

Notes to Specifier:

This Specification is prepared in accordance to CSI three part format. This specification must be adapted to suit the requirements of individual projects. Brackets [] indicate selections must be made or additional information from Specifier is required. Revise this Section by deleting and inserting text to meet Project-specific requirements.

Products specified in this Section are elastomeric formulated vapor-permeable, waterborne, spray-applied air barriers - "TK-AirMax 2104 VP Vapor Permeable Waterborne Liquid Air Barrier".

*This product meets the following:
Federal EPA's VOC Requirements
Complies with California Air Resource Board (CARB),
South Coast Air Quality Management District (SCAQMD)
Ozone Transportation Commission (OTC)
Lake Michigan Air Directors Consortium (LADCO)*

For solvent-based non-vapor-permeable products refer to TK Products "TK-AirMax 2102 NP Non-Perm Air Barrier".

For solvent-based non-vapor-permeable products requiring adherence to Ozone Transportation Commission regulations refer to "TK-AirMax 2102 NP OTC Non-Perm Air Barrier".

For vapor-impermeable waterborne (WB) products refer to TK Products "TK-AirMax 2103 WB Non-Perm Rubberized Air Barrier".

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

TK-AirMax 2104 VP Vapor Permeable Waterborne Liquid Air Barrier (TK Products, Division of Sierra Corporation)

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Fluid-applied, vapor permeable, membrane air barrier
 - 2. Transitions, penetrations and terminations
 - 3. Installation methods
 - 4. Testing
- B. Related Requirements

Note to Specifier: Edit list below as applicable.

- 1. Section 01 21 00 - Allowances: For testing and inspecting allowances.
- 2. Section 01 45 23 - Testing and Inspecting Services: Coordination with Owner's independent testing and inspection agency.
- 3. Section 01 45 16 - Field Quality Control Procedures: For exterior wall mock-ups.
- 4. Section 01 77 00 - Closeout Procedures
- 5. Section 01 78 00 - Closeout Submittals

Note to Specifier: Retain one of the following Subparagraphs as appropriate for the Project if the Project is intended for LEED Certification. Revise subparagraph numbering as required.

- [#. **Section 01 81 13.13 - Sustainable Design Requirements - LEED for New Construction and Major Renovations]**
- [#. **Section 01 81 13.19 - Sustainable Design Requirements - LEED for Core and Shell Development]**
- [#. **Section 01 81 13.23 - Sustainable Design Requirements - LEED for Schools]**
- 6. Section 03 30 00 - Cast-In-Place Concrete; Requirements for properly prepared concrete to receive air barrier membrane.
- 7. Section 04 20 00 - Unit Masonry: For embedded flashing and properly prepared masonry to receive air barrier membrane.
- 8. Section 06 10 00 - Rough Carpentry: For wall sheathing, wall sheathing joint-and-penetration treatments, building paper, and building wraps.
- 9. Section 06 16 00 - Sheathing: For wall sheathing, wall sheathing joint-and-penetration treatments, building paper, and building wraps.
- 10. Section 07 21 00 - Building Insulation: For foam-plastic board insulation.
- 11. Section 07 25 00 - Weather Barriers: For building paper, and building wraps.
- 12. Section 07 26 13 - Above-Grade Vapor Retarders
- 13. Section 07 27 13 - Modified Bituminous Sheet Membrane Air Barriers
- 14. Section 07 27 16 - Sheet Metal Membrane Air Barriers
- 15. Section 07 27 19 - Plastic Sheet Air Barriers
- 16. Section 07 5X XX - XXXXXXXXX Roofing: For roof air barriers.
- 17. Section 07 62 00 - Sheet Metal Flashing and Trim: For sheet metal flashing.
- 18. Section 07 71 13 - Manufactured Gravel Stops, Fascias, and Copings: For sheet metal flashings.
- 19. Section 07 92 00 - Joint Sealants: For joint sealant material and installation requirements.
- 20. Section 09 21 16 - Gypsum Board Assemblies: For wall sheathing, wall sheathing joint-and-penetration treatments, building paper, and building wraps.
- 21. Section 09 29 00 - Gypsum Board: For wall sheathing, wall sheathing joint-and-penetration treatments, building paper, and building wraps.
- 22. Division 21 - Fire Suppression: For coordination of penetrations through air barrier.
- 23. Division 22 - Plumbing: For coordination of penetrations through air barrier.
- 24. Division 23 - Heating, Ventilating and Air Conditioning (HVAC): For coordination of penetrations through air barrier.
- 25. Division 26 - Electrical: For coordination of penetrations through air barrier.

1.02 REFERENCES

A. Definitions

- 1. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- 2. Vapor-Barrier Material: A primary element that provides a continuous barrier that resists diffusion of moisture through wall, ceiling and floor assemblies, having a rate of moisture vapor transmission less than 1.0 perm.
- 3. Air-Barrier Accessory: Transitional components of the air barrier that provides continuity.

4. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall, and resists diffusion of moisture.
5. Air Permeance: The rate of airflow through a unit area of a material driven by unit static pressure difference across the material.

B. Reference Standards

1. American Association of Textile Chemists and Colorists (AATCC)
 - a. AATCC Test Method 127-2008, Water Resistance: Hydrostatic Pressure Test
2. Air Barrier Association of America (ABAA)

Note to Specifier: Edit the following ASTM numbers to fit the Project requirements.

3. ASTM International (ASTM); the most current edition
 - a. ASTM C666-03(2008), Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
 - b. ASTM C1193-11, Standard Guide for Use of Joint Sealants
 - c. ASTM C1305-08, Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
 - d. ASTM C1306-08, Standard Test Method for Hydrostatic Pressure Resistance of a Liquid-Applied Waterproofing Membrane
 - e. ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers–Tension
 - f. ASTM D4258-05, Standard Practice for Surface Cleaning Concrete for Coating
 - g. ASTM D4263-83(2005), Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 - h. ASTM D4541-09e1, Modified Version of the Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; (coating system from concrete substrates)
 - i. ASTM E96-10, Standard Test Methods for Water Vapor Transmission of Materials, Wet Method
 - j. ASTM E162-11, Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
 - k. ASTM E1186-03(2009), Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 - l. ASTM E2178-03, Standard Test Method for Air Permeance of Building Materials
 - m. ASTM E2357-05, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 - n. ASTM F2170-09, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
4. California Air Resource Board (CARB)
5. International Code Council (ICC)

Note to Specifier: Edit the following Subparagraphs as required for Project code requirements.

- a. International Building Code (IBC), [*insert ST and year*] edition.
- b. International Residential Code (IRC), [*insert ST and year*] edition.

Note to Specifier: Retain the following Subparagraphs for projects which require LEED certification.

6. Leadership in Energy and Environmental Design (LEED)
 - a. IEQ Credit 4: Low-Emitting Materials
 - b. CREDIT 4.2. Paints and Coatings
7. Lake Michigan Air Directors Consortium (LADCO).
8. Ozone Transportation Commission (OTC)
9. South Coast Air Quality Management District (SCAQMD)
10. U.S. Environmental Protection Agency (EPA)
 - a. Volatile Organic Compound (VOC) Requirements

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination

Note to Specifier: Edit Subparagraph 1 below as applicable

1. Coordinate installation of air barrier with installation of **[foundation waterproofing,] [roofing membrane,] [doors,] [storefront,] [curtain wall,] [windows,] [control joints,] [building expansion joints,]** and other penetrations to provide a continuous air barrier.
2. Provide protection of rough openings prior to installation of doors, storefront, curtain wall, windows, and other wall penetrations.

Note to Specifier: Retain Paragraph below if Preconstruction Testing of mockups is required. Mockup testing is usually limited to buildings with complex, unusual, or previously untested exterior envelope construction. Coordinate mockup testing with mockup requirements in Article 1.05 QUALITY ASSURANCE, and with Owner's testing and inspection requirements.

B. Preconstruction Testing

1. Mockup Air Leakage Testing: Air barrier assemblies shall comply with performance requirements specified, as evidenced by reports based on mockup testing by a qualified testing agency.
 - a. Owner will engage a qualified testing agency in accordance with Section 01 45 23.

Note to Specifier: Retain Subparagraph below if qualitative testing is required, and quantitative testing is NOT required. Select test method to be utilized. Delete the quantitative testing Subparagraph.

- b. Qualitative Air Leakage Testing: Mockups will be tested for evidence of air leakage in accordance with **[ASTM E1186, smoke pencil with pressurization or depressurization] [ASTM E1186, chamber pressurization or depressurization with smoke tracers] [ASTM E1186, chamber depressurization using detection liquids]**.

Note to Specifier: Retain Subparagraph below if quantitative air leakage testing of mockup is required, and delete Subparagraph qualitative air leakage testing above.

Other quantitative tests such as ASTM E283; ASTM E783; ASTM E779; or CAN/CGSB 149.10, "Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method"; or CAN/CGSB 149.15, "Determination of the Overall Envelope Airtightness of Office Buildings by the Fan Depressurization Method Using the Building's Air Handling System." Insert these other testing requirements below if applicable, and add these tests to the REFERENCE Article; PERFORMANCE CRITERIA Article and FIELD QUALITY CONTROL Article adjust specification accordingly. Verify with manufacturer prior to specifying these tests.

- c. Quantitative Air Leakage Testing: Testing of the mockup for air leakage will be conducted not to exceed the test pressure differential, positive and negative, indicated in Article 2.02 PERFORMANCE CRITERIA for air barrier assembly air leakage when tested in accordance with ASTM E2357.

Note to Specifier: Retain Subparagraph below if required, and edit accordingly.

- d. Notify Architect **[7] [insert other number]** days in advance of the dates and times when mockup testing will take place.

1.04 SUBMITTALS

Note to Specifier: Coordinate terminology of "Action" and "Informational" submittal procedures specified here with Division 01. "Action Submittals" and "Informational Submittals" should be defined and described in Division 01. Otherwise, delete "Action" and "Informational" submittals and change Subparagraphs (1., 2., ...) to Paragraphs (A., B., ...)

- A. Action Submittals: Submit the following in accordance with Section **[01 33 00] [01 33 23]**:
 1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
 2. 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.
 - a. Include details of interfaces with other materials that form part of air barrier.
 - b. Include details of mockups.

Note to Specifier: Include all or portions of the following for projects which are LEED certified.

3. Sustainable Design Submittals

Note to Specifier: Retain "Product Data for Credit IEQ 4.2" Subparagraph below for applications to LEED-NC and LEED-CS certified buildings.

- a. Product Data for Credit IEQ 4.2: For air-barrier products, documentation including printed statement of VOC content.

Note to Specifier: Retain "Laboratory Test Reports for Credit IEQ 4" Subparagraph below applies to LEED for Schools.

- b. Laboratory Test Reports for Credit IEQ 4: For air barriers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- B. Informational Submittals: Submit the following in accordance with Section **[01 33 00] [01 33 23]**:

Note to Specifier: Coordinate first Subparagraph below with qualification requirements in Article 1.05 QUALITY ASSURANCE.

1. Installer's Qualification Data
 - a. Submit information substantiating installer's experience with air barrier systems specified in Article 1.05 QUALITY ASSURANCE.
 - b. Submit document stating manufacturer's acceptance of installer and approval to install specified materials for this Project.

Note to Specifier: Retain Subparagraph below if retaining qualification requirement for ABAA-licensed Installer stated in Article 1.05 QUALITY ASSURANCE.

- [c. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.]**
 2. Manufacturer's Certification: Written certification from manufacturer stating that surfaces to receive air barrier system, and Drawings and Specifications, are consistent with the manufacturer's recommendations.

Note to Specifier: Retain "Product Certificates" Subparagraph below to require submittal of product certificates from manufacturers.

3. 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 air barrier; signed by product manufacturer.
4. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.
5. Field Test Reports: Based on field testing specified and performed by Owner's testing agency for air barrier assembly submit comprehensive test reports in accordance with Section 01 45 23, and include the following:
 - a. Continuity of air barrier membrane.
 - b. Preparation of substrates.
 - c. Conditions of transitions, penetrations, terminations, joints, and tie-ins with adjoining construction.

Note to Specifier: If Project complexities require extended warranties by the manufacturer retain the following Subparagraph. Coordinate this Subparagraph with Closeout Submittals below, and with Article 1.08 WARRANTIES.

6. Warranty: Sample of manufacturer's warranties for this Project, indicating obligations, remedies, limitations, and exclusions of warranty for the air barrier system.
- C. Closeout Submittals: Submit the following in accordance Section [01 77 00] [01 78 00]:

Note to Specifier: If Project complexities require extended warranties by the manufacturer retain the following Subparagraph. Coordinate this Subparagraph with Informational Submittals above, and with Article 1.08 WARRANTIES.

1. Warranty Documentation: Manufacturer's fully executed warranty forms with authorized signatures and endorsements indicating obligations, remedies, limitations, and exclusions of warranty and date of Substantial Completion.
2. Record Documents
 - a. Product Data
 - b. Test Reports
 - c. Inspection Reports
 - d. Certificates
 - e. Shop Drawings
 - f. Sustainable Design Closeout Documentation

1.05 QUALITY ASSURANCE

Note to Specifier: Retain addition of ABAA-licensed contractor in Paragraph below if applicable. Caution: ABAA-licensed contractors may not be readily available in location of Project; verify availability before specifying. Coordinate ABAA requirement with Qualification Data in Article 1.04 SUBMITTALS above.

- A. Installer Qualifications: A firm trained and approved by manufacturer, experienced in installing air barrier materials similar in material, design, and extent to those specified for this Project, whose work has resulted in installations with a record of successful in-service performance [**and who is an ABAA-licensed contractor**].

Note to Specifier: Retain Paragraph and Subparagraphs below if Project Mockups are required. If retaining, indicate location, size, and other details of mockups on Drawings or by inserts. Revise wording if only one mockup is required. Retain below with or without Paragraph 1.03.B. Preconstruction Testing, and coordinate requirements.

- B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly [, **shown on Drawings,**] [150 sq. ft.] [*insert dimensions*,] incorporating backup wall construction, external cladding, door frame and sill, window, insulation, and flashing. 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. Include junction with roofing membrane [**, building corner condition,]** [**and]** [**foundation wall intersection**].
3. If [**Architect]** [**Owner's testing agency**] determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

Note to Specifier: Select appropriate Subparagraph 4. below.

- [4. **Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.**]
- [4. **Approved mockups shall be removed from the Project site at time of Substantial Completion.**]

Note to Specifier: Delete Paragraph and Subparagraphs below if Work of this Section is not extensive or complex enough to justify a preinstallation conference.

- C. Preinstallation Conference: Conduct conference at Project site.
 1. Include installers of other construction connecting to air barrier, such as roofing, waterproofing, architectural precast concrete, masonry, joint sealants, door frames, windows, glazed curtain walls, and other engineering disciplines whose work may penetrate the air barrier.
 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, substrate minimum curing period, special details, flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, forecasted weather conditions, 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 in accordance with manufacturer's written instructions.
- D. Protect stored materials from direct sunlight.

1.07 FIELD 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 damp or wet substrate or during snow, rain, fog, or mist.

Note to Specifier: If Project complexities require an extended warranty by the manufacturer retain the following Article. Verify warranty obligations, remedies, limitations, and exclusions of warranty with manufacturer. Coordinate this Article with Informational and Closeout Submittals in Article 1.04 SUBMITTALS.

1.08 WARRANTIES

- A. Manufacturer's Warranty: Provide manufacturer's standard product warranty, for a minimum 5 years against defects in materials from date of Substantial Completion.
 1. Provide warranty in writing on manufacturer's preprinted letterhead, and signed by an executive of the waterproofing manufacturer.
 2. Manufacturer agrees to replace air barrier membrane materials, that fail within specified warranty period when installed and used in strict conformance with manufacturer's written instructions.
 3. Failures include, but are not limited to, the following:

- a. Failure to maintain specified air permeance rating.
 - b. Failure to maintain specified vapor permeance rating.
- B. Warranties do not include failure of membrane due to formation of new joints and cracks in substrate that exceed 1/16" in width.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. TK Products Division of Sierra Corporation
11400 West 47th Street
Minnetonka, MN 55343
Phone: 925-938-7223
Fax: 925-938-8084
Email: tksales@tkproduct.com
Website: <http://www.tkproduct.com>

2.02 PERFORMANCE CRITERIA

Note to Specifier: Retain the option if air barrier will serve as a primary or secondary drainage plane.

- A. General: Air barrier 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, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

Air-permeance value in "Membrane Air Permeance" Paragraph below is based on ABAA and energy-conservation requirements of the Massachusetts State Building Code, 780 CMR, Ch. 13, and ASHRAE Standard 90.1.

- B. Membrane Air Permeance: Air permeance not to exceed 0.004 cubic feet per minute per square foot (cfm/sq. ft.) under a pressure differential of 0.3 in. water (1.57 psf) (0.02 L/m² @ 75 Pa.) when tested according to ASTM E2178.

Vapor permeance value in "Membrane Vapor Permeance" Paragraph below is based on ABAA and energy-conservation requirements of the Massachusetts State Building Code, 780 CMR, Ch. 13, and ASHRAE Standard 90.1.

- C. Membrane Vapor Permeance: Not less than **[10 perms (580 ng/Pa x s x sq. m) [4 perms (243 ng/Pa x s x sq. m)]** when tested in accordance with ASTM E96.

Note to Specifier: Retain Paragraph below if quantitative testing in Paragraph 1.03.B. Preconstruction Testing, or Article 3.04 FIELD QUALITY CONTROL is retained. Air leakage value below is for whole opaque wall assemblies, excluding windows, doors, and other openings. Although this Specification Section is limited to one component of the assembly (the membrane air barrier), the performance of the air barrier assembly, made up of several components, is verifiable.

- D. Air Barrier Assembly Air Leakage: Not to exceed 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) when tested in accordance with ASTM E2357.

Note to Specifier: Retain the following Paragraph and edit accordingly if for Projects which are to be LEED Certified.

- E. Sustainable Requirements

Note to Specifier: Retain Subparagraph below if required for LEED-NC and LEED-CS Credit IEQ 4.2, which limits VOC content to 250 g/L for materials used inside the air barrier system. Retain below also as default requirement of authorities having jurisdiction.

1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

Note to Specifier: Retain subparagraph below for materials used inside the air barrier system if required for LEED for Schools Credit IEQ 4.

2. **Low-Emitting Materials:** Air barriers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.03 FLUID-APPLIED MEMBRANE AIR BARRIER

Note to Specifier: Vapor-permeable membranes function as air barriers and are usually located on the cold side of primary wall insulation. Because the cold-side location within a wall cross section may be different in cold northern climates than in warm southern climates with air-conditioned interiors, dew point calculations or more sophisticated vapor-flow analyses may be needed to determine location of vapor-permeable air barrier. A separate vapor retarder may also be required at a different location within the wall.

- A. Membrane Air Barrier: Single component, fluid-applied, self-curing elastomeric vapor-permeable membrane, free of solvents, isocyanates and bitumen; chemical, algae, bacteria, alkalis, acid and U.V. resistant; suitable for spray application to wet film thickness of 40 to 45 mils and a dry film thickness of 25 to 28 mils.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. "TK-AirMax 2104 VP Vapor Permeable Waterborne Liquid Air Barrier", (TK Products)
 2. Product Physical and Performance Properties
 - a. Membrane Air Permeance: Not exceeding 0.0004 cfm/sq. ft. of surface area at under a pressure differential of 0.3" of water (1.57 lbf/sq. ft.) (0.02 L/s x sq. m of surface area at 75-Pa), when tested in accordance with ASTM E2178.
 - b. Membrane Vapor Permeance: Not exceeding 17.26 perm (1001 ng/Pa x s x sq. m), when tested in accordance of ASTM E96, Wet Method.
 - c. Air Barrier Assembly Air Permeance: Not exceeding 0.0012 cfm/sq. ft. under a pressure differential of 0.3" of water (1.57 lb./sq. ft.) (0.006 L/sq. m of surface area at 75-Pa), when tested in accordance with ASTM E2357.
 - d. Pull Adhesion : 140.7 lb/sq. in. (0.9701 N/sq. mm) when tested in accordance with ASTM D4541 - Modified version from concrete substrate.
 - e. Elongation and Tensile Strength: Minimum 1009 percent at 73 degree F., when tested in accordance with ASTM D412.
 - f. Cold Temperature Test: No cracking or loss of adhesion upon completion of 10 cycles of movement at -15°F., when tested in accordance with ASTM C1305.
 - g. Hydrostatic Pressure

Note to Specifier: Retain one or both of the following subparagraphs

- 1) Passed long-term test, when tested in accordance with ASTM C1306.
- 1) Passed long-term test, when tested in accordance with AATCC Test Method 127
- h. Freeze/Thaw Resistance Test: Passed long-term test, when tested in accordance with ASTM C666.
- i. VOC Content: Less than 50 g/L.
- j. Solids Content: 53 to 55 percent by weight.

Note to Specifier: Retain the following paragraphs if applicable to the Project.

3. Complies with California Air Resource Board (CARB)
4. Complies with Lake Michigan Air Directors Consortium (LADCO)

5. Complies with Ozone Transportation Commission (OTC)
6. Complies with South Coast Air Quality Management District (SCAQMD)
7. Complies with U.S. Environmental Protection Agency (EPA) Volatile Organic Compound (VOC) Requirements

2.02 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. Substrate Patching Membrane: Single-component polyurethane sealant, ASTM C920, Type S, Grade NS, Class 25.
 1. Products: Subject to compliance with specified requirements, provide one of the following:
 - a. "Manus-Bond 75AM", (Manus Products, Inc.)
 - b. "TK-AirMax Caulk 2203", (TK Products)

Note to Specifier: Retain Paragraph below for materials to seal air barrier terminations with windows, doors, curtain walls, storefront systems, penetrations, counterflashing, and to terminate air barrier to compatible roofing membranes; verify compatibility with roofing membranes and revise strip material if necessary.

- C. Transition Strip (Detail Membrane): Acrylic pressure sensitive adhesive tape with release liner; self-adhering, self-sealing, waterproof, low vapor permeance, low and high temperature resistant, tear and puncture resistant transition tape.
 1. Application for sealing air barrier terminations with windows, doors, curtain walls, storefront systems, penetrations, counterflashing, and to terminate air barrier to compatible roofing membranes.
 2. Products: Subject to compliance with requirements, provide the following:
 - a. "TK-AirMax All Weather Flashing Tape 2200", (TK Products)
 - b. "3M All Weather Flashing Tape 8067", (3M Company)
 - c. "VentureStop VB 400", (Venture Tape, a 3M Company)

Note to Specifier: Retain the following Subparagraphs for use at sub-zero applications, otherwise delete from specification.

- a. "TK-AirMax 2201 Sheathing Tape", (TK Products)
- b. "1585 CW-2 Red Sheathing Facing Tape", (Venture Tape, a 3M Company)

- D. Joint Reinforcing Strip: Air barrier manufacturer's transition/detailing tape.

Note to Specifier: Retain Termination Mastic for applications at changes in substrate plane, at end of each working day, sealing top edge of strips and transition strips to substrate, around masonry reinforcing or ties and penetrations, at exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

- E. Termination Mastic: Single-component polyurethane sealant, ASTM C920, Type S, Grade NS, Class 25.
 1. Products: Subject to compliance with specified requirements, provide one of the following:
 - a. "Manus-Bond 75AM", (Manus Products, Inc.)
 - b. "TK-AirMax Caulk 2203", (TK Products)

Note to Specifier: Foam sealant in Paragraph below is used to fill gaps at penetrations and openings.

- F. Sprayed Polyurethane Foam Sealant: 1 or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less in accordance with ASTM E162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Notify the **[Contractor] [Construction Manager]** of conditions detrimental to performance of the Work and recommended corrections. Where the installation and its completion may be delayed due to existing conditions, follow notification immediately with a written report. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Manufacturer's Authorized Representative and **[Installer] [Installing Contractor]**: Examine surfaces prepared to receive air barrier. Examine Drawings and Specifications affecting work of this Section. Do not proceed with installation until receipt of certification from the manufacturer's authorized representative that surfaces to receive the system, and Drawings and Specifications, are consistent with the manufacturer's recommendations.
- C. Concrete Surfaces
 - 1. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.

Note to Specifier: Select one of the phrases below for testing of concrete moisture level.

- 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by **[plastic sheet method in accordance with ASTM D4263.] [performing relative humidity test using in situ probes in accordance with ASTM F2170.]** Proceed with installation only after substrates have been tested and moisture content or relative humidity levels are acceptable to membrane manufacturer.
- D. Masonry Surfaces
 - 1. Verify that masonry joints are completely filled with mortar and tooled concave. **FLUSH CUT JOINTS ARE NOT ACCEPTABLE.**

Note to Specifier: Select one of the phrases below for testing of masonry moisture level.

- 2. Verify that masonry is visibly dry and free of moisture. Test for capillary moisture by **[plastic sheet method in accordance with ASTM D4263.] [performing relative humidity test using in situ probes in accordance with ASTM F2170.]** Proceed with installation only after substrates have been tested and moisture content or relative humidity levels are acceptable to membrane manufacturer.

3.02 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

- F. 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.
- G. 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.

3.03 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.
- B. Gypsum Sheathing: Fill joints greater than 1/4" with specified substrate patching membrane or manufacturer recommended sealant in accordance with ASTM C1193 and in accordance with air barrier manufacturer's written instructions, or tape joints with single layer of transition strip (detail membrane). Apply layer of fluid air barrier membrane at joints.

3.04 TRANSITION STRIP INSTALLATION

Note to Specifier: Revise this Article to coordinate with Drawing details. Sheet or liquid seal materials should be placed over a firm backing to provide structural support for achieving an effective and permanent air barrier.

- A. Install 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.

Note to Specifier: Select appropriate type of strip below.

- 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3" of coverage is achieved over both substrates.
- B. Foam Sealant: Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

Note to Specifier: Select appropriate product for sealing air barrier terminations below

- C. Wall Openings: Apply transition strip so that a minimum of 3" of coverage is achieved over both substrates. Maintain 3" of full contact over firm bearing to perimeter frames with not less than 1" of full contact. Roll firmly to enhance adhesion, with steel flooring seam roller.

Note to Specifier: Coordinate Paragraph below with Drawings; add bracketed information if shown.

- D. Connect and seal exterior wall air barrier membrane continuously to separate vapor barrier applied to **[interior] [exterior]** wall surface, 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 **[as indicated]**.

Note to Specifier: Retain first option in first paragraph below if flashings are nonmetallic; retain second option for metal through-wall flashings.

- E. Terminate top of wall flashing with flashing manufacturer's termination bar and flashing sealant at top of termination bar. Seal all screw heads.
- F. Seal exposed edges of transition strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- G. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6" beyond repaired areas in strip direction.
- H. At end of each working day, seal top edge of transition strips to substrate with termination mastic.

- I. Joint Sealant: 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.

3.05 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to form a seal with strips and transition strips and 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.

Note to Specifier: Verify minimum thickness recommended by manufacturer; recommended thickness may vary with substrate.

1. Vapor-Permeable Membrane Air Barrier: 40 to 45 mils wet film thickness, and 25 to 28 mils dry film thickness.
- D. Apply strip and transition strip over cured air membrane overlapping 3" onto each surface according to air barrier manufacturer's written instructions.
- E. Do not conceal air barrier until it has been tested and inspected by Owner's testing agency.
- F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.06 FIELD QUALITY CONTROL

Note to Specifier: Coordinate test and inspection requirements in this Article, with Section 01 45 23, with input from Owner's testing agency.

- A. Testing and Inspection Services shall be performed by qualified parties as specified herein, and in accordance with the provisions of Section 01 45 23.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections **[will]** **[may]** include the following:

Note to Specifier: Retain list of inspections below if required for Contractor's information.

1. Continuity
 - a. Air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - b. Continuous structural support of air barrier system has been provided.
2. Preparation
 - a. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 - b. Masonry and concrete surfaces are cured.
 - c. Compatible materials have been used.
3. Site conditions
 - a. Application temperature and preparation of substrates have been maintained.
 - b. Maximum exposure time of materials to UV deterioration has not been exceeded.

4. Transitions, Penetrations, Terminations
 - a. Laps in strips and transition membranes have complied with minimum requirements and have been shingled in the correct direction (or liquid membrane has been applied on exposed edges), with no fishmouths.
 - b. Membrane support at changes in direction and gaps have been provided.
 - c. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - d. All penetrations have been sealed.
- D. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:

Note to Specifier: Retain Subparagraph below if qualitative testing is required, and quantitative testing is NOT required. Select test method to be utilized. Delete the quantitative testing Subparagraph.

1. Qualitative Air Leakage Testing: Air barrier assemblies will be tested for evidence of air leakage according to **[ASTM E1186, smoke pencil with pressurization or depressurization]** **[ASTM E1186, chamber pressurization or depressurization with smoke tracers]** **[ASTM E1186, chamber depressurization using detection liquids]**.

Note to Specifier: Retain Subparagraph below if quantitative air leakage testing is required, and delete Subparagraph qualitative air leakage testing above. Select test method to be utilized.

Other quantitative tests such as ASTM E283; ASTM E783; ASTM E779; or CAN/CGSB 149.10, "Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method"; or CAN/CGSB 149.15, "Determination of the Overall Envelope Airtightness of Office Buildings by the Fan Depressurization Method Using the Building's Air Handling System." Insert these other testing requirements below if applicable, and add these tests to the REFERENCE Article; ADMINISTRATIVE REQUIREMENTS Article; PERFORMANCE CRITERIA Article and adjust specification accordingly. Verify with manufacturer prior to specifying these tests.

2. Quantitative Air Leakage Testing: Testing for air leakage not to exceed the test pressure differential, positive and negative, indicated in Article 2.02 PERFORMANCE CRITERIA for air barrier assembly air leakage when tested in accordance with ASTM E2357.
- E. Remove and replace deficient air barrier components and retest as specified above.

3.07 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/vapor barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Air barrier exposed for more than 12 months shall be cleaned, prepared and receive additional layer of air barrier.
- C. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.
 1. 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