SECTION 07 27 13 – modified bituminous sheet air barriers

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. General
   1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
  1. SUMMARY
     1. Section includes self-adhering, vapor-retarding, modified bituminous sheet air barriers.
     2. Related Requirements:
        1. Section 06 16 00 – Sheathing for wall sheathings and wall sheathing joint-and-penetration treatments.
        2. Section 07 27 15 – Non-bituminous Self-Adhering Sheet Air Barriers for self-adhering sheet air barriers composed of non-bituminous polymers.
        3. Section 07 25 00 – Weather Barriers" for weather barriers, including [building paper] [flexible flashing] [and] [building wraps with air-barrier properties].
  2. definitions

Retain terms that remain after this Section has been edited for a project.

* + 1. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
    2. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
    3. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
  1. preinstallation meetings

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + 1. Preinstallation Conference: Conduct conference at Project site.
       1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

If needed, insert list of conference participants not mentioned in Section 013100 "Project Management and Coordination."

* 1. action SUBMITTALS
     1. Product Data: For each type of product.
        1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; and tested physical and performance properties of products.
     2. Sustainable Design Submittals:

"Product Data" Subparagraph below applies to LEED 2009 NC, CI, and CS; LEED v4; IgCC; ASHRAE 189.1; and Green Globes. Coordinate with requirements for paints and coatings.

* + - 1. Product Data: For coatings, indicating VOC content.

"Laboratory Test Reports" Subparagraph below applies to LEED 2009 for Schools, LEED v4, IgCC, ASHRAE 189.1, and Green Globes. Coordinate with requirements for paints and coatings.

* + - 1. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
    1. Shop Drawings: For air-barrier assemblies.
       1. Show locations and extent of air barrier materials, accessories, and assemblies specific to Project conditions.
       2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
       3. Include details of interfaces with other materials that form part of air barrier.
  1. informational submittals

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article. Retain option below if retaining qualification requirement for ABAA-licensed Installer.

* + 1. Qualification Data: For Installer**. [ Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.]**

Retain "Product Certificates" Paragraph below to require submittal of product certificates from manufacturers.

* + 1. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with air barrier.
    2. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

Retain "Field quality-control reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + 1. Field quality-control reports.
  1. QUALITY ASSURANCE
     1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

Retain subparagraph below only if ABAA's Quality Assurance Program is required; consult ABAA for requirements and costs. Before retaining, verify availability of ABAA-licensed contractors. Retaining subparagraph requires using, and Contractor paying for, the whole ABAA's Quality Assurance Program.

* + - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
    1. Mockups: Build mockups to set quality standards for materials and **execution [ and for preconstruction testing]**.

Indicate portion of wall represented by mock-up on Drawings or draw mock-up as separate element.

* + - 1. Build integrated mockups of exterior wall assembly **[as indicated on Drawings] [, 150 sq. ft. (14 sq. m)] <Insert requirement>**, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties, and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

Generally, retain first subparagraph below if requiring preconstruction testing.

* + - * 1. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
        2. Include junction with roofing membrane **[, building corner condition,] [and] [foundation wall intersection]**.
        3. If Architect determines mockups do not comply with requirements, reconstruct mock-ups, and apply air barrier until mockups are approved.
      1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 01 40 00 – Quality Requirements for demolishing and removing mock-ups.

* + - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  1. PRECONSTRUCTION TESTING

Retain this article for preconstruction testing. Project-specific preconstruction testing of assemblies can be expensive but may be the best means of proving that performance requirements are met. Mockup testing is usually limited to buildings with complex, unusual, or previously untested exterior envelope construction.

* + 1. Preconstruction Testing Service: **[Owner will engage] [Engage]** a qualified testing agency to perform preconstruction testing on field mockups.
    2. Mock-up Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mock-up testing by a qualified testing agency.

Retain "Air-Leakage-Location Testing" Subparagraph below if testing to locate air-leakage sites is required and if air-leakage-volume testing is required.

* + - 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to **[ASTM E 1186, chamber pressurization or depressurization with smoke tracers] [ASTM E 1186, chamber depressurization with detection liquids] <Insert requirement>**.

Retain "Air-Leakage-Volume Testing" Subparagraph below if testing to quantify air-leakage rate is required. Testing according to ASTM E 783 may be more practical for on-site testing. ASTM E 2357, specifically for air-barrier assemblies, can also be used; however, on-site testing according to this standard is more costly. See the Evaluations.

* + - 1. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to **[ASTM E 783] [or] [ASTM E 2357]**.
      2. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate according to ASTM D 4541.
      3. Notify Architect **[seven] <Insert number>** days in advance of the dates and times when mockups will be tested.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Remove and replace liquid materials that cannot be applied within their stated shelf life.
     2. Protect stored materials from direct sunlight.
  2. FIELD CONDITIONS
     1. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
        1. Protect substrates from environmental conditions that affect air-barrier performance.
        2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1. Products

Manufacturers and Products listed are neither recommended nor endorsed by the AIA or Avitru. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 01 61 00 – Common Product Requirements.

* 1. materials
     1. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
  2. performance requirements

Retain first option in "Air-Barrier Performance" Paragraph below if air barrier serves as a primary or secondary drainage plane.

* + 1. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous 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, penetrations **[, tie-ins to installed waterproofing]**, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

Generally, retain "Air-Barrier Assembly Air Leakage" Paragraph below. Air-leakage value below is the maximum permitted by the IBC/IECC and ABAA. See the Evaluations.

* + 1. Air-Barrier Assembly Air Leakage: Maximum **[0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa)] <Insert value**>, when tested according to ASTM E 2357.
  1. SELF-ADHERING SHEET air barrier

Retain option in "Modified Bituminous Sheet" Paragraph below if application with VOC-conforming accessory materials is required.

* + 1. Modified Bituminous Sheet: 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick, cross-laminated polyethylene film with release liner on adhesive **side [ and formulated for application with primer that complies with VOC limits]**.

Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

* + - 1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:
         1. Carlisle Coatings & Waterproofing Inc**; [CCW-705][CCW-705 HT][CCW-705 LT]**.
         2. Grace Construction Products; W.R. Grace & Co. -- Conn**.; [Perm-A-Barrier High Temperature Wall Membrane][Perm-A-Barrier Low Temperature Wall Membrane][Perm-A-Barrier Wall Membrane]**.
         3. Henry Company; **[Blueskin SA][Blueskin SA HT][Blueskin SA LT].**
         4. Polyguard Products, Inc.; Polyguard 400 Sheet Air Barrier.
         5. Rubber Polymer Corporation, Inc.; Rub-R-Wall SA.
         6. Tremco Incorporated; ExoAir 110/110LT.
         7. W.R. Meadows, Inc; SealTight Air-Shield.
         8. **<Insert manufacturer's name; product name or designation>**.
      2. Physical and Performance Properties:

Option in "Air Permeance" Subparagraph below is the maximum permitted by the IBC/IECC and ABAA.

* + - * 1. Air Permeance: Maximum [0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa)] **<Insert value>** pressure difference; ASTM E 2178.
        2. Tensile Strength: Minimum [250 psi (1.7 MPa)] **<Insert value>**; ASTM D 412, Die C.
        3. Ultimate Elongation: Minimum [200] **<Insert number>** percent; ASTM D 412, Die C.

Option in "Puncture Resistance" Subparagraph below is ABAA's requirement for approving a self-adhered air-barrier material; revise to suit Project.

* + - * 1. Puncture Resistance: Minimum [40 lbf (180 N)] **<Insert value>**; ASTM E 154/E 154M.
        2. Water Absorption: Maximum [0.15] **<Insert number>** percent weight gain after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.

Option in "Vapor Permeance" Subparagraph below is the maximum value of a Class I vapor retarder as defined by the 2012 IBC. Verify available values with manufacturers.

* + - * 1. Vapor Permeance: Maximum [0.1 perm ((5.8 ng/Pa x s x sq. m))] **<Insert value>**; ASTM E 96/E 96M, Desiccant Method.

Option in "Adhesion to Substrate" Subparagraph below is ABAA's requirement for approving an air-barrier material's adhesion to concrete, glass-fiber-based gypsum sheathing, and concrete block substrates; revise to suit Project.

* + - * 1. Adhesion to Substrate: Minimum [16 lbf/sq. in. (110 kPa)] **<Insert value>** when tested according to ASTM D 4541 as modified by ABAA.

Retain "Fire Propagation Characteristics" Subparagraph below if required for the air barrier, such as combustible sheets that also function as water-resistive barriers in buildings of Type I, II, III, or IV construction that are taller than 40 feet (12 192 mm) above grade. Air-barrier materials that pass NFPA 285 testing may be unavailable from some manufacturers or for some wall assemblies; contact manufacturers for test results.

* + - * 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

Retain "UV Resistance" Subparagraph below if required, such as for rainscreen locations or delayed installation of covering materials. Manufacturers generally specify covering the air barrier within 30 or 60 days except for products with modified UV resistance; consult manufacturers for recommendations and product availability. Alternatively, consider using aluminum-faced modified bituminous sheet.

* + - * 1. UV Resistance: Can be exposed to sunlight for [30] [60] **<Insert number>** days according to manufacturer's written instructions.

Retain option in "Aluminum-Faced Modified Bituminous Sheet" Paragraph below if application with VOC-conforming accessory materials is required.

* + 1. Aluminum-Faced Modified Bituminous Sheet: 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick, cross-laminated polyethylene film faced with aluminum foil, with release liner on adhesive side **[ and formulated for application with primer that complies with VOC limits]**.

Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

* + - 1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:
         1. Grace Construction Products; W.R. Grace & Co. -- Conn**.; [Perm-A-Barrier Aluminum Wall Membrane] [Perm-A-Barrier Low Temperature Aluminum Wall Membrane]**.
         2. Henry Company; HE200AM-Metal Clad Weather Barrier.
         3. **<Insert manufacturer's name; product name or designation>**.
      2. Physical and Performance Properties:

Option in "Air Permeance" Subparagraph below is based on IBC/IECC and ABAA requirements.

* + - * 1. Air Permeance: Maximum [0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa)] **<Insert value>** pressure difference; ASTM E 2178.
        2. Tensile Strength: Minimum [250 psi (1.7 MPa)] **<Insert value>**; ASTM D 412, Die C.
        3. Ultimate Elongation: Minimum [80] **<Insert number>** percent; ASTM D 412, Die C.

Option in "Puncture Resistance" Subparagraph below is ABAA's requirement for approving a self-adhered air-barrier material; revise to suit Project.

* + - * 1. Puncture Resistance: Minimum [40 lbf (180 N)] **<Insert value>**; ASTM E 154/E 154M.
        2. Water Absorption: Maximum [0.15] **<Insert number>** percent weight gain after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.

Option in "Vapor Permeance" Subparagraph below is the maximum value of a Class I vapor retarder as defined by the 2012 IBC. Verify available values with manufacturers.

* + - * 1. Vapor Permeance: Maximum [0.1 perm ((5.8 ng/Pa x s x sq. m))] **<Insert value>**; ASTM E 96/E 96M, Desiccant Method.

Option in "Adhesion to Substrate" Subparagraph below is ABAA's requirement for approving an air-barrier material's adhesion to concrete, glass-fiber-based gypsum sheathing, and concrete block substrates; revise to suit Project.

* + - * 1. Adhesion to Substrate: Minimum [16 lbf/sq. in. (110 kPa)] **<Insert value>** when tested according to ASTM D 4541 as modified by ABAA.

Retain "Fire Propagation Characteristics" Subparagraph below if required for the air barrier, such as combustible sheets that also function as water-resistive barriers in buildings of Type I, II, III, or IV construction that are taller than 40 feet (12 192 mm) above grade. Air-barrier materials that pass NFPA 285 testing may be unavailable from some manufacturers or for some wall assemblies; contact manufacturers for test results.

* + - * 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

Retain "UV Resistance" Subparagraph below if required, such as for rainscreen locations or delayed installation of covering materials. Aluminum-faced modified bituminous sheet has high UV resistance; consult manufacturers for recommendations and product availability.

* + - * 1. UV Resistance: Can be exposed to sunlight for [360] **<Insert number>** days according to manufacturer's written instructions.
  1. ACCESSORy materials
     1. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

Revise paragraphs below to suit Project; consult manufacturers for recommendations.

Both types of liquid primer in "Primer" Paragraph below may be used on concrete, masonry, gypsum and wood-based sheathing, metal, and painted substrates.

* + 1. Primer: Liquid **[waterborne] [solvent-borne]** primer recommended for substrate by air-barrier material manufacturer.

"VOC Content" Subparagraph below applies to LEED 2009 NC, CI, and CS Credit IEQ 4.2.

* + - 1. VOC Content: [250] **<Insert number>** g/L or less.

"Low-Emitting Materials" Subparagraph below applies to LEED 2009 for Schools.

* + - 1. Low-Emitting Materials: Interior coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

"VOC Content" and "Low-Emitting Materials" subparagraphs below apply to LEED v4.

* + - 1. VOC Content: [100] <Insert number> g/L or less.
      2. Low-Emitting Materials: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

"VOC Content" and "Low-Emitting Materials" subparagraphs below apply to IgCC.

* + - 1. VOC Content: [100] <Insert number> g/L or less.
      2. Low-Emitting Materials: VOC emissions of products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

"VOC Content" and "Low-Emitting Materials" subparagraphs below apply to ASHRAE 189.1.

* + - 1. VOC Content: [100] <Insert number> g/L or less.
      2. Low-Emitting Materials: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

"VOC Emissions" Subparagraph below applies to Green Globes.

* + - 1. VOC Emissions: Products shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.
    1. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, [0.0187 inch (0.5 mm)] [0.0250 inch (0.64 mm)] **<Insert dimension>** thick, and Series 300 stainless-steel fasteners.
    2. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

Retain "Products" Subparagraph and list of manufacturers and products below to require specific products or a comparable product from other manufacturers.

* + - 1. Products: Subject to compliance with requirements**, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:
         1. Dow Corning Corporation; 123 Silicone Seal.
         2. GE Construction Sealants; Momentive Performance Materials Inc.; US11000 UltraSpan.
         3. Pecora Corporation; Sil-Span.
         4. Tremco Incorporated; Spectrem Simple Seal.
         5. **<Insert manufacturer's name; insert product designation>**.

1. Execution
   1. examination
      1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
         1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
         2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
         3. Verify that substrates are visibly dry and free of moisture**. [Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.]**
         4. Verify that masonry joints are flush and completely filled with mortar.
      2. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. SURFACE PREPARATION
      1. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
      2. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
      3. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
      4. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
      5. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
      6. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
      7. 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.

Treatment at expansion joints, isolation joints, and other discontinuous joints varies. Not only primary architectural expansion joints but also building expansion joints may need continuous air barriers. Coordinate expansion-joint treatment with Section 07 95 13 – Expansion Joint Assemblies.

* + 1. Bridge **[isolation joints] [expansion joints] [and]** discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.
  1. INSTALLATION
     1. Install materials according to air-barrier manufacturer's written instructions and details and according to recommendations in ASTM D 6135 to form a seal with adjacent construction and ensure continuity of air and water barrier.

Retain first subparagraph below if installation at low temperatures may be required. Verify that retained manufacturers produce low-temperature products. An upper-limit temperature may be recommended by air-barrier manufacturers to reduce workmanship problems with more aggressive adhesion.

* + - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous air-barrier sheet produced for low-temperature application. Do not install low-temperature sheet if ambient or substrate temperature is higher than 60 deg F (16 deg C).
      2. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
    1. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.
    2. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.
    3. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
       1. Apply sheets in a shingled manner to shed water.
       2. Roll sheets firmly to enhance adhesion to substrate.
    4. Apply continuous air-barrier sheets over accessory strips bridging substrate cracks, construction, and contraction joints.

Retain "CMU" Paragraph below if masonry anchors are installed before air-barrier placement. Retain if installing air-barrier sheet after projecting interior wythe masonry ties or joint reinforcement has been installed.

* + 1. CMU: Install air-barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air-barrier sheet immediately below protruding masonry ties or joint reinforcement or ties, and firmly adhere in place.
       1. Overlap horizontally adjacent sheets a minimum of 2 inches (50 mm) and roll seams.
       2. Apply overlapping sheets with bottom edge slit to fit around masonry reinforcing or ties. Roll firmly into place.
       3. Seal around masonry reinforcing or ties and penetrations with termination mastic.
       4. Continue the sheet into all openings in the wall, such as doors and windows, and terminate at points to maintain an airtight barrier that is not visible from interior.
    2. Seal top of through-wall flashings to air-barrier sheet with an additional 6-inch- (150-mm-) wide, transition strip.
    3. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
    4. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
       1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
       2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
    5. Connect and seal exterior wall air-barrier sheet 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.
    6. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.
    7. 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.
    8. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply [transition strip] [preformed silicone extrusion] so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.

Retain "Transition Strip" or "Preformed Silicone Extrusion" Subparagraph below, depending on option retained in "Wall Openings" Paragraph above.

* + - 1. Transition Strip: Roll firmly to enhance adhesion.
      2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
    1. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air-barrier material with foam sealant.
    2. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches (150 mm) beyond repaired areas in all directions.
    3. Do not cover air barrier until it has been tested and inspected by testing agency.
    4. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.
  1. field quality control

Retain "ABAA Quality Assurance Program" Paragraph below if required; consult ABAA for requirements and costs. Verify availability of ABAA-licensed contractors before retaining.

* + 1. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

Coordinate test and inspection requirements in this article with Owner.

Retain "Testing Agency" Paragraph below to identify who shall perform tests and inspections. If retaining second option in paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article.

* + 1. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.

Retain option in "Inspections" Paragraph below with list of inspections if required for Contractor's information.

* + 1. Inspections: Air-barrier materials, accessories, 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.
       7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
       8. Termination mastic has been applied on cut edges.
       9. Air barrier has 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 (air barrier 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.
    2. Tests: As determined by testing agency from among the following tests:

Retain "Air-Leakage-Location Testing" Subparagraph below if testing to locate air-leakage sites is required and if air-leakage-volume testing is required.

* + - 1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to **[ASTM E 1186, chamber pressurization or depressurization with smoke tracers] [ASTM E 1186, chamber depressurization using detection liquids] <Insert requirement>**.

Retain "Air-Leakage-Volume Testing" Subparagraph below if testing to quantify air-leakage rate is required. Testing according to ASTM E 783 may be more practical for on-site testing. ASTM E 2357, specifically for air-barrier assemblies, can also be used; however, on-site testing according to this standard is more costly. See the Evaluations.

* + - 1. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to **[ASTM E 783] [or] [ASTM E 2357] <Insert test>**.
      2. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each [600 sq. ft. (56 sq. m)] **<Insert value>** of installed air barrier or part thereof.

See Section 01 40 00 – Quality Requirements for retesting and reinspecting requirements and Section 01 73 00 – Execution for requirements for correcting the Work.

* + 1. Air barriers will be considered defective if they do not pass tests and inspections.
       1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
       2. Remove and replace deficient air-barrier components for retesting as specified above.
    2. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
    3. Prepare test and inspection reports.
  1. CLEANING AND PROTECTION
     1. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
        1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove, and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
        2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
     2. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION