SECTION 071327

ADHESIVELY BONDED SHEET MEMBRANE WATERPROOFING SYSTEM TO RESIST WATER MIGRATION IN STRUCTURES BELOW GROUND

1. GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

SUMMARY

This Section includes waterproofing systems with the design intent of preventing water migration around structures below ground through full adhesion in accordance with BS 8102:2009 (Figure 6) for the following applications:

Adhesively bonded HDPE sheet waterproofing with dual adhesive Ziplaps for pre-applied or blind-side waterproofing applications for installation against vertical, permanent formwork and shoring, and/or over horizontal blinding or mud slab. Basis of design is GCP Preprufe® 300R Plus.

Self-adhering solar reflective sheet waterproofing for post-applied open excavation walls and suspended slabs in hot climates. Basis of design is GCP Bituthene® 8000HC.

Systems requiring hot works certificates shall not be permitted.

Related Sections:

Section 033000 - Cast-In-Place Concrete.

Section 079200 - Joint Sealants.

SUBMITTALS

Product Data: Submit manufacturer’s product data and written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

Shop Drawings: Submit shop drawings showing locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

Samples: Submit two 300 by 300 mm (12 by 12 inch) square samples of each type of waterproofing.

Qualification Data: Submit written qualification data for Installer and manufacturer.

Warranties: Submit warranties specified in this Section.

QUALITY ASSURANCE

Manufacturer Qualifications: Minimum of 20-years experience in the production of bonded sheet membrane waterproofing.

Installer Qualifications: A trained and experienced applicator that is acceptable to waterproofing manufacturer for installation of waterproofing required for this Project.

Source Limitations: Obtain primary waterproofing materials, molded sheet drainage panels and protection courses through one source from a single manufacturer.

Pre-installation Conference: Conduct conference at Project site. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

DELIVERY, STORAGE, AND HANDLING

Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

Remove and replace liquid materials that cannot be applied within their stated shelf life.

Store rolls according to manufacturer's written instructions. Protect stored materials from direct sunlight.

PROJECT CONDITIONS

Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate. Do not apply in fog or mist.

Maintain adequate ventilation during preparation and application of waterproofing materials.

WARRANTY

 Manufacturer's Material Warranty against manufacturing defect for a period of Ten years from date of Substantial Completion. Provide manufacturer's standard product warranty.

1. PRODUCTS

 The complete waterproofing system shall be proven to prevent water migration around structures below ground in accordance with BS8102:2009 (Figure 6). Manufacturer shall provide a valid British Board of Agreement certificate for the products or equivalent European approved certification.

2.1 PRE-APPLIED ADHESIVELY BONDED HDPE SHEET WATERPROOFING

Pre-applied, adhesively bonded waterproofing sheet membrane: Membrane shall be 1.2 mm (46-mils) thick, flexible sheets consisting of 0.8 mm (30-mils) thick, HDPE sheet coated with a pressure-sensitive adhesive, and a trafficable, weather and dirt resistant non-absorbent coating. Sheet shall be durable and robust, manufactured using only virgin HDPE polymers. The membrane shall form a continuous and permanent adhesive bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. The membrane shall not risk activation due to wet conditions and shall be unaffected by ground settlement beneath slabs. Continuity between adjacent sheets shall be assured using only adhesive to adhesive sealing, using either manufactured Ziplaps at side laps, or multiple adhesive layer tape at end laps or cut edges. Flame or heat welded laps are not permitted. Basis of design is GCP Preprufe® 300R Plus.

The membrane shall be capable of exposure without additional protection for a minimum of six weeks (42 days) prior concrete pouring. To avoid contamination interfering with the bond to concrete, only smooth faced, non-absorbent and easy-to-clean membranes shall be permitted.

Only HDPE based membranes shall be permitted for long term durability in local ground conditions.

Pre-applied membranes shall be smooth faced to avoid clogging or contamination and easy to clean prior to concreting to ensure intimate bonding to concrete.

The membrane shall provide an integral continuous & permanent seal in one layer application to resists water migration between membrane and structure using Advanced Bond Technology™; without relying on hydration by water, or mechanical attachment.

The membrane shall not risk activation due to wet conditions and shall be unaffected by ground settlement beneath slabs.

The membrane shall be cold applied, self-protected, and chemically resistant. Hot works shall not be permitted below ground.

Basis of design is GCP Preprufe® 300R Plus.

The membrane shall be chemically resistant and protect the structure from chloride and sulfate attack, with the following typical property values:

1. Lateral water migration resistance: Pass in both directions at 70 m (7 bar) of hydrostatic head pressure, ASTM D 5385 modified.

2. Shear strength of joints: 14.5 N/mm; EN12317-2.

3. Adhesion to concrete: 2.88 N/mm; EN1372.

4. Lap peel adhesion at 22°C: 1408 N/m (8 lbs/in); ASTM D1876, modified.

5. Lap peel adhesion at 4°C: 1408 N/m (8 lbs/in); ASTM D1876, modified.

6. Hydrostatic-Head Resistance at laps: 70 m (230 feet); ASTM D5385, modified.

7. Puncture Resistance: 990 N (221 lbs), ASTM E154.

8. Low Temperature Flexibility: Unaffected at -29°C (-20°F); ASTM D1970.

2.2 POST\_APPLIED SELF-ADHERING SHEET WATERPROOFING

 Post-applied Self-Adhering Modified Bituminous Sheet Waterproofing: Membrane shall be self-adhering cold-applied sheet consisting of rubberized asphalt laminated to a grey solar reflective, non-metalized HDPE film to reduce heat gain while the membrane is exposed and with release liner on adhesive side. Flame or heat welded laps are not permitted.

 The membrane shall be specially formulated to allow application in hot climates and aggressive soils, with the following typical property values:

Thickness: 1.5 mm (60 mils) total consisting of 1.4 mm (56 mils) rubberized asphalt laminated to 0.10 mm (4 mils) thick film.

Hydrostatic Head Resistance: Greater than 70 m, ASTM D5385-93, test carried out on an overlap crossing a post formed crack.

Water Vapor Transmission Rate: 0.06 g/m2/day, ASTM E96-92.

Methane Permeability: 3.89 ml/m2/day, test method from Queen Mary & Westfield College, University of London; typical value for BRE recommended minimum standard (BRE Report 212) is 360 ml/m2/day.

Tensile Strength (Carrier Film): 48.4 N/mm2 longitudinal, 45.4 N/mm2 transverse, ASTM D638-91.

Puncture Resistance: 280N, ASTM E154-08.

National Standards: Complies with BS 8102:2009.

AUXILIARY MATERIALS

 General: All waterproofing membranes and ancillary materials shall be from the same manufacturer to ensure compatibility for the full system. The manufacturer shall provide a fully compatible system with compliant performance (including laps and robust detailing) for the combined pre- and post-applied system.

 Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

 Tapes: Provide tapes recommended by waterproofing manufacturer.

Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 100 mm (4 inches) wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.

Construction Joint Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 200 mm (8 inches) wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.

Tieback Covers: Prefabricated ABS plastic covers with waterproof flexible membrane covering as recommended by waterproofing manufacturer for sealing tie back anchors in soil retention systems.

Sealing Strip: Double sided waterproofing sealing strip of flexible polyethylene coated on both sides with rubberized asphalt and used as detailing aid and bedding strip for externally placed waterstops.

Waterstops: Provide active or passive waterstops recommended by waterproofing membrane manufacturer for additional protection at construction joints providing single source responsibility. Provide hydroexpansive waterstop as indicated on the drawings.

Pile Head Treatment: Cementitious, non-shrink grout for re-profiling of pile heads used in conjunction with three part epoxy grout for waterproofing pile heads.

Primer for post applied self-adhering sheet: Liquid solvent based primer recommended for substrate by manufacturer of self-adhesive sheet waterproofing material.

Protection Course for post applied self-adhering sheet: Tough and flexible bituminous board for the protection of self-adhesive membrane waterproofing system during backfill operations: The board should be specially engineered for the protection of self-adhesive membranes; made of modified bituminous compound with a fiberglass core for dimensional stability. The boards should be covered with polyethylene film on both sides.

1. EXECUTION

PRE-APPLIED INTEGRALLY BONDED HDPE SHEET WATERPROOFING INSTALLATION

Examination: Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

For applications over blinding, a concrete mud-slab, compacted subgrade or vertical soil retention system, verify that compacted sub-grade or concrete mud-slab is smooth and sound; and ready to receive integrally bonded HDPE sheet.

Verify that vertical soil retention systems are prepared using drainage composite, plywood, shotcrete or other approved means to achieve a uniform, sound and continuous substrate ready to receive the integrally bonded HDPE Sheet.

Proceed with installation only after unsatisfactory conditions have been corrected.

Installation:

Horizontal Applications: Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:

Place the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.

Leave the yellow and blue zip strips in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet.

Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.

Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller

Vertical Applications: Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:

Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length.

Fasten through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.

Leave the yellow and blue zip strips in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet.

Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.

Roll firmly to ensure a watertight seal.

Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

Seal penetrations through sheet waterproofing to provide watertight seal with prefabricated plastic covers, or detail tape patches or wraps and a liquid-membrane troweling as recommended by membrane manufacturer.

Construction Joints: Apply 200 mm (8-inches) joint tape to the surface of the membrane and centered along the line of all horizontal and vertical concrete pour joints.

Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 150 mm (6 inches) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

POST-APPLIED MODIFIED BITUMINOUS SHEET WATERPROOFING INSTALLATION

Examination: Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.

Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

Verify that concrete substrates are smooth, float finished and monolithic.

Proceed with installation only after unsatisfactory conditions have been corrected.

Surface Preparation:

Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1.6 mm (1/16 inch).

Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

Application:

Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D6135.

Apply quick drying primer to allow membrane application within the same hour to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 50 mm (2 inches) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

Two-Ply Application (Where indicated on the drawings): Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths to provide a minimum of 2 thicknesses of sheet membrane over areas to receive waterproofing.

Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.

Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

Seal exposed edges of sheets at terminations not concealed by metal counter flashings or ending in reglets with mastic.

Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 150 mm (6 inches) beyond repaired areas in all directions.

Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

Place and secure protection course according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate waterproofing. Protect installed panels during subsequent construction.

FIELD QUALITY CONTROL

Engage a full-time independent site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

PROTECTION AND CLEANING

Do not permit foot or vehicular traffic on unprotected modified bituminous sheet membrane

Protect waterproofing from damage and wear during remainder of construction period.

Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

 END OF SECTION

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