SECTION 07 2700

AIR BARRIER MEMBRANES

PART 1 GENERAL

1.1 SUMMARY

A. Work of this Section consists of air barrier membranes, and includes but is not limited to the following:

1. Sheet vapor permeable air barrier membrane system.
    a. Alternate: Fluid-applied air barrier membrane system.

B. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. Other Documents and Sections that directly relate to work of this Section include, but are not limited to:

1. General provisions of the Contract, including General and Supplementary Conditions, and Division 01 General Requirements Specification Sections.
2. Section 03 3000 - CAST-IN-PLACE CONCRETE.
3. Section 06 1643 - GYPSUM SHEATHING.
4. Section 07 4213 - FORMED METAL WALL PANELS
5. Section 07 4213.16 - METAL PLATE WALL PANELS
6. Section 07 4243 - COMPOSITE METAL WALL PANELS
7. Section 07 4247 - HIGH PERFORMANCE GFRC WALL PANELS
8. Section 07 6200 - SHEET METAL FLASHING AND TRIM.
9. Section 07 9200 - JOINT SEALANTS.

1.2 SYSTEM DESCRIPTION

A. Definitions:

1. Air Barrier Assembly: A collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control the rate of air movement through the wall, floor and roof systems.

B. Performance Requirements:

1. 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.

C. Design Requirements:

1. Provide a continuous air barrier capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, transferring loads to the structure, and not displacing adjacent materials under full load.
2. Join air barrier in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to pressure, 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.
h. Concrete column penetration through roof assembly.

3. Penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's printed descriptions of materials and systems, performance criteria, use limitations, recommendations and installation information.

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. Sheet membrane.
2. Fluid applied membrane.
3. Transition tape.
4. Through-wall flashing.

D. Quality Assurance Submittals

1. 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.
2. Product Certificates: Submit with manufacturer’s signature certifying that each product and/or system meets the requirements of the performance characteristics, physical criteria, and applicable standards specified.
3. Manufacturer’s Instructions: Installation.
4. Qualification Statements: Submit a letter, on printed letterhead and signed by an officer of the firm, for each listed quality assurance qualification listed, attesting to meeting each requirement called out.

E. Closeout Submittals

1. Executed Warranties: Manufacturers’ material warranties and installers workmanship warranty.
2. Product Data for Maintenance and Training Manuals: Including, but not limited to, methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance
3. Record Documents:
   a. Update Record Drawings for location and extent as affected by addenda, product or system selection and contract modifications.
   b. Update this Record Specification Section by
      1). Inserting each applicable Addendum
      2). Indicating actual products or system installed
      3). Including each applicable Construction Change Directive and Change Order

modification

1.4 QUALITY ASSURANCE

A. Manufacturer: Air barrier systems shall be manufactured and marketed by a firm with a minimum of ten (10) years' experience in the production and sales of waterproofing.

1. 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 (5) 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 at least a three (3) year record of successful in-service performance of installations of similar size and scope, and who will perform installation with skilled, experienced and trained workmen supervised by trained personnel.

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 system 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Shipping, Delivery and Handling: Adequately protect products from soiling, damage, deterioration, and loss, including theft, handling with proper care in proportion to the fragility and hazard of each product and its finished surface.

1. Manufacturers, fabricators, suppliers and shippers shall provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable or recyclable.
2. Deliver materials to Project site in an undamaged condition, in original, unopened packages or containers or bundles bearing manufacturer's names, brand names, types and thicknesses of contents, and proper handling, storing, unpacking, protecting, and installation instructions, as warranted.
    a. In addition to the above requirements, follow manufacturer’s recommendation for shipping, delivery and handling.
3. Sequence deliveries to avoid delays, but minimize on-site storage.

B. Acceptance at Site: Inspect shipped materials on delivery to ensure compliance with requirements, reject damaged goods and accept properly ordered, protected and undamaged goods.

C. Storage and Protection: Protect materials during shipping, handling, storage and installation from exposure to harmful weather conditions, vandalism, extreme changes in temperature, dryness or humidity, denting, chipping, gouging, warping, peeling, moisture, construction operations, and other damage, all in accordance with manufacturer’s recommendations.

1. 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.
2. Protect fluid-applied membrane components from freezing and extreme heat.
3. Remove damaged material from the site and dispose of in accordance with applicable regulations.

1.6 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/m^2 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 (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 VAPOR PERMEABLE SHEET MEMBRANE AIR BARRIER

A. Performance Requirements

1. General: Continuous weather-resistive assembly acting in conjunction with adjacent materials to resist air and water leakage into the building and to function as a drainage plane for incidental moisture.
2. Air Infiltration:
   a. Material: 0.004 cfm/sf at a pressure differential of 1.57 lb/sq ft per ASTM E2357.
   b. Assembly: Assembly: 0.04 cfm/sf at 1.57 lb/sq ft per ASTM E2357.
3. Vapor Permeance: 0.1 perm maximum; ASTM E96 Desiccant Method.
4. Fire Resistance: Tested as a component of assembly passing NFPA 285.

B. Membrane: Self-adhering, air and water barrier membrane.

1. Manufacturer and Product:
   a. 3M™ Air Barrier with Permeable Backing 3015VP.
2. Description: 15 mil (0.38 mm) thick proprietary film with acrylic adhesive, elastomeric coated, nonwoven backing, and 3 mils (0.078 mm) polyester liner.
3. Color: White.
4. Physical and Performance Properties:
   a. Elongation at Break: 40 percent, ASTM D882.
   b. Tensile Strength: 1177 psi (8.1 MPa) <Insert value>; ASTM D882.
   c. Lap Adhesion: 50 oz/inch (0.44 N/mm) <Insert value>; ASTM D3330.
   d. Nail Sealability: 5 inches (127 mm) <Insert value>;of water head after 3 days, dry and passes per ASTM D1970.
   e. Surface Burning Characteristics: ASTM E84
      1). Flame Spread Index: Less than 5.
      2). Smoke Developed Index: Less than 0.

C. Accessories

1. General: Accessory materials recommended by air-barrier manufacturer and compatible with primary air-barrier membrane.

2. Joint Sealant: Manufacturers approved sealants.

2.2 FLUID-APPLIED AIR AND VAPOR BARRIER

A. Air/vapor barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

1. Basis-of-Design Manufacturer: Henry Company, El Segundo, CA.
2. Provide Basis-of-Design product, or equal by Prosoco or GCP Applied Technologies.

B. Primary trowel applied liquid air/vapor barrier membrane shall be Air-Bloc 21, manufactured by Henry; a synthetic trowel grade rubber based adhesive, compatibility with substrates, transition membranes and insulation. Membrane shall have the following physical properties:

1. Air permeability: 0.0026 CFM/ft^2 1.6 lbs/ft^2 to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft^2 for 1 hour and gust wind load pressure of 62.8 lbs/ft^2 for 10 seconds when tested at 1.6 lbs/ft^2 to ASTM E331,
2. Water vapor permeance: 0.03 perms to ASTM E96,
3. Nominal wet film thickness: 120 mils,
4. Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements,
5. Long Term Flexible: CGSB 71-GP-24M,
6. Chemical resistance: Mild acids, alkalis and salt

C. Self-Adhered transition membrane shall be Blueskin SA, LT, or HT manufactured by Henry, an SBS modified bitumen, self-adhering sheet membrane complete with a blue engineered thermoplastic film. Membrane shall have the following physical properties:

1. Air leakage: <0.0001 CFM/ft² 1.6 lbs/ft^2 to ASTM E2178,
2. Vapor permeance: 0.03 perms to ASTM E96 (Desiccant Method),
3. Membrane Thickness: 0.0394 inches (40 mils),
4. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M

D. Alternate self-adhering membrane for all window and window sill flashings, door openings, inside and outside corners and other transitions shall be HE200 AM Metal Clad manufactured by Henry; a SBS modified bitumen, self-adhering sheet membrane complete with surface layer of metallic aluminum film that many sealants adhere well to. Membrane shall have the following physical properties:

1. Peel Adhesion to Primed Steel 15.0 to ASTM D 1000
2. Vapor Permeance: < 0.014 perms to ASTM E 96
3. Membrane Thickness: 0.0443 inches (45 mils)
4. Low temperature flexibility: -15 degrees F to ASTM D146 min
5. Elongation: 40% to ASTM D412-modifed min

E. Liquid-applied flashing alternate to self-adhered flashing membranes for all window, door, MEP penetrations, inside/outside and dissimilar material connections shall be Air-Bloc LF manufactured by Henry; a moisture-curing single component STPe liquid-applied flashing compatible with a variety of substrates and all Henry liquid and self-adhered air barrier membranes. Liquid-flashing shall have the following physical properties:

1. Elongation: minimum 250% minimum to ASTM D412,
2. Tensile Strength: 132% psi minimum to ASTM D412,
3. Nail Sealability: Pass to AAMA 711,
4. VOC Content: 25 g/L max,

5. Solids Content by Volume: 95%,
6. Moisture Absorption:.1% to ASTM D570

F. Adhesive with low VOC content for self-adhering membranes at all temperatures shall be Blueskin LVC Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:

1. Color: Blue,
2. VOC: <240 g/L,
3. Solids by weight: 40%,
4. Drying time (initial set): 30 minutes

G. Termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:

1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A,
3. Complies with ASTM C 920, Type S, Grade NS, Class 25,
4. Elongation: 450 – 550%,
5. Remains flexible with aging,
6. Seals construction joints up to 1 inch wide

2.3 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. Wall Primer (for Use with Through-wall Flashing and Tapes Applied to Substrate): Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.

C. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.

D. Transition Tape: 0.8mm of self-adhesive rubberized asphalt integrally bonded to 0.2mm of cross-laminated, high-density polyethylene film to provide a minimum 1.0mm thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

E. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

F. Sprayed Polyurethane Foam Sealant: One or two-component, foamed-in-place, polyurethane foam sealant, ; flame spread index of 25 or less according to ASTM E162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

G. 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 PROJECT CONDITIONS

A. Environmental Limitations:

1. Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer.
2. Protect substrates from environmental conditions that affect performance of air barrier.

3. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

3.2 EXAMINATION

A. Carefully examine installation areas with Installer present, for compliance with requirements affecting Work performance.

1. Verification of Conditions: Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are as required by the manufacturer, and ready to receive Work.
   a. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
   b. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
   c. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SURFACE PREPARATION

A. Refer to manufacturer’s literature for requirements for preparation of substrates.

1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
2. Remove contaminants such as grease, oil and wax from exposed surfaces.
3. Remove dust, dirt, loose stone and debris.
4. 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.

1. Pre-treat all board joints with 2-3 inch wide, manufacturer's recommended self-adhesive tape.
2. Gaps greater than 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.

1. 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 liquid bituthene 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.

3.4 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.

3.5 LIQUID-APPLIED 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 wet film thickness, 45 mil dry film thickness.

D. Do not cover air barrier until it has been tested and inspected by independent testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.6 SELF-ADHERED SHEET AIR BARRIER MEMBRANE INSTALLATION

A. Install modified bituminous sheets according to air barrier manufacturer's written instructions and according to recommendations in ASTM D 6135.

B. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air barrier sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

C. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install modified bituminous strips centered over vertical inside corners. Install 3/4-inch fillets of termination mastic on horizontal inside corners.

D. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier sheets. Accurately align sheets and maintain a uniform 6-inch minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure airtight installation. Stagger end laps by a minimum of 24 inches.

E. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.

F. Roll sheets firmly to enhance adhesion to substrate.

3.7 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 in. 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. Reprime areas exposed for more than twenty four (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. Lap membranes shingle-style to facilitate drainage without reliance on sealant only.

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.

1. Apply transition strip so that a minimum of 3 inches of coverage is achieved over both substrates.
2. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
3. 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 holes, holes from removed fasteners, pin holes, tears, damage, bubbles, blisters, wrinkles, fishmouths, slump, sag, runs, sponginess, and all other damage and defects.

1. Patch with transition strips or circular patch of air barrier membrane extending at least 6 in. beyond repaired areas in strip direction.

3.8 INSTALLATION SEQUENCE

A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space, before proceeding with air barrier installation.

B. Seal penetrations made through installed product according to manufacturer's instructions and drawings.

C. Through-wall flashing may be installed before or after product. Seal termination of metal through-wall flashing to product with 6 inch width counter-flashing strip consisting of any of these:

1. Detail flashing
2. Reinforcing fabric imbedded in product
3. Glass mat imbedded in product

D. Cladding shall be installed after product. Cladding clips shall be installed prior to installation of product.

E. Rigid or semi-rigid insulation installed over product shall be attached with insulation adhesive and mechanical fastening according to insulation manufacturer and air barrier manufacturer's instructions.

F. Sequence Work to enable air barrier continuity at wall-to-foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies and other conditions providing challenges to air barrier continuity.

3.9 FIELD QUALITY CONTROL

A. Spray-Applied Membranes: Verify each coating or specified thickness immediately after it is applied and before the material attains final set by use of wet film-thickness gauge as work progresses. With the approval of the Architect, immediately apply additional coating to produce required thickness where readings indicate thickness less than the specified.

1. If any imperfection is detected or coating materials do not comply with contract requirements, submit correction methods for repair. Remove all imperfect or non-complying materials, prepare and reapply surfaces with new materials. Repeat tests and make repairs until no leak or imperfection remains.

3.10 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 one hundred fifty (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