SECTION 07 27 00

AIR BARRIERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fluid-Applied Membrane Air Barrier
    a. Vapor Permeable

B. Related Sections:

1. Section 07 20 00 – Thermal Protection
2. Section 07 62 00 - Sheet Metal Flashing and Trim
3. Section 07 92 00 - Joint Sealants

1.02 REFERENCES

A. ASTM International Publications:

1. C578 "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation"
2. C665 "Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing"
3. C1193 "Standard Guide for Use of Joint Sealants"
4. D522 "Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings"
5. D3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"
6. D4258 "Standard Practice for Surface Cleaning Concrete for Coating"
7. D4397 "Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications"
8. D4541 “Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers”
9. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
10. E96 "Standard Test Methods for Water Vapor Transmission of Materials"
11. E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"
12. E136 "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C"
13. E283 “Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen”
14. E331 “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”
15. E1186 “Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems”
16. E1233 "Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential"
17. E1677 "Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls"
18. E1745 "Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

19. E1827 “Standard Test Methods for Determining Air tightness of Buildings Using an Orifice Blower Door”
20. E2178 “Test Method for Air Permeance of Building Materials”
21. E2247 "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property"
22. E2357 “Standard Test Method for Determining Air Leakage of Air Barrier Assemblies”

B. Gypsum Association (GA) Publications:
1. GA-600 "Fire Resistance Design Manual"
2. GA-253 "Recommended Specifications for the Application of Gypsum Sheathing"
3. GA-254 "Fire-Resistant Gypsum Sheathing"

C. The Engineered Wood Association (APA) Publications:
1. Form No. E30, "APA Engineered Wood Construction Guide"

D. American Association of Textile Chemists and Colorists (AATCC)
1. Test Method 127 "Water Resistance: Hydrostatic Pressure Test"

E. ICC Evaluation Service Reports:
1. ES AC212 “ICC Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing”

1.03 PERFORMANCE REQUIREMENTS

A. General: Function as a continuous vapor-permeable air barrier system and as a liquid-water drainage plane flashed to discharge condensation or water penetration to the exterior.

B. Deflection Criteria: Maximum allowable deflection normal to the plane of the wall: L/240

C. Wind Load: Conform to local code requirements.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:
1. Product Data: Include manufacturer's written technical data and installation instructions.
2. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, perm ratings, and similar properties.

1.05 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. Source Limitations: Provide air barrier and accessory materials produced by single manufacturer.

C. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly for approval by Owner's Representative, 150 sq. ft., 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site.

1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, masonry, sealants, windows, aluminum storefront, and door frames.

2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

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

C. Store rolls according to manufacturer's written instructions.

D. Protect stored materials from direct sunlight, freezing temperatures, and temperatures in excess of 90 degrees F.

1.07 PROJECT CONDITIONS

A. The Installer must examine the substrate and the conditions under which insulation work is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Weather Conditions: Proceed with work only when weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with requirements and the manufacturer's recommendations.

C. Do not apply air barrier and components to damp, frozen, dirty, dusty, or surfaces unacceptable to manufacturer.

1. Maintain ambient and surface temperatures above 40 degrees F. during application and drying period, minimum 24 hours after application of air and moisture barrier

2. Provide supplementary heat for installation in temperatures less than 40 degrees F. or if surface temperature is likely to fall below 40 degrees F.

D. Coordinate this work with all trades and protect it after installation.

1.08 SEQUENCING

A. Coordinate installation of roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier.

B. Provide sill flashing to direct water to the exterior before windows and doors are installed.

C. Install window and door head flashing immediately after windows and doors are installed.

D. Install diverter flashings wherever water can enter the assembly to direct water to the exterior.

E. Coordinate Inspections of Air Barriers with installation of flashing and wall cladding materials.

PART 2 PRODUCTS

2.01 FLUID-APPLIED MEMBRANE AIR BARRIER - ABOVE GRADE

A. Approved Manufacturers

1. “DuPont Tyvek Fluid Applied WB System”; DuPont Company (800-448-9835)

a. Joint Treatment: "Tyvek Fluid Applied Flashing and Joint Compound, Trowel Grade"

b. Membrane Air Barrier Coating: "DuPont Tyvek Fluid Applied System"

c. Flashing System: "Tyvek FlexWrap" and "Tyvek StraightFlash"

d. Sealant for use with System: “Dupont Sealant for Tyvek Fluid Applied System”

2. "Sto Guard"; Sto Corporation (800-221-2397)
   a. Joint Treatment: "Sto Gold Coat with StoGuard Fabric"
   b. Membrane Air Barrier Coating: "Sto Gold Coat"
   c. Flashing System: "Sto Gold Coat with StoGuard Fabric"
3. "R GUARD Spray Wrap"; PROSOCO (800-255-4244)
   a. Joint Treatment: “R-GUARD Joint and Seam Filler”
   b. Membrane Air Barrier Coating: "R-GUARD Spray Wrap"
   c. Flashing System: “R-GUARD FastFlash”
4. "Perm-A-Barrier VP”; Grace Construction Products (866-333-3726)
   a. Joint Treatment: "Bituthene Liquid Membrane"
   b. Membrane Air Barrier Coating: "Perm-A-Barrier VP"
   c. Flashing System: “Perm-A-Barrier Wall Flashing”
5. "Backstop NT"; Dryvit Systems, Inc. (800-556-7752)
   a. Joint Treatment: "Dryvit Grid Tape and Surface Conditioner / Backstop NT Texture"
   b. Membrane Air Barrier Coating: "Backstop NT"
   c. Flashing System: "AquaFlash Liquid with AquaFlash Tape"

B. Fluid-Applied Membrane Air Barrier: Acrylic-based weather resistive, vapor permeable coating over exterior sheathing and concrete masonry unit walls above grade.

C. Performance Characteristics:
1. Maximum air permeability: 0.004 cfm/SF under a pressure differential of 0.3 in water (1.57 psf) when tested in accordance with ASTM E2178.
2. Aging/Water Penetration Resistance
   a. Method: AATCC 127 (Water Column) and ASTM E331
   b. Criteria: Resist 21.6 inches water for 5 hours before and after aging
   c. Results: No water penetration before and after aging
3. Structural Loading/Water Penetration Testing
   a. Method: ASTM E1233 / ASTM E331
   b. Criteria: No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf differential
   c. Results: No water penetration
4. Cyclic Pressure/Water Penetration Testing
   a. Method: ASTM E283 / ASTM E331
   b. Criteria: No water penetration or evidence of elevated moisture levels in plywood sheathing after 10 cycles of conditioning at 299 Pa positive and negative pressure followed by 75 minutes water spray at 6.24 psf pressure differential with water spray rate of 5 gal/ft2·hr.
   c. Results: No water penetration, no elevated moisture levels
5. Water Resistance Testing

a. Method: ASTM D2247

b. Results: No deleterious effects after 14 day exposure

6. Resistance to Mold Growth

a. Method: ASTM D3273

b. Results: No mold growth after 28 days

7. Water Vapor Transmission

a. Method: ASTM E96 Method B (Water Method)

b. Results: 17.3 perms

8. Flexibility

a. Method: ASTM D522

b. Criteria: No cracking or delamination using 1/8" mandrel at 14 deg°F before and after aging

c. Results: No cracking or delamination before and after aging

9. Surface Burning

a. Method: ASTM E84

b. Criteria:

1) Flame Spread: <25

2) Smoke Developed: <450

10. Fire Resistance

a. Method: ASTM E119

b. Criteria: Meets criteria for 1-hour fire resistance rating when installed over 1 hour fire resistance rated sheathing.

2.02 ACCESSORY MATERIALS

A. Provide accessory materials as recommended by the membrane air barrier manufacturer as recommended for complete installation, including but not limited to joint reinforcing strips, adhesives, tapes, primers, and sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Require Installer to examine substrates and conditions under which air barrier work is to be performed. A satisfactory substrate is one that complies with requirements of the sections in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

1. Verify adjacent materials are dry, free of contaminants and ready to receive barrier system.

2. Verify substrate surface is flat, free of honeycomb, fins, irregularities, and materials that will impede adhesive bond.

3. Verify that concrete surfaces are dry and have cured for minimum time recommended by membrane air barrier manufacturer.

3.02 PREPARATION

A. Clean substrates of substances harmful to membranes, including removal of projections which might puncture vapor retarders.

B. Inspect sheathing application for compliance with applicable requirement:

1. Exterior gypsum sheathing: GA-253

2. Glass mat faced gypsum sheathing: Consult manufacturer's published recommendations.

3. Remove surface contaminants and replace damaged sheathing.

4. Spot surface defects in sheathing with joint treatment as recommended by membrane manufacturer.

5. Repair cracks, spalls, or other damage in concrete or concrete masonry surfaces.

3.03 INSTALLATION, GENERAL

A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specified recommendations before proceeding with work.

B. The Air Barrier system must be installed to form a continuous air barrier, with all joints and penetrations made airtight. Connections shall be made between the following Building Systems:

1. Foundation and walls.

2. Walls and windows or doors

3. Different wall systems.

4. Wall and roof systems

5. Wall and roof over unconditioned space.

6. Walls, floor and roof across construction, control and expansion joints.

7. Walls, floors and roof to utility, pipe and duct penetrations.

3.04 INSTALLATION - FLUID-APPLIED MEMBRANE AIR BARRIER

A. Install Fluid-Applied Membrane Air Barrier in strict accordance with manufacturers written instructions.

1. Coordinate work with other trades to ensure air barrier continuity with connections at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.

B. Prepare and treat joints as recommended by manufacturer and in accordance with ASTM C1193.

1. Gypsum Sheathing: All joints greater than 1/16 inch shall be filled with joint sealer as recommended by membrane air barrier manufacturer.

a. No joint treatment required for joints up to 1/16 inch.

b. Joints 1/16 to 1/4 inch: Fluid-applied joint compound applied to form a 1 inch width on each side of sheathing joint; smooth joint compound across sheathing joint. Thickness shall be 15 to 25 mils.

c. Joints 1/16 to 1/2 inch: Apply joint tape to bridge both sides of joint equally. Apply fluid-applied joint compound and trowel smooth embedding joint compound

uniformly into joint tape to form a 1 inch width on each side of sheathing joint at a consistent thickness of 15 to 25 mils.

d. Joints 1/2 to 1 inch: Apply sheet flashing primer above and below sheathing joint. Center sheet flashing over sheathing joint and press firmly in place per manufacturer's recommendations.

2. Non-movement joints in masonry and transitions to columns and beams:

a. Joints 1/4 inch wide or less: Apply fluid-applied joint compound a minimum of 2 inches wide by 60 mils thick to each side of joint or crack.

3. Concrete and Masonry:

a. Inspect concrete and concrete masonry surfaces for:

1) Contamination — algae, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.

2) Surface deficiencies – weak, friable, chalkiness, laitance, bugholes, and spalls.

3) Cracks, Contractor shall measure crack width and record location of cracks.

4) Damage or deterioration.

5) Moisture content and moisture damage, contractor to determine if the surface is dry enough to receive the air barrier in accordance with manufacturer's recommendations. Record any areas of moisture damage or excess moisture.

b. Flush masonry mortar joints shall be completely filled with mortar.

c. Remove dust in accordance with ASTM D4258 before applying coatings.

C. Install transition strips and other accessory materials according to membrane air barrier manufacturer's instructions to form a continuous seal with all adjacent materials.

D. Corners: Apply fluid-applied joint compound, in thickness as recommended by manufacturer, to outside and inside corners. Joint compound shall extend 2 inches from corner for full height of corner, or apply primer to outside and inside corners, extend 2 inches on each side of corner. Center sheet flashing over corner and press firmly in place per manufacturer's recommendations.

E. Membrane system shall be extended into all wall openings such as doors and windows to form a complete seal at perimeters.

1. Refer to Section 07 62 00 "Sheet Metal Flashing and Trim" for flashings at Wall Openings such as windows and doors.

F. All through wall flashings shall be sealed at top with counterflashings as recommended by membrane air barrier manufacturer.

G. Repair all damaged locations including punctures, voids, deficient seams, fishmouths and blisters.

3.05 FIELD QUALITY CONTROL

A. Notify Fluid Applied Air Barrier manufacturer's designated representative to obtain periodic observations of Fluid Applied Air Barrier system installation.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections: Fluid Applied Air Barrier materials, accessories, and installation are subject to inspection for compliance with performance requirements.

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 of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed if applicable.
7. Laps in strips and transitions strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish mouths.
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 in changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barriers and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

D. Fluid Applied Air Barrier assemblies will be considered defective upon failure of inspections and specific project testing required.
1. Apply additional fluid-applied air barrier material, in accordance with manufacturer's instructions, where inspection results indicate insufficient thickness, voids, skips, pinholes or other defects as recommended by weather barrier manufacturer.
2. Remove and replace deficient weather barrier system components for retesting as specified above.

E. Repair damage to weather barriers caused by destructive testing; follow manufacturer's written instructions.

3.06 PROTECTION

A. General: Protect installed membranes and barriers from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure. Remove and replace membranes or barriers where exposed for greater than 60 days.

END OF SECTION 07 27 00