

DIVISION 07000 – THERMAL AND MOISTURE PROTECTION**07100 ROOF WATER PROOFING AND HEAT INSULATION****07101 GENERAL****A- Scope of Work**

The work covered by this section of the Specifications consists of furnishing all plant, labour, equipment, appliances and materials and performing all operations in connection with installation of Water Proofing and Heat Insulation over RCC Roof Slab, flat or sloped as indicated on the Drawings, in strict accordance with this section of the Specifications, and subject to the terms and conditions of the Contract.

07102 PRODUCTS**A- Codes And Standards**

The ASTM and or BS standards and codes form a part of this section of specifications as though written in and/or attached here to and are intended to be used as a guide only to provide a minimum standard of kind quality and finish. The Engineer reserves the right to determine compliance and/or acceptability of the material and/or standards.

B- Submittals

The following submittals are required:

- Samples
- Certificates of Compliance

C- Materials

- a) 3mm thick Torch-on, APP Polymer modified bituminous sheet membrane (imported).
- b) Precast Heat Insulation Tiles shall be of high density thermopore embedded in concrete (1:2:4) using vibration process (self extinguishing/fire resistant) of minimum density 2 lbs per cu.ft (32 kg/m³). Thickness shall be 2" and/or as shown on Drawings, and as manufacturer's specifications.
- c) Cement, aggregate and water shall be in accordance with Specifications for, "Plain and Reinforced Concrete".
- d) Materials and methods not specifically described but required for proper installation, shall be provided by the Contractor subject to prior approval of Engineer, at no additional cost to the Employer.
- e) Samples of all materials proposed for use under this Section shall be submitted to the Engineer for his approval.

07103 EXECUTION**A- Product Handling and Delivery**

- a) Deliver materials to the job Site and store in a safe dry place with all labels intact and legible at time of installation.
- b) Protect materials before, during, and after installation and protect the installed work and materials of other trades.
- c) Do not leave insulation exposed to sunlight. Keep it covered with clean or light coloured material. Apply finish material soon after installation of the insulation. Brush off any sunlight degraded surface material prior to adhering insulation.
- d) Tiles chipped, cracked or squashed shall be rejected in the event of damage, immediately make repairs and replacements to the entire satisfaction of Engineer, at no additional cost to the Employer.

B- Preparatory Work

- a) Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
- b) Verify that building insulation may be installed in accordance with the original design and the manufacturer's recommendations.
- c) In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation in areas of discrepancy until they have been fully resolved.
- d) All surfaces to receive waterproofing and insulation should be sound, clean, smooth, dry and free of debris, loose material or defects, which would otherwise have an adverse effect on the application, bonding, and performance.

C- Application of Roofing**(01) Base Layer (Screed)**

- a) Apply cement sand base layer to an average thickness of approximately 40mm, over concrete slab. Mix to consist of one part cement to four (4) parts sand aggregate to Engineer's approval.
- b) Wet concrete base slab before screeding.
- c) Spread and place screed to conform with slopes indicated on drawings. Applying in alternate bays not exceeding 250 sq. ft (25 Sq. M. Approx). Form canted fillets at upstands.
- d) Screeding and tamping shall be done immediately after spreading to achieve prescribed slope.
- e) The screed shall then be smoothened and consolidated to a uniform close textured surface with a wood float, to remove high and low spots exceeding 1/4 in (6mm) in 10 ft (3 M. Approx). Avoid excessive floating.

- f) Areas showing signs of laitance will be subject to rejection by the Engineer. These faulty areas shall be replaced at no additional cost to the Employer.
- g) Screed layer shall be cured for a minimum of 7 days after finishing.
- h) Allow sufficient time for screed to thoroughly harden and dry before allowing other work to be carried out.

(02) Water Proofing

- a) Surface Preparation

Examine all concrete surfaces to which the water proofing membrane is to be applied. Smooth, monolithic concrete surfaces are required for proper membrane adhesion. Surfaces must be free of voids, spalled areas, loose aggregate, and sharp protrusions, with no coarse aggregate visible. Broom finishes must not be used. Concrete must be cured and dry before application of 3mm thick Torch-on, APP Polymer modified bituminous sheet membrane (imported) to remove dust, loose stones, and debris.

- b) Priming

Apply Primer to all concrete or masonry mopping the surfaces with 0.05 lbs/sft (200-300 Grams/Sqm) with Dermaprimer (ASTM D4). Allow primer to dry one hour or until tack free. Prime only the area, which will be covered with membrane in a working day. Areas not covered with membrane in 24 hours must be reprimed. Metal or other dense surfaces do not require priming but must be clean, dry, free of loose paint, rust or other contaminants.

- c) Temperature

Apply Waterproofing Membrane only in fair weather when air and surface temperatures are above 5°C.

- d) Sealing Edges

For vertical applications, Waterproofing Membrane should be applied over the edge of the slab or over the top of the foundation or parapet wall. If the membrane is terminated on the vertical surface, a reglet or counter flashing may be used or the membrane may be terminated on the concrete by pressing very firmly to the wall. Press edges with a metal or hardwood tool such as a hammer or knife handle. Failure to use heavy pressure at terminations can result in a poor seal. Nailing of the membrane is usually not required.

Apply trowelled bead of Waterproofing Membrane Mastic to all vertical and horizontal terminations.

- e) Sealing Seams

All edge and end seams must be overlapped at least 65 mm. A guideline is printed on the membrane for this purpose.

f) Corner Details

Cover all inside and outside corners with an initial strip a minimum of 30 cm wide centered on the axis of the corner followed by the full width Waterproofing Membrane application. Outside corner must be free of sharp edges. Inspect surfaces adjacent to all corners and repair if necessary to provide a smooth dense surface. Inside corners should receive a fillet formed with latex modified cement mortar (such as Daraweld-C mixed in with cement mortar) and a double coverage of membrane as described above. Do not use fiber or wood cants.

g) Protection of Membrane

Waterproofing Membrane should be protected to avoid damage from other trades, construction materials. The Membrane Protection System should be used on terraces / balconies with protection layer of screed 3" (75 mm) thick or equivalent as recommended.

The Membrane Protection System should be laid the same day the membrane is applied immediately after 24-hour flood testing.

h) Certification

Certification of the material and its performance in accordance with the literature shall be furnished by the supplier from the manufacturer.

(03) Heat Insulation

Install roof insulation tiles over water proofing membrane.

D- Roof Finish

- a) Set tiles in patterns with 1/2" (12.5mm) mortar joints. Joints shall be grouted and tooled with cement sand mortar, tinted to match colour of tiles.
- b) Area to receive tiles shall be set out to correct alignment, gradients etc.
- c) Lay tiles with joints butted and aligned in both directions but not coincidental with insulation joints. Set out tiles to terrace / balconies areas so that distance remaining at perimeter walls, to receive in-situ concrete edge, are equal but are not less than 12 in (300mm) and not greater than 18 in (450mm).
- d) Cut tiles square to face to a tolerance of 1/8 in (3mm). Cutting shall be kept to a minimum.
- e) Ensure alignment is correct with adjacent tiles and evidence of movement or rocking is eliminated.
- f) Chipped, broken and cracked tiles shall be rejected.

- g) Deviations exceeding 1/4" (6mm) in 10 ft (3 M Approx) applied in all directions shall not be accepted.

07104**MEASUREMENT AND PAYMENT**

- a) Unless otherwise specifically stated in the bill of Quantities or herein, all items shall be deemed to be inclusive of, but not limited to the following: -
 - i) Contractor's establishment charges, overhead charges, profit, interest.
 - ii) All other expenses, charges, taxes specified in conditions of Contract.
 - iii) Labour and all costs in connection therewith.
 - iv) Use of plant, equipment and machinery and all costs in connection therewith, e.g. mobilization, demobilization, transporting, fuel, energy charges, grease oil, installing, operating, storing, watching, returning, replacing, handling, maintaining, idle stand, parking, removing, damaged, destroyed, salvage.
 - v) Material and goods e.g. marketing, selecting, conveyance, loading, unloading, storing, watching, returning, handling, hoisting, lowering, cutting, joining, fixing, wastage, destroyed, damaged, salvaged.
- b) Works shall be measured net as applied in position as per Drawings and instructions of the Engineer. Each measurement shall be taken to the nearest 1/2" (12.5mm). This rule shall not apply to any dimensions stated in descriptions.
- c) Waterproofing Membrane and Heat Insulation Tiles, except where otherwise stated shall be measured each separately as the net actual visible areas of the treated surface in sq. ft (square metres) describing the quality.
- d) Unit rates for water proofing membrane and heat insulation tiles shall be deemed to be inclusive of all preparatory work, scrapping, scratching, cleaning, priming / mopping and the like, complete as directed by the Engineer.
- e) Unit rates for water proofing membrane and insulation tiles shall be deemed to be inclusive of gravel strips, flashings, scuppers, roof drains, grouting of tiles joints, turn-ups, turn-downs and wedging of membrane, laps of membrane and the like as shown on drawings, complete as directed by the Engineer.

*** End of Section 7100 ***

07110 WATER PROOFING**A- Scope of Work**

The work covered by this section of the Specifications consists of furnishing all labour, tools scaffolding, equipment and water proofing materials of the required kind; and in performing all operations in connection with procurement, transportation and delivery and application / installation etc. of all work classified as water proofing work or included herein, all items supplied by other trades and customarily built-in and/or installed under waterproofing work or required to complete this work.

07112 EXTERNAL WATER PROOFING THROUGH BITUMINOUS MEMBRANE**A- Codes and Standards**

The ASTM and or BS standards and codes form a part of this section of specifications as though written in and/or attached here to and are intended to be used as a guide only to provide a minimum standard of kind quality and finish. The Engineer reserves the right to determine compliance and/or acceptability of the material and/or standards.

B- Submittals

The following submittals are required:

- Samples
- Certificates of Compliance

C- Transportation, Handling, Storage and protection**i) Storage**

All materials shall be stored in an approved manner and shall be protected from contact with soil and exposure elements.

ii) Roll Materials

All materials delivered in roll type packaging shall be stacked on end at all times

iii) Temperature control

Water proofing membrane shall be protected from freezing temperature or ambient temperatures above 38°C (100°F).

D- Products

4mm thick Torch-on, APP Polymer modified bituminous sheet membrane (imported).

E- Execution

Installation guide

- a) Surface Preparation: Concrete must be smooth and free of voids, loose aggregate and sharp protrusions. Concrete must be cured and dry before application.

- b) Priming: Apply by spray or mopping. Allow to dry one hour or until tack-free. Prime only areas to be covered with membrane within a working day.
- c) Membrane Application -Horizontal Surfaces: Apply Membrane from the low point to the high point so that laps shed water. All seams must be overlapped at least 65mm. Stagger end laps. Roll the entire membrane firmly and completely as soon as possible.
- d) Membrane Application -Vertical Surfaces: Apply Membrane vertically in lengths up to 2.5 metres. All seams are to be overlapped at least 65mm. Roll all membrane with hand roller.
- e) Protection of Membrane: The Membrane protection system should be used on foundation and horizontal surfaces.

07113 INTERNAL WATER PROOFING THROUGH SURFACE COATING**A- General**

This part covers furnishing and installing concrete waterproofing through surface coating at all inside cast-in-place concrete surfaces of under ground water tank's slab and walls, green areas, water pond, flower troughs and as specified on the Drawings. In principle, the coating should have the capability to form insoluble crystals into water bearing capillaries and interstices to effectively block passage of water and to ensure permanent water tightness for the life of the structure.

B- Submittals

The following submittals are required:

- a) Detail Drawings and/or Shop Drawings

For the proposed system to be used and details of construction joint, expansion joint and edge treatment.
- b) Installation Manuals

Include application procedure, storage procedure and curing time.
- c) Samples

Concrete water proofing material, in sealed containers/ bags.
- d) Manufacturer's recommendations for applications.
- e) Test Reports

Include certified test report on material properties and field test reports.

C- Product Handling**a) Delivery**

Deliver manufactured materials to the site in original, unopened containers clearly indicating manufacturers name, brand name, and other identifying information.

b) Storage

Store material in a dry location, off the ground and in such manner as to prevent damage or intrusion of foreign matter. Replace materials which have become damaged or otherwise unfit for use during delivery or storage.

D- Products**a) Concrete Waterproofing Material**

Material shall be composed of a compound of chemicals, quartz sand and cement. It shall be supplied in powder form ready to be mixed with water and shall be applied as a slurry coat -that waterproofs by crystalline growth through the capillary voids in the concrete substrate. Acceptable products shall be one of the following or approved equivalent:

Master Hyseal, Ferro Hyseal or superior

b) Water

Treated (utility water quality), clean and free of deleterious materials which are determined to impair the strength or bond of the waterproofing materials.

E- Execution**(01) Condition of Surfaces**

Examine all concrete surfaces to which the waterproofing material will be applied. Waterproofing material shall be applied only to sound concrete. Concrete surfaces shall be clean and free from all form scale, laitance, formwork oil, curing agents and other foreign materials as per the recommendations of the approved manufacturer.

(02) Preparation

Prepare the concrete surface for waterproofing treatment in accordance with manufacturer's instructions. Prior to the specified final application of waterproofing material, initial applications to construction joints and repairs to form-tie holes, honeycombed pockets, faulty construction joints, and cracks shall be completed in accordance with manufacture's instructions.

(03) Mixing, Application and Curing

a) Slurry Coat

Apply first slurry coat of the product as per manufacturers recommendations over any primer if required. Apply second coat if recommended by the manufacturer after a specified time.

b) Mixing, Application and Curing

Mixing, application and curing of waterproofing material shall be completed by a qualified applicator in accordance with manufacturer's instructions.

(04) Cleaning

Upon completion of work, remove unused materials, containers and equipment from the site. Clean and repair surfaces that are stained, marred, or otherwise damaged by work under this section.

(05) Certification

Certification of the material and its performance in accordance with the literature submitted earlier for approval shall be furnished by the supplier from the manufacturer to the satisfaction of the Engineer.

07114 MEASUREMENT AND PAYMENT

Measurement and payment shall be made for acceptable measured quantity on the basis of unit rate per square foot quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item to complete the job as per specifications and BOQ.

*** End of Division 07000 ***