

## **STANDARD SPECIFICATIONS**

### **BASEMENT WATERPROOFING**

#### **1. GENERAL**

##### **1.1 SCOPE OF WORKS**

Supply and installation of waterproofing system to all concrete surfaces from slab on grade level down to concrete blinding below basement slab including pile caps, retaining walls etc.

Supply and installation of injectable hose in construction joints and injectable waterstop in expansion joints.

##### **1.2 APPROVED SUBCONTRACTORS**

Waterproofing shall be applied by a franchised applicator of the waterproofing membrane manufacturer, having not less than 5 years of proven experience in this type of work and climatic condition and who has the necessary equipment and skilled labour to carry out the work satisfactorily.

##### **1.3 QUALITY ASSURANCE**

1. Substrate condition : Have subcontractors representative conditions of substrates prior to the application of waterproofing. Rectify conditions as necessary to obtain subcontractor's representative's approval.
2. Subcontractor's representative : Have subcontractor's technical representative present during the performance of the work as necessary to ensure proper preparation of substrate and installation of waterproofing.
3. All waterproofing works and related protection shall be done by the same approved applicator.

##### **1.4 SUBMITTALS**

1. Product Data : Provide manufacturer's printed specifications and membrane installation instructions, including methods and materials used for terminations, penetrations, flashing, protection, compatibility and bonding.
2. Shop drawings : Provide shop drawings indicating installation details.

3. Sample :
  - a. Membrane : Provide three 100 mm x 100 mm samples of membrane
  - b. Protection board : Provide three 100 mm x 100 mm sample of protection board.
  - c. Injection hose : Provide 3 x 300 mm length sample of injection hose and related accessories.
  - d. Injectable waterstop : 3 x 300 mm length sample of injectable waterstop.
4. Certification :
  - a. Submit manufacturer's certification/approval for the installer of waterproofing system.
  - b. Submit waterproofing subcontractor qualifications indicating related experience and equipment and manpower available.
  - c. Submit manufacturer's certification stating materials supplied are compatible with each other.

## **1.5 PRODUCT HANDLING**

1. Store materials in dry area out of direct sunlight and as directed by the materials manufacturers.
2. Do not use old materials or materials damaged in handling and storage.

## **1.6 WARRANTY**

1. Furnish written warranty of materials and workmanship for the complete watertightness of the basement.
2. Warranty shall be signed by the applicator agreeing to repair or replace defects in material and workmanship agreeing to repair or replace defects in material and workmanship and failure of waterproofing to prevent water from entering into the building : for a period of **twenty years** from date of the Defects Liability Certificate. Under the warranty the applicator shall be responsible to seal leaks, if any, using high pressure injection through preinstalled injection hoses as specified in this section.

## **2. PRODUCTS**

### **2.1 MATERIALS**

1. Basement and Pit tanking and slab-on-Grade Membrane :

A homogeneous SBS elastomeric bituminous membrane 5 mm thick non reinforced with no fillers such as FLEXOBIT by M/S BITUFA WATERPROOFING B.V. HOLLAND or approved equivalent.

**TECHNICAL SPECIFICATION**

SBS content 20-33% homogeneous membrane.

Membrane elongation 1000% with over 95% recovery.

No fillers or reinforcements.

Welded parts must possess the same characteristics as the membrane itself.

Can bridge cracks upto 100 mm.

Description	Nominal values	Tolerances
1. COMPOUND	BD 300 A 14 BD 300 A 24	
Filler content	0%	
Softening point (ring and ball)	130°C	-5
Low temperature flexibility	-43°C ASTM D-2137	+0
2. MEMBRANE		
Thickness	5mm	
average:±0.2mm		
Mass	5000 g/m2	+15%-10%
Inhibited deformation resp.+10%	≥-0.3&≤+0.3%	-0
Total bitumen quantity	5000 g/m2	-0
Filler content	0%	+5
Elongation	above1000% at 25°C (77°F), ASTM D-2523	
Penetration	18at25°C(77°F),ASTM D-5	
Fire resistance	class A, UL 790, ASTM E-108	
Wind uplift resistance	UL 580, class I-90 After 6000 hours of ageing in BDA pounding tester and 40,000 fatigue cycles (corresponding to 30 years life) :	
Transverse mass variation	1.0	BD300A14
Flow temperature	95°	-0
Cold bending temperature	-15°C	+0
Flow temperature after thermal or UV ageing	85°	-0
Cold bending temp. after thermal or UV ageing	-10°C	+0
Resistance to tensile load at 750% elongation		
• Longitudinal	0.4 N/mm2	±0.2
• Transversal	0.4 N/mm2	±0.2
Permanent deformation (initial elongation 500%)	6%	+0

2. Horizontal Protection under basement slabs, pit slabs and slab on grade : membrane on 75 mm of lean blinding concrete, with protective 50 mm screed on top of the membrane.
3. Vertical Protection : Ensure protective boards are of sufficient strength of preformed semi rigid board to withstand pressure loads and provide absolute protection to membrane. Protection board to be semi flexible asphaltic sheet consisting of a blend of an asphalt and inert filler, sandwich construction. Protection board shall be from 6mm. Thick SILCART or approved equivalent.
4. Primer : as recommended by the membrane manufacturer and formulated to ensure bond of the membrane to the substrate.
5. Protection screed : 50 mm thick normal density C20 grade concrete except maximum size of coarse aggregate to be 5 mm.
6. Sealant : Hot applied SBS sealant, cold applied bituminous or approved equivalent.
7. Reinforcing Strips : as recommended by the membrane manufacturer so as to ensure complete protection at junctions, corners, construction joints and mechanical/electrical penetrations through walls and slabs.
8. Injection Hose : The injection hose is to be TRIOJECT or equal approved. The Injection Hose must be a flat hose consisting of 3 injection channels capable of being injected independently of each other as and when required.
9. Injectable PVC water bar : The injectable PVC water bar must be INJECTBAND or equal approved. It must be 250 mm wide with a central bulb and 2 injection channels on either side of the bulb.

The physical properties of the PVC water bar must be as follows :

Density	1.27 g/cm <sup>3</sup>
Tensile strength	17N/mm <sup>2</sup>
Elongation limit	340%
Share hardness A :	75

The connection to injection channels must be made using proprietary fabric tube injection ends at a spacing not exceeding 8m per injection channel.

10. Injection resin : The injection resin must be MC-INJEKTOPRESS 2300 NV or equal approved. The resin must be 2 component polyurethane suitable for flexible crack injection and sealing with the following properties :

Viscosity:	100 mPas
Pot life_:	100 minutes
Shore A Hardness :	50
Crack width penetration :	down to 0.1 mm

11. Injection equipment : the pump to be used for injection must be an air driven one component high pressure injection pump with an injection pressure of up to 390 bar. The injection pump must be connected with a suitable gauge to control the pressure as required to enable a thorough injection process.
12. Cable/pipe sealing compound : one part water and gas tight sealing compound to seal cable penetration and other pipe penetration through sleeve openings in the waterproofing. The sealing compound shall remain flexible forever to enable new cables or pipes to be conducted through the openings. The sealing compound shall be STOPAQ or approved equivalent.

### 3. EXECUTION

#### 3.1 INSPECTION

1. Ensure substrates are dry, clean. Smooth, and free of matter and conditions detrimental to bond and performance of the membrane.
2. Verify that substrate and concrete blinding substrate are smooth, sound and suitable to accept waterproofing.
3. Ensure all items to be installed by other trades which require penetrations through the waterproofing membrane are placed prior to the application of the membrane.

#### 3.2 PREPARATION

##### a. General

1. Comply with membrane manufacturer's instructions for preparation of substrate.
2. Sweep substrate as necessary to remove laitence, loose materials and other contaminants which will have detrimental effect on membrane. Grind smooth all concrete ridges and irregularities.
3. Fill voids and cracks in substrates as recommended by membrane manufacturer. Make substrates smooth.

4. Prime vertical substrates and other substrates where membrane is to be applied as recommended by membrane manufacturer for optimum adhesion of materials. Allow primer to dry minimum 24 hours before application of the membrane waterproofing.
5. All pipe penetrations shall be fitted with an approved pipe sleeve with a welded flange bolted and sealed to structural concrete.
6. Groove or approved provision for membrane termination at grade shall be available.
7. All external corners shall be rounded or chamfered. All internal corners shall receive a 40x40 mm mortar fillet.

**b. PILE CAPS.**

Refer to waterproofing details and carry out waterproofing accordingly.

### **3.3 INSTALLATION**

**a. MEMBRANE :**

1. Install membrane in strict compliance with manufacturer's instructions.
2. Apply membrane free of wrinkles and free of wavy edges.
3. Extend membrane full height of basement walls and over entire horizontal basement and ground floor area around tie beams, under slab on grade etc. as shown on drawings. Extend membrane under trenches, pits and depressions.
4. Apply membrane fully torched onto surfaces as directed by manufacturer except horizontal surface where membrane should be loose laid.
5. All lap joints of sheets, to be torched and welded, with 100 mm side laps and end laps fully torched. Apply heat to both sides overlaps in proper order and immediately press the overlaps right.
6. Have subcontractor's technical representative thoroughly check all seams. Repair faulty seams.
7. For all details of corners, membrane termination, pipe penetration, pile head treatment and the like, refer to the technical documents and approved shop drawings and provide reinforcing strips, collars, metal clamps, sealant, etc. as required.
8. Pockets : The building on horizontal surfaces could settle. For the membrane to accommodate this future movement, form a continuous 75mm x 75mm pocket in the concrete blinding where the blinding butts the concrete on the vertical surfaces. Loop the horizontal membrane into the pocket and seal to the vertical membrane.
9. Extend membrane under bases before columns are placed and make watertight seal to all anchor rods passing through the membrane.
10. Make watertight seals to all items passing through the membrane such as ties, anchors, pipes, etc. to overcome any water penetration.

11. Use special sealants such as STOPAQ to seal cable and pipes through preinstalled sleeves.

### **3.4 PROTECTION SCREED**

1. Apply 50mm uniform thickness of screed over waterproofing membrane which is placed horizontally on the concrete blinding. Do not extend the screed over concrete pile heads.

### **3.5 PROTECTION BOARD**

1. Apply protection board onto membrane on all vertical and sloping surfaces to protect the waterproofing from damages due to placing and vibrating of the concrete, and to reduce drag-down on the membrane by the placing action of the concrete.
2. Apply full coverage and butt joints between boards, to moderate contacts.
3. Spot adhere the protection boards to the membrane with daubs of adhesive of type approved by the membrane manufacturer. Alternatively, torch the protection board to allow bitumen to ooze out and press the board against the membrane to ensure good adhesion.
4. At locations where pockets are provided in the concrete blinding to accept the looped membrane, extend the protection board over the pockets, prior to placing the protection screed.

### **3.6 DEWATERING SYSTEM**

1. Make all openings used for dewatering, watertight on removal of the dewatering system apparatus.

### **3.7 INJECTION HOSE**

1. The injection hose must have a foam pad on the bottom assuring continuous full width access to the surface of the concrete.  
The injection hose must be firmly secured in position and protected by means of a steel mesh.  
The injection hose shall be placed preferably at the centre of the construction joint for concrete sections up to 50 cm. Thick.  
The injection points must be specially designed proprietary packers installed at a spacing not exceeding 8 m.

### **3.8 INJECTABLE PVC WATER BAR**

1. This is to be installed at extension joints of walls and slabs against waterproofing. Adjust reinforcement to accommodate the water bar. Installation must be strictly in accordance to manufacturer's instructions.

**End of section**