

SECTION 07 27 00
AIR BARRIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
1. Materials and installation methods for self-adhered 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 07 60 00 - Flashing and Sheet Metal
 2. Section 07 92 00 - Joint Sealants
 3. Section 07 21 13 - Thermal Insulation

1.3 DEFINITIONS

- A. ABAA: Air Barrier Association of America
- B. 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.

1.4 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.
- B. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain

temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:

1. It must be continuous, with all joints made airtight.
2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf) (equal to 0.02L/sq. m @ 75 Pa), when tested in accordance with ASTM E2178.
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. It shall be durable or maintainable.
5. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
6. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.5 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
- B. American Society for Testing and Materials (ASTM)
 1. ASTM C920 Specifications for Elastomeric Joint Sealants
 2. ASTM C1193 Standard Guide Use of Joint Sealants
 3. ASTM D412 Standard Test Methods for Rubber Properties in Tension
 4. ASTM D570 Test Method for Water Absorption of Plastics
 5. ASTM D882 Test Method for Tensile Properties of This Plastic Sheeting

6. ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 7. ASTM D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
 8. ASTM D1117 Standard Guide for Evaluating Non-woven Fabrics
 9. ASTM D1876 Test Method for Peel Resistance of Adhesives
 10. ASTM D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting
 11. ASTM D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 12. ASTM D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 13. ASTM D4541 Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers
 14. ASTM D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics
 15. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
 16. ASTM E96 Test Methods for Water Vapor Transmission of Materials
 17. ASTM E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 18. ASTM E1677 Specification for Air Retarder material or System for Framed Building Walls
 19. ASTM E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems
 20. ASTM E2178 Standard Test Method for Air Permeance of Building Materials
 21. ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 17. AATCC-127 Water Resistance: Hydrostatic Pressure Test (American Association of Textile Chemists and Colorists)
- C. TAPPI
1. Test Method T-410 Grams of Paper and Paperboard (Weight per Unit Area)
 2. Test Method T-460 Air Resistance (Gurley Hill Method)

1.6 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.
 - 1. Include details of interfaces with other materials that form part of air barrier.
 - 2. Include details of mockups.
- C. Samples: Submit representative samples of the following for approval:
 - 1. Self-Adhered Air Barrier Membrane
 - 2. Self-Adhered Transition Membrane
 - 3. Self-Adhered 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. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.10.
- H. Mock-up - provide in exterior wall/window/door mock-up.

1.7 QUALITY ASSURANCE

- A. 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.
- B. 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 owner determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
3. Mockup size (10 feet x 10 feet).

C. Qualifications

1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.8 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.

1.9 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.

1.10 WARRANTY

- A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace self-adhered 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 .004 cfm/sq. ft (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 15 perms when tested in accordance with ATM E96, Method B.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. DuPont Tyvek CommercialWrap or approved equal.

2.2 WEATHER BARRIER

- A. A non-perforated, nonwoven, non-absorbing, breathable membrane that resists air flow, bulk water and wind driven rain and channels water and moisture to the outside of the building envelope. It has microscopic pores that allow moisture vapor to escape from inside walls.
- B. Physical Properties
1. Spunbonded polyolefin membrane.
- C. Performance Characteristics:
1. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677.
 2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
 3. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.
 4. Basis Weight: Minimum 2.7 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
 6. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
 7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
 8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed:10.

2.3 ACCESORIES

- A. Seam Tape: As recommended by the weather barrier manufacturer.
- B. Fasteners:
1. 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4" or 2" metal gasketed washer.
AND/OR
 2. Nail Caps: #4 nails with large 1-inch plastic cap fasteners.
AND/OR
 3. Masonry tap-con fasteners with Caps: 2-inch diameter plastic cap fasteners.
- C. Sealants

1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
 2. Products: Sealants recommended by the weather barrier manufacturer.
- D. Adhesives:
1. Provide adhesive recommended by weather barrier manufacturer.
 2. Products: Adhesives recommend by the weather barrier manufacturer.
- E. Primers:
1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 2. Products: Primers recommended by the flashing manufacturer.
- F. Flashing:
1. Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer.
- AND/OR
2. Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc. recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

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 air barrier assembly.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws in accordance with exterior sheathing manufacturers written instructions.
- C. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- D. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

- E. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- F. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- G. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- H. 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.
- I. 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 INSTALLATION - WEATHER BARRIER

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
- B. Install weather barrier prior to installation of windows and doors.
- C. Start weather barrier installation at building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier completely over openings.
- F. Window and Door Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier
 - 1. Exterior corners: minimum 12 inches.
 - 2. Seams: minimum 6 inches.
- H. Weather Barrier Attachment:
 - 1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

AND/OR

- I. Apply flashing to weather barrier membrane prior to installing cladding anchors.

3.4 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.5 OPENING PREPARATION (FOR USE WITH NON-FLANGED WINDOWS - ALL CLADDING TYPES)

- A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
- B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.6 FLASHING (FOR USE WITH NON-FLANGED WINDOWS - ALL CLADDING TYPES)

- A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.
- B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
- D. Apply 9-inch wide strips of flashing at jambs. Align flashing with interior edge of jamb framing. Start flashing at head of opening and lap sill flashing down to the sill.
- E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
- F. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
- G. Coordinate flashing with window installation.
- H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193.
- I. Position weather barrier head flap across head flashing. Adhere using flashing over the 45-degree seams.
- J. Tape top of window in accordance with manufacturer recommendations.
- K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create

air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.7 FIELD QUALITY CONTROL

- A. Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.8 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.

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