SECTION 07272

FLUID-APPLIED AIR/VAPOR BARRIER SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes a fluid-applied air/vapor barrier system.

B. Related Sections include the following:
1. Division 3 Section "Cast-In-Place Concrete" for underslab vapor barrier.
2. Division 7 Section "Self-Adhering Sheet Waterproofing" for below grade waterproofing.
3. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.

1.03 PERFORMANCE REQUIREMENTS

A. Air/Vapor Barrier: Shall be designed and constructed as a continuous air barrier to control air leakage into, or out of the conditioned space, and to act as a watertight barrier to discharge to the outside any incidental condensation or water penetration. Air/vapor barrier membrane shall accommodate movements of building materials by providing expansion and control joints as required, with appropriate air seal materials at such locations, changes in substrate and perimeter conditions. Barrier shall be continuous with all joints made air-tight and shall have the following characteristics:
1. Air Permeability: Shall not exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 inch water when tested in accordance with ASTM E 283.
2. Water Vapor Permeance: Shall not exceed 0.21 perms for 40-mil dry coating grams/ft²/hr in Hg when tested in accordance with ASTM E 96.
3. Liquid Water Absorption: Less than 0.5% (weight) when tested in accordance with ASTM D 95.
4. Shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on envelope without damage or displacement; shall transfer load to structure; and shall not displace adjacent materials under full load.
5. Shall be joined in an airtight, flexible manner to the air barrier surface/material of adjacent systems, allowing for relative movement of systems due to thermal and moisture variations or creep. Air/vapor barrier shall be connected to the following system components:
a. Foundation and walls.
b. Doors and windows penetrating exterior walls.
c. Aluminum-framed entrances, storefronts and curtain walls.
d. Different wall systems.
e. Roof assemblies.
f. Wall and roof intersections.
g. Walls and roof assemblies over unconditioned space.
h. Wall, floor and roof assemblies spanning control and expansion joints.
i. Wall, floor and roof penetrations by masonry ties, screws, bolts and similar items.
j. Wall, floor and roof penetrations by pipes, ducts and conduits.

B. Air/Vapor Barrier Penetrations: All penetrations of the air/vapor barrier and paths of air infiltration or exfiltration shall be made airtight to not less than the rating of the air/vapor barrier.

C. Provide an air barrier assembly that has been tested in accordance with the Air Barrier Association of America's (ABAA's) approved testing protocol.

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01300.

B. Product Data: For each type of product indicated. Include technical data; certified test results; manufacturer's printed instructions for evaluating, preparing and treating substrate; and installation instructions, including temperature and other limitations of installation.

C. Shop Drawings: Show locations and extent of air/vapor barrier and details of intersections with other envelope systems and materials; details of membrane counter-flashings; details for construction of inside and outside corners; and details showing how expansion and control joints will be bridged. Show relationship to adjacent materials, sequence of installation and materials, and methods for sealing penetrations. Shop drawing shall include connection details between the air/vapor barrier and for the following exterior envelope components as applicable to the project:
1. Foundations and walls.
2. Doors and windows.
3. Aluminum-framed entrances, storefronts and curtain walls.
4. Wall and roof assemblies.
5. Wall penetrations by pipes, ducts and conduits.

D. Samples: Submit sample of each product, not less than 6 by 12 inches (152 by 305 mm) in size.
1. Include 12- by 12-inch (305 by 305-mm) sample showing flashing and counterflashing laps with air/vapor barrier.

E. Field quality-control test reports and audit reports.

F. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of air/vapor barrier system for compliance with requirements, based on comprehensive testing of current air/vapor barrier system in accordance with ASTM E 2178.

G. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Shall meet the following requirements:
1. Shall be factory trained and approved in writing by air/vapor barrier membrane manufacturer.
2. The air barrier contractor shall be a Licensed Contractor by the Air Barrier Association of America (ABAA). Each worker who is installing air barriers shall be either a Certified Applicator or an installer who is registered with ABAA.

B. Source Limitations: Obtain air/vapor barrier membrane materials through one source from a single manufacturer.

C. Mockups: Construct mockup, 8 feet long by 8 feet high, of typical exterior wall assembly, including connection between wall and roof, foundation and glazing systems, showing relationship of materials with air/vapor barrier and quality of workmanship. Locate mockup where directed by Architect.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
2. Complete mockup for review at preinstallation conference.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to air/vapor barrier membrane installation.
1. Meet with Owner, Architect, air/vapor barrier membrane Installer, air/vapor barrier membrane system manufacturer's representative, testing agency representative, and installers whose work interfaces with or affects air/vapor barrier membrane including, but not limited to, installers of exterior sheathing, exterior wall assemblies, door and window assemblies, and roofing assemblies.
2. Review approved submittals.
3. Review mock-up.

4. Review methods and procedures related to air/vapor barrier membrane installation, including manufacturer's written instructions.
5. Review compatibility of air/vapor barrier materials with building envelope materials.
6. Review and coordinate sequence of installation with adjacent materials.
7. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
8. Review construction schedule for subsequent work covering air/vapor barrier.
9. Review procedures for quality assurance, testing, and corrective procedures.
10. Schedule for subsequent work covering air/vapor barrier membrane.
11. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
12. Provide 72-hour minimum advance notice to participants prior to convening preinstallation conference.

1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Protect materials from damage from sunlight, weather, freezing, excessive temperatures, and construction operations. Remove damaged material from site and replace at no additional cost to Owner.

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

D. Comply with the manufacturer's written instructions for proper material storage and handling.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted temperature and humidity conditions permit air/vapor barrier membrane to be installed according to manufacturers' written instructions and requirements.
1. Do not apply air/vapor barrier system in snow, rain, fog, or mist.

B. Environmental Conditions: Apply air/vapor barrier materials within the range of ambient and substrate temperatures recommended by air/vapor barrier manufacturer. Do not apply air/vapor barrier system to a damp or wet substrate.

1.08 WARRANTY

A. General: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's System Warranty: Written system warranty, signed by air/vapor barrier manufacturer agreeing to replace air/vapor barrier system materials and accessories which fail to achieve specified air tightness and vapor seal, exhibit loss of adhesion or cohesion, or do not cure within specified warranty period.
1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Liquid Air/Vapor Barrier Membrane: Provide one of the following:
1. Procor Air/Vapor Barrier Fluid-Applied Membrane, two-part, self-curing, rubber-based fluid for spray application; Grace Construction Products.

2. BARRISEAL-R roller grade water-based asphalt emulsion modified with a blend of synthetic rubbers and special additives, compatible with sheet membranes; Carlisle Coatings and Waterproofing, Inc.
3. BARRISEAL-S spray grade water-based asphalt emulsion modified with a blend of synthetic rubbers and special additives, compatible with sheet membranes; Carlisle Coatings and Waterproofing, Inc.

B. Flexible Flashing Strip/Transition Strip: 40-mil (1.0-mm) thick, self-adhering flashing strips, not less than 12 inches wide, consisting of 36 mils (0.9 mm) of rubberized asphalt integrally laminated to a 4-mil (0.10-mm) thick, cross-laminated, high-density polyethylene film with silicone-coated release paper on adhesive side. Provide manufacturer's recommended primer and one of the following that meet or exceed specified requirements:
1. Perm-A-Barrier Wall Flashing; Grace Construction Products.
2. CCW-705 Membrane; Carlisle Coatings and Waterproofing, Inc.

C. Transition Strip Between Air/Vapor System and TPO/EPDM Roofing: 30 mils (0.76 mm) thick minimum, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl rubber adhesive, with a disposable silicone-coated release-paper backing; cold applied.
1. Product: Vycor Ultra; Grace Construction Products.

D. Primer: Water-based liquid primer for concrete, masonry, gypsum sheathing, extruded polystyrene, wood, metal, and painted substrates as recommended by air/vapor manufacturer for application indicated.

E. Transition Strip Primer: Water-based liquid primer for application indicated.

F. Mastic, Adhesives, and Tape: Liquid mastics, adhesives, and tapes as recommended by air/vapor barrier manufacturer for indicated applications.

G. Concrete Conditioner: Latex-based, water-dispersible liquid for concrete substrate preparation applied before application of self-adhered membranes and tapes.

H. Termination Mastic: Two part, elastomeric, cold-applied, trowel grade material designed for use with self-adhered membranes and tapes; 100 g/l maximum VOC content.

I. Sealants: Provide in accordance with Division 7 Section "Joint Sealants" and ASTM C 920 classifications for type, grade, class, and uses.
1. Silicone Sealant: Single component, neutral curing, low modulus.
   a. Location: To seal sheet membrane flashing to polyethylene face of sheet rubberized-asphalt barrier and to seal between and to non-bituminous sheet systems.
   b. Product: Dow 790; Dow Corning Corporation or Pecora 864 Silicone Sealant.
2. SPF (Sprayed Polyurethane Foam) Sealant: Provide one- or two-component, foamed-in-place, polyurethane foam sealant with the following characteristics:
   a. Density: 1.5 to 2.0 PCF.
   b. Flame Spread (ASTM E162): 25 or less.
   c. Initial R-Value (at 1 inch): Not less than 7.
   d. Products: Zerodraft or Flexible Products.

2.02 EQUIPMENT

A. Sprayer: Airless spray equipment approved by air/vapor barrier manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions as each area is completed for air/vapor barrier installation, with Installer present, to verify that surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants that are detrimental to the adhesion of air/vapor barrier membrane materials.
   1. Concrete Substrates: Verify that concrete has cured and aged for minimum time period recommended by air/vapor barrier manufacturer; that concrete is visibly dry and free of moisture; and that concrete surfaces are smooth without large voids, spalled areas or sharp protrusions.
      a. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   2. Masonry Surfaces: Verify that masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
   3. Gypsum Sheathing: Verify that boards are sufficiently stabilized with corners and edges fastened with appropriate screws at proper spacing.
   4. If unacceptable conditions are encountered, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air/vapor barrier application.

B. Concrete and Masonry Substrates:
   1. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.
   2. Prime with conditioning primer when installing modified asphalt membrane transition membranes.

C. Gypsum Sheathing Panels:
   1. Pre-treat all board joints with 2 to 3 inch (50 - 75mm) wide, reinforced self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 1/4-inch (6mm) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and liquid membrane.
   2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond to transition membranes, with adequate drying time between coats.

D. Prime wood, metal, and painted substrates with primer recommended by membrane manufacturer.

E. Fill gaps between different substrate systems; gaps between substrates and window, door, storefront systems, and curtain wall systems; and miscellaneous penetrations in substrates with sealant.
   1. Apply foam sealant in gaps up to 2 inches (50.8 mm) wide.
   2. Apply insulation foam sealant in gaps greater the 2 inches (50.8 mm) wide.
   3. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air/vapor barrier and at protrusions according to air/vapor barrier manufacturer's written instructions.

3.03 INSTALLATION, GENERAL

A. Strictly comply with air/vapor barrier membrane manufacturer's printed instructions, ABAA recommendations, approved submittals and the following:
   1. Apply materials within manufacturer's requirements for temperature and weather conditions.
   2. Do not apply to wet or frozen substrates.
   3. Do not allow contamination with dust or dirt.
   4. Seal completely at edges, perimeter and penetrations.

5. Wrap membrane around perimeter of window openings, so the window systems can be caulked around the interior perimeter of the opening, sealing between edge of window and air/vapor barrier.

B. Spray apply air/vapor membrane using airless spray equipment. Use cross-hatching technique (alternating horizontal and vertical passes) to ensure complete coverage of substrate and transition strips and even thickness of air/vapor barrier. Seal to penetrations to achieve an airtight envelope.

C. Treat construction joints and install flashings as recommended by manufacturer.

3.04 INSTALLATION

A. Apply air/vapor barrier in a continuous, uniform film using multiple, overlapping passes to achieve a dry film thickness not less than 60 mils (1.5 mm) thickness.

B. Inspect sprayed surfaces and fill any remaining gaps.

C. Application of Transition Membrane:
1. Allow spray-applied membrane to cure to tack-free. Apply transition membrane with an overlap of not less than 3 inches (75mm) onto each surface at all beams, columns and joints as indicated in detail drawings and on approved Shop Drawings.
2. Tie in to window and door frames, storefront framing, curtain wall systems, spandrel panels, roof and floor intersections and changes in substrate.
3. Use pre-cut, easily handled lengths for each location.
4. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
5. When properly positioned, place against surface by pressing firmly into place by hand roller.
6. Overlap adjacent pieces not less than 2 inches (50.8 mm) and roll all seams with a hand roller.
7. Seal top edge of transition membranes and flashing with termination mastic.
8. Apply liquid membrane to all fastener heads, overlapping board not less than 1 inch (25.4 mm).

D. Transition Strip Flashing to Window and Door Frames, and Storefront and Curtain Wall Perimeters: Prime all surfaces in accordance with recommendations of air/vapor barrier manufacturer. Lap transition strip from wall substrate with not less than 3 inches (76.2 mm) of full contact over firm bearing to penetration frame with not less than 1 inch (25.4 mm) of full contact.
1. Secure rubberized asphalt membrane flashings to substrates, membrane, and frames using roller to assure proper adhesion.
2. Set extruded preformed silicone flashings in full bed of low modulus silicone sealant.

E. At base of walls, apply air/vapor barrier to seal transition between top of foundation and wall. Apply air/vapor to back and bottom of brick shelves, stopping barrier 1 inch back from outside face of foundation wall.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.05 FIELD QUALITY CONTROL

A. Installer Documentation: Installer shall document entire installation process on daily job site reports in accordance with ABAA Quality Assurance Program.

B. Third Party Testing Agency: Owner may engage a qualified, ABAA certified testing and inspecting agency to perform field tests and inspections and to prepare test reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections and tests.
1. Air/vapor barrier system shall be tested for air infiltration and bond adhesion in compliance with ABAA.
2. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed air and vapor barrier membrane unless it has been inspected, tested and approved.

C. Remove and replace applications of air/vapor barrier membrane where test results indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Do not cover air/vapor barrier membrane until field quality control testing has been completed.

3.06 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations, remove material overspray and fallout from surfaces of other construction not to be coated and clean exposed surfaces to remove evidence of soiling.
   1. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

B. Repair damage to air/vapor barrier membrane caused by construction activities or subsequent work prior to covering membrane.

C. Coordinate installation of exterior rigid insulation with application of air/vapor barrier membrane. Adhere insulation to air/vapor barrier membrane after initial set time of 1 to 2 hours, and while membrane is still tacky, to prevent convection currents occurring behind insulation.

D. Schedule work to ensure that the air and vapor barrier system is covered as soon as possible after installation and inspection. Protect air and vapor barrier system from damage during subsequent operations. If the air and vapor barrier system cannot be covered within 30 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION