

Section 071324

Pre-Applied Sheet Membrane Waterproofing

PART 1 — GENERAL

1.01 SUMMARY

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following property-line construction applications:
 - 1. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
 - 2. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
- B. Related sections include, but are not limited to, the following:
 - 1. Section 031000 - Concrete Forming
 - 2. Section 312000 – Earth Moving
 - 3. Section 031500 – Concrete Accessories
 - 4. Section 032000 - Concrete Reinforcing
 - 5. Section 033000 – Cast-In-Place Concrete
 - 6. Section 033713 – Shotcrete

1.02 SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions. Include manufacturer's written instruction for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and project-specific details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Submit for typical and non-typical conditions of Project. Manufacturer's standard sheets are no acceptable for Shop Drawings.
 - 2. Clearly indicate and identify materials to be incorporated in the work, change in direction, dimensions, thickness of each material and system, and relationships to adjacent construction; provide a narrative of sequencing the two types of waterproofing.
 - 3. Indicate extent of waterproofing, detail call-outs on plans and elevations of areas to receive waterproofing.
 - 4. Shop drawings shall be approved by the waterproofing manufacturer prior to submission to the Architect for review and approval. Manufacturer's approval shall be clearly noted on the shop drawings.
 - 5. Coordinate shop drawings with Shoring, Architectural, Structural and MEP design.
- C. Certificate: Provide a written certification letter from the manufacturer stating that all materials are suitable for site conditions, applications indicated and specified in the construction documents.
- D. Manufacturer's Installation Instructions: Indicate special preparation of substrate, panel attachment methods, and perimeter conditions requiring special attention.
- E. Qualification Data: For Installer, manufacturer, and third-party observation agency.

- F. Sample Warranty: Submit sample manufacturer's warranty.

1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
 - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
 - D 412 Standard Test Methods for Rubber Properties in Tension
 - D 570 Standard Test Method for Water Absorption of Plastics
 - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
 - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D 3767 Standard Practice for Rubber - Measurements of Dimensions
 - D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
 - E 96 Standard Test Methods for Water Vapor Transmission of Materials
 - E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- ACI 506 Shotcrete to be placed in accordance with the American Concrete Institute (ACI)

1.04 QUALITY ASSURANCE

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified. Manufacturer shall be capable of providing field service representation during construction, approving an applicable installer, and recommended appropriate installation methods.
- B. Installer: A firm which has at least 3 years' experience in work of the type required by this section. All work of this Section shall be performed by a subcontractor who is trained and certified by the manufacturer of the waterproofing material.
- C. Independent Observation: Owner shall make all arrangements and payments for an independent observation service to verify and approve substrate prior to installation; monitor waterproofing material installation compliance with the project contract documents and manufacturer's published literature and site-specific details. Independent Observation Firm shall be an approved company participating with the waterproofing manufacturer's inspection program. Observation service shall produce reports and digital photographs documenting each site visit. Reports shall be made available to the Contractor, waterproofing installer, waterproofing material manufacturer, and Architect. Observations should include substrate examination, beginning of waterproofing installation, periodic intervals, and final observation prior to concrete or backfill placement against the waterproofing.
- D. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.

- E. Pre-Installation Conference:
 - 1. Conduct preconstruction meeting at the project site to review the waterproofing requirements including substrate conditions and pretreatment, surface preparation, minimum curing periods, unique details, sheet flashings, installation procedures, testing and inspection procedures, protection and repair procedures, warranty requirements, and all other work covered under this Section.
 - 2. The preconstruction meeting shall occur only after a complete submittal has been submitted, reviewed and approved by the Architect and Owner's Consultant.
 - 3. Attendees shall include the Owner's Representative or Owner, Architect, Owner's Consultant, Inspection Firm, General Contractor, Waterproofing Contractor, Manufactures' Representative and any other trade Representatives from involved in this scope of work and adjacent work (e.g. shoring installer, concrete subcontractor, etc.).
- F. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations at no additional cost to the Owner.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow or rain.
 - 2. Proceed with installation only when existing and forecasted weather conditions permit waterproofing to be installed per manufacturer's written instructions and warranty requirements.
 - 3. Do not apply waterproofing materials in areas with standing water.
- B. Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproofing shall be positively secured in their proper positions prior to membrane application. Substrate preparation shall be per waterproofing manufacturer's guidelines.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer agrees to furnish waterproofing material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.
 - 1. Access for Repair: Owner shall provide unimpeded access to the Project and the waterproofing system for purposes of testing, leak investigation, and repair, and shall reinstall removed cladding and overburden materials upon completion of repair.
 - 2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original cost of the material
 - 3. Warranty Period: 5 years from date of Substantial Completion
- B. Special Warranties specified in this article exclude deterioration or failure of waterproofing materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the waterproofing exceeding the manufacturer's written specifications for elongation.
2. Mechanical damage caused by outside agents.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Aussie Skin 550 for application temperatures between 25°F and 90°F by AVM Industries, Inc., a 0.075 in. nominal thickness composite sheet membrane comprising 0.047 in. of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

MINIMUM PHYSICAL PROPERTIES:

Property	Test Results	Test Requirements	Test Method
Color	White		
Thickness	1.9 mm (0.075 in.) nominal		
Puncture Resistance	239 lbs.	Min 40 lbs.	ASTM E154
Hydrostatic Pressure Resistance (ft)	231 ft	As Tested	ASTM D5385M
Hydrostatic Pressure Resistance (psi)	192 PSI	As Tested	ASTM D751
Lateral Water Migration Resistance	231 ft	Pass	ASTM D 5385M
Adhesion to Concrete and Masonry	30.4 Pounds	Min 5 Pounds	ASTM D903
Tension & Elongation: Machine Direction	1061 %	Min 250%	ASTM D412
Tension & Elongation: Cross Machine Direction	1050 %	Min 250%	ASTM D412
Accelerated Aging	No considerable reduction in Tension and Elongation of Aged Specimens	Pass No considerable reduction in either	ASTM G23 & G153
Resistance to Decay (Weight Loss)	0.8%	Max 10%	ASTM E154
Resistance to Decay (Permeance Loss)	0%	Max 10%	ASTM E154
Water Vapor Transmission	0.016 Perms	Max 0.1 Perms	ASTM E96
Water Vapor Transmission after Decay	0.016 Perms	Max 0.1 Perms	ASTM E96
Low temperature flexibility	Unaffected at -29°C	Not Listed	ASTM D1970
Shear strength of joints	14.5 (N/mm)	Not Listed	ASTM D1876

Water Absorption	0.059%	As Tested	ASTM D570
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- B. 2- part Spray applied Bitumen Aussie Membrane 502. Installed at a minimum 60 dry mil. Provide membrane with the minimum following physical properties.

Technical Information		
Color	Emulsion: Dark brown. Membrane: black	
Specific Gravity	1 gr/cm ³	
Solid Content	60% +/- 2%	
Flash Point	Non-flammable	
Service Temperature	15°F-140°F (-10°C to +60°C)	
Application Temperature	40°F-100°F (+5°C to 40°C)	
Heat Stability	>194°F (>90°C)	ASTM D 2939
Cold Flexibility	-4°F (-20°C)	ASTM D 522
Low Temperature Flexibility and Crack Bridging	Pass, Conducted @ -15°F (-26°C)	ASTM D 836
Tensile Strength	>0.1 MPa (>14.2 psi)	ASTM D 412
Elongation at break	>1200%	ASTM D 412
Resistance to water pressure	>1 atm, 24 hr (>14.7 psi, 24 hr)	DIN 52123
Water vapor permeance	0.35 Perms	ASTM E 96
Recovery (at 800-900% elongation)	>85%	ASTM D 412
Creep At 212°F (100°C)	No Creep	DIN 52123
Resistance to Standing Water	Passed	ASTM D 2939
Bacterial Attack in soil 30 days @ 105°F (40°C)	Passed	ASTM D 3083
VOC (Volatile Organic Content)	20 Grams/Liter	
Crack bridging	>3/16" (>5mm)	IS 1731
Approvals / Certifications	ICC, LARR, ISO 9002, Green Label, I.Q. Net (International Certification Network)	
1 Tote, 265 Gallons	Approx. 2,200 Lbs.	VOC: 12 Grams/liter

Mixing / Spraying Information

Mixing Ratio	Accelerator (Salt water): Pour the 55 lbs of salt into 32-35 gallons of water
Spraying Ratio	1 Gallon accelerator (salt water) to 9 gallons of bitumen

For membrane thickness and drainage board requirements refer to the “Aussie II Min Thickness Table”

Coverage Table								
To Get	60 Mils Dry	90 Mils Dry	100 Mils Dry	120 Mils Dry	160 Mils Dry	180 Mils Dry	240 Mils Dry	270 Mils Dry
Apply	100 Mils Wet	150 Mils Wet	160 Mils Wet	200 Mils Wet	160 Mils Wet	300 Mils Wet	400 Mils Wet	450 Mils Wet
For 100 sq. ft	5.75 Gallons	8.75 Gallons	9.5 Gallons	11.5 Gallons	15 Gallons	17.25 Gallons	23 Gallons	26.25 Gallons

Coverage Table								
To Get	1.5 mm Dry	2.25 mm Dry	2.5 mm Dry	3.0 mm Dry	4.0 mm Dry	4.5 mm Dry	6.0 mm Dry	6.75 mm Dry
Apply	2.4 mm Wet	3.6 mm Wet	4.0 mm Wet	4.8 mm Wet	6.4 mm Wet	7.2 mm Wet	9.6 mm Wet	10.8 mm Wet
For M2	2.4 kg/m ²	3.6 kg/m ²	4.0 kg/m ²	4.8 kg/m ²	6.5 kg/m ²	7.3 kg/m ²	9.6 kg/m ²	10.8 kg/m ²

- C. GPL-16 Polyolefin vapor retarder and membrane liner. Provide liner with the minimum following physical properties.

Item/Component	Packaging	Approximate Shipping Weights	Qty per Pallet	VO C
GPL-16 Liner	12.75'x150' (1912.5 sq. Ft.)	145 lbs. (66 KG) / Roll	20 Rolls/Pallet	N/A
GPL-16 Seam Tape White	4"x150' Roll (12 rolls/Case)	2.4 Lbs. (1.1 KG) / Roll	Call	N/A

No.	Item	Test Method	Results
1	Classification	ASTM E 1745	Exceed Class A, B and C

2	Water Vapor Permeance	ASTM E 96	0.007 perms (US)
3	Tensile Strength	ASTM E 154-93 (ASTM D 882)	83.75 lbs. / in
4	Puncture Resistance	ASTM D 1709	3960 grams
5	Life Expectancy	ASTM E 154	Indefinite
6	Chemical Resistance	ASTM E 154	unaffected

D. Accessory Waterproofing Products: All accessory waterproofing materials shall be provided by the waterproofing manufacturer or shall have manufacturer's written approval for substitution:

1. Detail Strip: Aussie Skin Detail Strip, by AVM Industries, Inc. 7-3/4 in. wide Aussie Skin detail membrane with pressure sensitive adhesive on one side, and HDPE on the back side.
2. Sanded Tape: Aussie Skin Sanded Tape, by AVM Industries, Inc. 4 in. wide accessory tape, with sand adhered to one side, and pressure sensitive adhesive on the back side.
3. Dual-Sided Tape: Aussie Skin tape, by AVM Industries, Inv. 4 in. wide double-sided stick tape.
4. Fleece-backed Tape: Aussie Skin Fabric Tape, by AVM Industries, Inv. 3.9 in. wide tape with fleece on one side and pressure sensitive adhesive on the back side.
5. Hydrophilic Waterstop: Aussie Swell Block Water Stop or approved equal
6. Injection tube Waterstop: Aussie Tube or approved equal. 1/2 in. wide permeable tube installed prior to concrete pour, with packers set at 25 ft. on center. Inject after concrete cure. Provide min. 2-1/2 in. concrete cover on all sides. Stagger end laps of hose min. 2 in.
7. Sealant: Aussie Seal M. Single, component polyether sealant and adhesive.
8. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
9. Molded Sheet Drainage Panel: Drain Board 6000 by AVM Industries, Inc., or approved equal. Dimple drainage board core bonded to layer of woven filter fabric. Thickness 0.4 in. Min. 15,000 PSF compressive strength (ASTM D-1621). Min. 21 gal/min/sq. ft. flow rate (ASTM D-4491) through core.
10. Base-Drain: Bottom Drain 12" by AVM Industries, Inc. Thickened base drain composite designed to collect water from sheet drainage pales and then discharge water through collector pipes to collection system.
11. Spray Adhesive: Super 77 by 3M or approved equal. Environmentally friendly, spray adhesive for drainage panel filter fabric lap joints.
12. Staples: Galvanized staples approved by membrane manufacturer. Staples for securing vertical waterproofing panels to wood lagging prior to concrete placement.

PART 3 — EXECUTION

3.01 EXECUTION

- A. The installer, with the Owner's Independent Observer present, shall examine conditions of substrates and other conditions under which this section 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 substrate conditions are corrected and are

acceptable for compliance with manufacturer's warranty requirements. General substrate conditions acceptable for the waterproofing installation are listed below. For conditions not covered in this Section, contact the waterproofing manufacturer for guidance.

3.02 SUBSTRATE PREPARATION

- A. It is essential to create a sound and solid substrate to eliminate movement during the concrete placement.
- B. Horizontal Surfaces:
 - 1. Earth or Crushed Stone: The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. Ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete placement. Grout around all penetrations such as utility conduits, etc. for stability.
 - 2. Unreinforced Concrete Rat Slab: Provide uniform, broom finished concrete substrate. Infill voids, honeycombs and gaps greater than 1/2 in. deep. Grind down all projections, ridges, and sharp fins greater than 1/4 in.
- C. Vertical Surfaces:
 - 1. Sheet Piling: Use concrete, plywood, board insulation, or drainage panel or other approved facing over sheet piling to provide support to the membrane.
 - 2. Wood Lagging Shoring: Extend to the lowest level of the waterproofing installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards should be planar and tight together with gaps less than 1/2 in. Gaps in excess of 1/2 in. should be filled with cementitious grout, compacted soil, wood, extruded polystyrene (20 psi minimum) or AVM approved polyurethane spray foam. Insulation protection board may be used over lagging gaps up to 1 in. and drainage panel utilized over lagging gaps up to 2 in.
- D. Mechanical and/or Other Penetrations: Mechanical, structural, or architectural materials that will pass through the plane of the waterproofing membrane shall be properly installed and secured in their final position prior to installation of the waterproofing system. Ensure minimum 6 in. clear spacing between penetrations on horizontal and vertical substrates.
- E. If top of steel I-beams are to be removed, either pre-burn the front face and half-way through the webbing or cover the front face with a minimum 18 inches by 18 inches by 1/2 in. cement board to prevent damage to the installed membrane.
- F. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

3.03 INSTALLATION, HORIZONTAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
 - 1. Place the membrane HDPE film side to the substrate with the granulated surface facing up.
 - 2. Accurately position succeeding sheets to overlap the previous sheet along the selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
 - 3. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
 - 4. Inspect installation before and after reinforcement bar supports for slab are installed. Repair damaged membrane and remove contaminant including pooled water, soil, mud,

debris, rebar tie scraps, etc. as necessary to ensure concrete can achieve continuous bond to waterproofing membrane.

3.04 INSTALLATION, VERTICAL APPLICATIONS

A. Drainage Panel:

1. At the base of the lagging wall, install base-drain horizontally oriented. Secure the bottom edge of drain to the lagging wall with washer-head fasteners at 24 in. on center. Use couplers and corner fittings, as required, to form a continuous drain installation. Install discharge outlet fittings to connect with discharge pipes as required for the project. Weep discharge pipes stubbed into the base-drain or drainage panel without proper discharge connection fittings are not acceptable.
2. Mechanically fasten the drainage mat with the core facing the installer with the fabric placed against the substrate.
3. Positively shingle lap the filter fabric lap joints and adhere filter fabric with approved spray adhesive.
4. Around penetrations and tie-back heads, cut sheet drainage composite to fit and wrap extra filter fabric around open core edge to prevent soil from entering core.
5. At the top of the sheet drain installation, wrap the filter fabric flap behind the exposed top core edge to prevent intrusion of soil into the core and secure sheet drain to wall with termination bar fastened 12 in. on center with the fabric wrapped.

B. Aussie GPL 16:

1. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate and installed only on the blind-lap.
2. Any fastener placed in the field of the membrane must be sealed as per the standard manufacturer requirements.
3. The membrane may be installed in any convenient length.
4. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
5. Roll firmly to ensure a watertight seal.
6. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
7. Tape all seems using GPL tape

C. Installation of Aussie 502:

1. Insure Aussie GPL-16 is clean and free of contamination
2. Spray to a minimum 60 mil dry thickness

D. Aussie Skin 550: Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:

1. The membrane may be installed in any convenient length, in either vertical or horizontal orientation.
2. Mechanically fasten the membrane vertically using staples into the wood lagging only in the blind-lap. Minimize number of fasteners to secure membrane onto the wall, so that the membrane lays flat and allows firmly rolled overlaps until concrete placement.
3. Ensure the underside of the succeeding sheet is clean, dry and free from contamination.
4. Back lap vertical seams with detail strip, center between sheet edges. Roll firmly to ensure a watertight seal. Cover butt seam with sanded tape, sand facing the installer and again roll firmly. Complete similar lap termination at roll ends and cut edges.

5. Tie-Back Heads: For all tie-back heads and soil nails, install waterproofing system with applicable sized sheet metal tie-back box covers in accordance with contract documents, approved shop drawings and manufacturer's detail for specific project condition(s). For irregular shoring wall conditions at tie-backs or oversize tie-back heads consult manufacturer for alternate detail for specific project condition(s).
6. Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system in accordance with contract documents, approved shop drawings and manufacturer's detail for specific project condition(s).
7. Inspect finished waterproofing installation and repair any damaged material prior to concrete placement.

3.05 WATERSTOP INSTALLATION

- A. Injection Tube Waterstop: Install an injection tube waterstop between the mat slab and basement wall transition around the building perimeter and between the elevator pit walls and mat slab. Complete installation in accordance with installation instructions in manufacturer's published literature and inject waterstop after concrete has curing min. 28 days.
- B. Hydrophilic Waterstop: At typical penetrations, and cold joints install hydrophilic waterstop in accordance with installation instructions in manufacturer's published literature, including but not limited to, the following:
 1. Surfaces should be clean and dry. Remove all dirt, rocks, rust, debris or other foreign matter that might inhibit the adhesive from bonding to the concrete. Do not install Aussie Swell in standing water.
 2. Apply a continuous bead of Aussie Seal M along the substrate where Aussie Swell will be installed. Assure proper 3" concrete coverage will be maintained.
 3. Mechanical fasteners should not be used to secure product alone, but may be used in conjunction with Aussie Seal M.
 4. Tightly butt coil ends together to form a continuous waterstop (do not overlap coil ends). Place in maximum practical lengths to minimize coil end joints.

3.06 FIELD QUALITY CONTROL

- A. Project waterproofing details must be installed in accordance with AVM's standard published and/or project specific waterproofing details. Job specific details created by AVM Applicator or designer must be signed off by AVM Representative.

3.07 PROTECTION

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete.
- B. Use only water-based marking chalk on top of the installed waterproofing membrane. If other construction marking products are intended to be used, they must be reviewed and approved in writing by the waterproofing manufacturer.
- C. Protect membrane during concrete placement from overspray with polyethylene sheeting or other approved means. Remove contamination and cured overspray material from membrane with mechanical means, taking extra care to not damage the waterproofing, prior to further placement of adjoining concrete.
- D. Do not permit vehicular traffic on unprotected membrane.
- E. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

- F. Product may not be exposed to sunlight for longer than 60 days. If exposure duration is approached and/or exceeded contact manufacturer representative for repair and/or replacement recommendations.

END OF SECTION