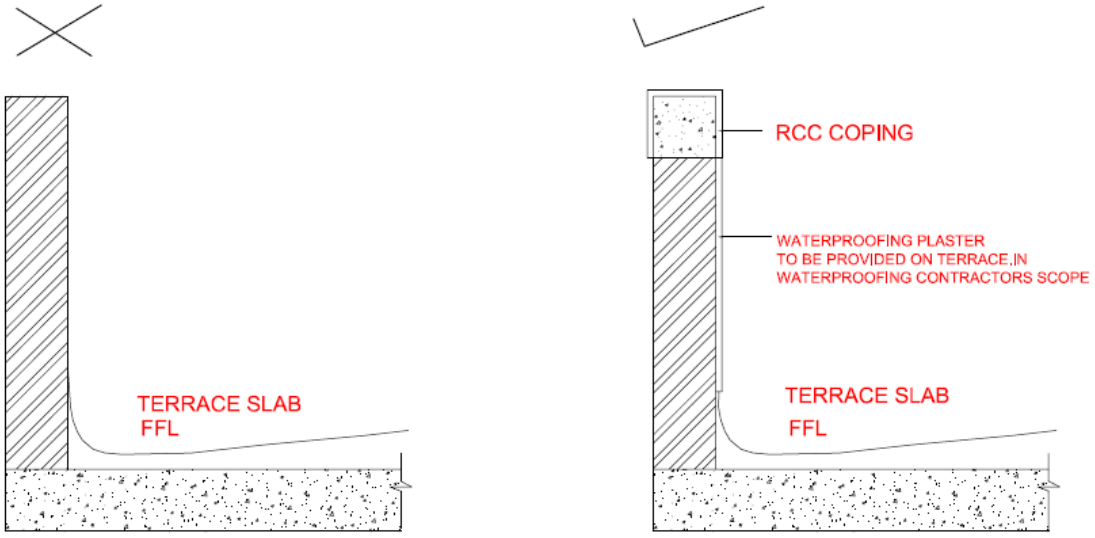
- Service penetrations through terrace if any need to be treated with proper waterproofing details with annular gaps sealed with silicon sealant or any sealant compatible with concrete and service
- Internal and top plaster of parapet to be responsibility of terrace waterproofing contractor. Also RCC coping to be provided at top in case of masonry plaster
- Peripheral columns to be extended at the top of parapet
- Masonry top to be closed with RCC band
- Staircase landing must be minimum 150 mm above the FFL of terrace so that water does not enter the staircase

SKETCH



2. INDICATIVE SECTION THROUGH TERRACE

A-2 MASONARY PARAPET ABOVE TERRACE



B) INSULATION ROOF (APPLICABLE FOR COMMERCIAL PROJECTS)

WHAT TO USE?

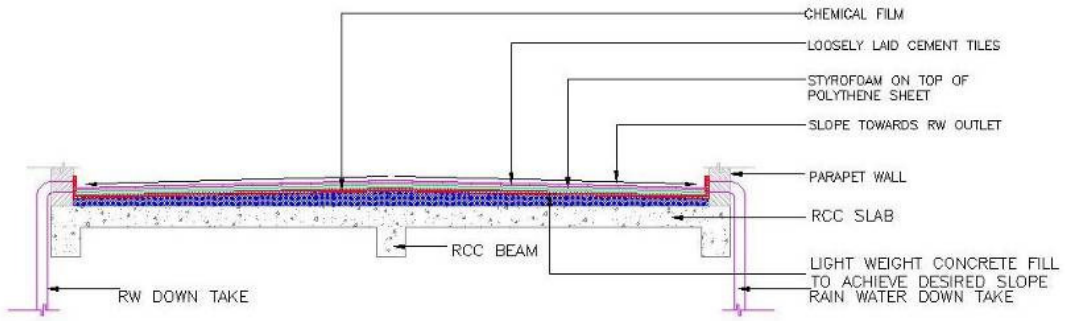
a. CASA Projects : Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Insulation layer (expanded polystyrene sheets with tounge and groove joints) to laid over screeed followed by 500 gauge polythene sheet. Finishing to be done by Butt jointed loosely laid cement tiles Also chemical coating needs to be carried over the parapet walls

b. ASPIRATIONAL Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Insulation layer (expanded polystyrene sheets with tounge and groove joints) to laid over screeed followed by 500 gauge polythene sheet. Finishing to be done by Butt jointed loosely laid cement tiles Also chemical coating needs to be carried over the parapet walls

c. HIGH END Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Insulation layer (expanded polystyrene sheets with tounge and groove joints) to laid over screeed followed by 500 gauge polythene sheet. Finishing to be done by Butt jointed loosely laid cement tiles Also chemical coating needs to be carried over the parapet walls

d. LUXURY Projects: Chemical coat with protective screed laid to slope, followed by brick bat coba / light weight concrete filling having density 1100 kg per cum, follwed by chemical coat with protective screed. Insulation layer (expanded polystyrene sheets with tounge and groove joints) to laid over screeed followed by 500 gauge polythene sheet.

Finishing to be done by Butt jointed loosely laid cement tiles Also chemical coating needs to be carried over the parapet walls



3. INDICATIVE SECTION THROUGH INSULATED ROOF
ONLY IN THE FOLLOWING CASES:
A: BUILDING HAS LEED CERTIFICATION (TILING MATERIAL SHALL BE AS PER LEED CERTIFIED)
B. TO REDUCE HEAT LOAD FOR CENTRAL AIR CONDITIONING

C) SLOPING ROOF

WHAT TO USE?

a. CASA Projects : Back form shutter to be used so that vibration of concrete can be carried out. Follow terrace waterproofing methodology

b. ASPIRATIONAL Projects: Back form shutter to be used so that vibration of concrete can be carried out. Follow terrace waterproofing methodology

c. HIGH END Projects: Back form shutter to be used so that vibration of concrete can be carried out. Follow terrace waterproofing methodology

d. LUXURY Projects: Back form shutter to be used so that vibration of concrete can be carried out. Follow terrace waterproofing methodology

CONTRACTOR CLASSIFICATION

Based on experience and performance reports at various lodha sites following is the proposed classification of waterproofing contractors

CLASS A: Nina, BASF, Grace

CLASS B: Pidilite, Chowgule, AA Nayak, Choksey, Cico

CLASS C: Coating & Foaming, Buildtech

Any changes/addition to classification should be made with approval of COO/HOC-QE + HOD-Procurement only.

WHO WILL CHECK THE WATERPROOFING PROCESS?

- CONTRACTOR Authorized technical represenative of product as well as applicator will monitor and supervise the job
- LODHA CM Supervisors (level 4 & 5) will monitor the process. Final approval will be given by Area incharge (above Level 3)
- LODHA QE Technical inspection & acceptance of product, Random process checking , water ponding and grouting assurance compulsory
- All pipes entering the waterproofing layer / slab / RCC elements shall be checked and certified by respective Services associate of Lodha

DOs and DONTs of WATERPROOFING

Following are the DOs of waterproofing process

1. All window openings to have chajjas on top.
2. Openings in service shafts above terrace to be at least 2 ft. above the finished terrace and to have chajjas on the top.
3. Avoid 'L' shape windows on south and western sides.
4. Service shafts need to have minimum length and width so as plastering work can be carried out inside. Minimum dimension therefore should not be less than 900 mm.
5. Groove in the external plaster needs to be placed in such a manner that they do not overlap masonry and RCC building/columns. Normally 3 coats of plaster are required where grooves need to be provided.
6. The expansion joint between the tower and the podium needs to be placed a little away from the external face of the tower.
7. ACP at top of canopy to be replaced by profile sheet and should be sloping away from the building.
8. Water proofing methodology to treat service penetrations.
9. Embedment of steel into water proofing to be avoided.
10. Grouting of joints between beam and block work to be done by water proofing contractor.
11. No construction joint in terrace slab.
12. Holes are not to be allowed in masonry for bamboo scaffold.
13. Peripheral columns to be extended at the top of parapet.
14. Masonry top to be closed with RCC band.
15. Grouting of construction joints of lift wall and lift foundation.

16. Proper drainage design in podiums.
17. Terrace water proofing to be extended after top of parapet.
18. Fixing details of the handrail area.