

SECTION 07272

VAPOR PERMEABLE, FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Materials and installation methods for fluid applied, vapor permeable air barrier membrane system located in the non-accessible part of the wall.
2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assembly.

B. Related Sections include the following:

1. Section 07410 - Prefinished Insulated Metal Panel System
2. Section 07412 - Metal Wall Panels
3. Section 07415 - Composite Metal Panel System
4. Section 07920 - Joint Sealants
5. Section 09255 - Exterior Sheathing:

1.2 REFERENCES

A. American Society for Testing and Materials

1. C920 Specifications for Elastomeric Joint Sealants
2. C1193 Guide for Use of Joint Sealants
3. D412 Standard Test Methods for Rubber Properties in Tension
4. D570 Test Method for Water Absorption of Plastics
5. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
6. D1876 Test Method for Peel Resistance of Adhesives
7. D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheet-
ing
8. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous
Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
9. D4258 Practice for Surface Cleaning Concrete for Coating
10. D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet
Method
11. E96 Test Methods for Water Vapor Transmission of Materials
12. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth
Under Concrete Slabs, on Walls, or as Ground Cover
13. E162 Test Method for Surface Flammability of Materials Using a Radiant Heat
Source
14. E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air
Retarder Systems

15. E2178-01 Standard Test Method for Air Permeance of Building Materials

1.3 PERFORMANCE REQUIREMENTS

- A. **General:** Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.4 DEFINITIONS

- A. **Air Barrier Assembly:** The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.5 SUBMITTALS

- A. **Product Data:** Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of air barrier.
- B. **Shop Drawings:** Show locations and extent of air barrier Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction..
- C. **Samples:** Submit representative samples of the following for approval:
 - 1. Fluid applied membrane
 - 2. Transition tape
 - 3. Through Wall Flashing
- D. **Product Certificates:** For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- E. **Qualification Data:** For Applicator.
- F. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.
- G. **Sample Warranty:** Copy of special manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting installation.

1.6 QUALITY ASSURANCE

- A. **Manufacturer:** Air barrier systems 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, and include a list of projects of similar design and complexity completed within the past five years.

- B. **Applicator Qualifications:** A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. **Mockups:** Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
 - 2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
- D. **Pre-Installation Conference:** A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Pre-installation conference shall include the Contractor, installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:
 - 1. Review of submittals.
 - 2. Review of surface preparation, minimum curing period and installation procedures.
 - 3. Review of special details and flashings.
 - 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 - 5. Review of mock-up requirements.
 - 6. Review of inspection, testing, protection and repair procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver materials and products** in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- B. **Do not double-stack pallets** of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- C. **Protect fluid-applied membrane components** from freezing and extreme heat.
- D. **Sequence deliveries** to avoid delays, but minimize on-site storage.

1.8 PROJECT CONDITIONS

- A. **Environmental Limitations:** Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

1.9 WARRANTY

- A. **Material Warranty:** Manufacturer's standard form in which manufacturer agrees to replace fluid-applied air barrier membrane materials, that fail within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.
1. Failures include, but are not limited to, the following:
 - a. Failure to maintain air permeance rating not to exceed 0.02 L/s/sq. m. when tested per ASTM E2178, within specified warranty period.
 - b. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ATM E96, Method B.
 2. Warranty Period: Five years from date of Substantial Completion.
- B. **Special Installer's Warranty:** Written air barrier membrane Installer's warranty, signed by Installer, covering Work of this Section, for warranty period of two years.
- C. **Deviations:** In the event these Specifications or the Drawings deviate from the manufacturer's current specifications, these specifications prevail, except where they conflict with the manufacturer's requirements for the specified guarantee. In this case, the manufacturer's specifications prevail.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED, VAPOR PERMEABLE MEMBRANE AIR BARRIER

- A. **Fluid-Applied, Vapor-Permeable Membrane Air Barrier, Basis of Design:** Subject to compliance with requirements, provide the following:
1. Single Component Acrylic Membrane: Perm-A-Barrier VP, as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA.
- B. **Physical and Performance Properties:** Provide products with the following minimum properties:
1. Membrane Air Permeance: Not to exceed 0.0004 cfm/sq. ft. of surface area (at specified thickness) at 1.57-lbf/sq. ft. pressure difference (0.002 L/s x sq. m of surface area at 75-Pa) when applied to CMU wall; when tested per ASTM E2178.
 2. Membrane Vapor Permeance: Not less than 11.2 perms (649.6 ng/Pa x s x sq. m); when tested per ASTM E96.
 3. UV Exposure Limit: Not more than 150 calendar days; per ASTM D412 and ASTM E96-Method B.
- C. **Acceptable manufacturers,** provided the following can meet all specified criteria:
1. Henry Company.
 2. Rubber Polymer Corporation; Rub-R-Wall Airtight.

2.2 AUXILIARY MATERIALS

- A. **General:** Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

- B. **Liquid Membrane for Details and Terminations:** Provide Bituthene Liquid Membrane as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA.
- C. **Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate):** Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
 - 1. Flash Point: No flash to boiling point
 - 2. Solvent Type: Water
 - 3. VOC Content: Not to exceed 10 g/l
 - 4. Application Temperature: -4°C (25°F) and above
 - 5. Freezing point (as packaged): -7°C (21°F)
 - 6. Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products.
- D. **Flexible Membrane Wall Flashing:** 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
 - 1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 - 2. Water Absorption: ASTM D570: max. 0.1% by weight
 - 3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
 - 4. Tear Resistance
 - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.
 - 5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
 - 6. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 - 7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
 - 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
 - 9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- E. **Joint Reinforcing Strip:** Air barrier manufacturer's approved tape.
- F. **Transition Tape:** 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
 - 1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
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7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- G. **Substrate Patching Membrane:** Manufacturer's standard trowel-grade substrate filler.
 1. Product: Bituthene Liquid Membrane, manufactured by Grace Construction Products.
- H. **Sprayed Polyurethane Foam Sealant:** 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- I. **Joint Sealant:** ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Examine substrates,** areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 4. Verify that masonry joints are struck flush and completely filled with mortar.
 5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. **Refer to manufacturer's literature** for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.

- B. **Exterior Sheathing Panels:** Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 50 - 75mm (2-3 in.) wide, manufacturer's recommended self-adhesive tape. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied air barrier system.
- C. **Masonry Substrates:** Apply air and vapor barrier over concrete block and brick with smooth trowel-cut mortar joints, struck full and flush. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.
- D. **Related Materials:** Treat construction joints and install flashing as recommended by manufacturer.
- E. **Clean, prepare, treat, and seal substrate** according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- F. **Mask off adjoining surfaces** not covered by air barrier to prevent spillage and overspray affecting other construction.
- G. **Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings** from concrete.
- H. **Remove fins, ridges, mortar, and other projections** and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- I. **Remove excess mortar** from masonry ties, shelf angles, and other obstructions.
- J. **At changes in substrate plane**, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- K. **Cover gaps in substrate plane** and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

- A. **Concrete and Masonry:** Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
 - 1. Prime substrate as required.
- B. **Gypsum Sheathing:** Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply tape to joint prior to installing fluid air barrier membrane.

3.4 AIR BARRIER MEMBRANE INSTALLATION

- A. **Apply air barrier membrane** to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

- B. **Apply air barrier membrane** within manufacturer's recommended application temperature ranges.
- C. **Apply a continuous unbroken air barrier** to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable Membrane Air Barrier: 90-mil (2.4-mm) wet film thickness, 45-mil (1.2-mm) dry film thickness.
- D. **Do not cover air barrier** until it has been tested and inspected by Owner's testing agency.
- E. **Correct deficiencies** in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.5 TRANSITION STRIP INSTALLATION

- A. **Install strips, transition strips, and auxiliary materials** according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.
 - 3. Install all flashings only after application of air barrier.
- B. **Apply primer to substrates** to receive transition tapes at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Re-prime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. **Connect and seal exterior wall air barrier membrane** continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- D. **At end of each working day**, seal top edge of strips and transition strips to substrate with termination mastic.
- E. **Apply joint sealants** forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. **Wall Openings:** Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.

- G. **Fill gaps in perimeter frame surfaces** of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. **Repair punctures, voids, and deficient lapped seams** in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.6 FIELD QUALITY CONTROL

- A. **Testing Agency:** Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. **Inspections:** Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air barrier system has been provided.
 - 3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 6. Surfaces have been primed, if applicable.
 - 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 8. Termination mastic has been applied on cut edges.
 - 9. Strips and transition strips have been firmly adhered to substrate.
 - 10. Compatible materials have been used.
 - 11. Transitions at changes in direction and structural support at gaps have been provided.
 - 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - 13. All penetrations have been sealed.
- C. **Tests:** Testing to be performed will be determined by Owner's testing agency from among the following tests:
 - 1. **Qualitative Testing:** Air barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.
- D. **Remove and replace** deficient air barrier components and retest as specified above.

3.7 CLEANING AND PROTECTION

- A. **Protect air barrier system** from damage during application and remainder of construction period, according to manufacturer's written instructions.

- B. **Protect air barrier** from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 150 days.
- C. **Clean spills, stains, and soiling** from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. **Remove masking materials** after installation.

END OF SECTION