



SECTION 072703

CLOSED CELL, MEDIUM DENSITY SPRAY POLYURETHANE FOAM AIR BARRIER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes the following:

1. Closed cell, medium density spray polyurethane foam air barrier located in the non-accessible part of the wall.
2. Materials to bridge and seal the following air leakage pathways and gaps:
 - a. Connections of the walls to the roof air barrier.
 - b. Connections of the walls to the foundation air barrier.
 - c. Seismic and expansion joints.
 - d. Openings and penetrations of window frames, storefront, curtain wall.
 - e. Barrier precast concrete and other envelope systems.
 - f. Door frames.
 - g. Piping, conduit, duct and similar penetrations.
 - h. Masonry ties, screws, bolts and similar penetrations.
 - i. All other air leakage pathways in the building envelope.

SPEC NOTE: COORDINATE RELATED WORK REQUIREMENTS WITH CONTENTS OF REFERENCED SPECIFICATION SECTIONS.

B. Related Work in other Sections includes the following:

1. Section 061100 – Wood Framing: Load-bearing, wood exterior wall framing assemblies to support the spray polyurethane foam air barrier.
2. Section 014000 - Quality Requirements; coordination with Owner's independent testing and inspection agency.
3. Section 014339 - Mock-Ups; exterior wall mock-ups.
4. Section 015000 - Temporary Facilities and Controls; requirement to schedule work to prevent sunlight and weather exposure of materials beyond limits

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- established by manufacturer; requirement to protect materials from damage after installation and prior to installation of enclosing work.
5. Section 033000 – Cast-In-Place Concrete; requirement that backup concrete be smooth without protrusions.
 6. Section 042000 – Unit Masonry; requirement that backup masonry joints are flush and completely filled with mortar, and that excess mortar on brick ties will be removed; requirement for gap at deflection joints and fillers; coordination with sequencing of through-wall flashing.
 7. Section 054000 – Cold-Formed Metal Framing: Load-bearing, metal exterior wall framing assemblies to support the closed cell, medium density sprayed polyurethane foam.
 8. Section 061600 – Sheathing; requirement that backup sheathing has been installed.
 9. Section 075000 - Membrane Roofing; requirement for coordination with sequencing of membrane roofing; requirement to seal roof membrane to wall air barrier.

1.2 PERFORMANCE REQUIREMENTS

- A. Material Performance: Provide air barrier materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.004 cfm/ft² @ 1.57 psf), [0.02 liters per square meter per second under a pressure differential of 75 Pa (0.02 L/(s·m²) @ 75 Pa)] when tested in accordance with ASTM E2178 (unmodified).
- B. The water vapor permeance [Desiccant method, (Procedure A) and Water method (Procedure B)] shall be determined in accordance with ASTM E96 and shall be declared by the material manufacturer.

SPEC NOTE: THE WATER VAPOR PERMEANCE IS DECLARED BY THE MANUFACTURER AND INCLUDED IN THIS DOCUMENT SO THAT THE DESIGN PROFESSIONAL HAS THIS INFORMATION READILY AVAILABLE.

- C. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.04 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.04 cfm/ft² @ 1.57 psf) [0.2 liters per square meter per second under a pressure differential of 75 Pa (0.2 L/(s·m²) @ 75 Pa)] when tested in accordance with ASTM E2357. The assembly shall accommodate movements of building materials by providing expansion and control joints as required. Expansion / control joints, changes in substrate and perimeter conditions shall have appropriate accessory materials at such locations.

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1. The air barrier assembly shall be capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement, and shall transfer the load to the structure.
 2. Closed cell, medium density spray polyurethane foam air barriers shall not displace adjacent materials in the assembly under full load.
 3. The air barrier assembly shall be joined in an airtight and flexible manner to the air barrier materials of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations, creep, and anticipated seismic movement.
- D. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:
1. Foundation and walls, including penetrations, ties and anchors.
 2. Walls, windows, curtain walls, storefronts, louvers and doors.
 3. Different assemblies and fixed openings within those assemblies.
 4. Wall and roof connections.
 5. Floors 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.
 8. Seismic and expansion joints.
 9. All other potential air leakage pathways in the building envelope.

1.3 SUBMITTALS

- A. Submittals: Submit in accordance with Division 1 requirements.
- B. Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program (QAP). Submit accreditation number of the Contractor and certification number(s) of the ABAA Certified Installer(s).
- C. Product Data: Submit material Manufacturer's Product Data, material manufacturer's instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, Technical Data, and tested physical and performance properties.
1. Submit letter from primary air barrier material manufacturer indicating approval of materials that are proposed to be used that are not currently listed in the accessories section of this specification for that manufacturer's material.
 2. Include statement from the primary air barrier material manufacturer that the materials used in their air barrier assembly which will be used to adhere to the underlying substrate are chemically compatible to the substrate material.
 3. Samples: Submit clearly labeled samples, three (3) inch by four (4) inch [75 mm by 100 mm] minimum size of each material specified.

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- D. Shop Drawings of Mock-Up: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and air barrier transitions and terminations.
- E. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.
- F. Shop Drawings: Submit Shop Drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.
 - 1. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
 - 2. Include statement that materials are compatible with adjacent materials proposed for use.
 - 3. Include required values for field adhesion test on each substrate in accordance with ASTM D4541 (modified), using a type II pull tester.
- G. Compatibility: Submit letter from primary material manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from material manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
- H. Air Barrier Subcontractor Qualifications: Air barrier Subcontractor(s) shall be accredited at the time of bidding and during the complete installation period by the Air Barrier Association of America (ABAA) whose Installer(s) are certified in accordance with the site Quality Assurance Program used by ABAA.
 - 1. Closed cell, medium density sprayed polyurethane foam air barrier Installer(s) shall be certified by BPQI (Building Performance Quality Institute) for the ABAA Quality Assurance Program in accordance with the requirements outlined in the QAP program used by ABAA. Installers shall have their photo-identification air barrier certification cards in their possession and available on the project site, for inspection upon request.
- I. Manufacturer: Obtain primary ABAA Evaluated Materials from a single ABAA Evaluated Manufacturer regularly engaged in manufacturing specified closed cell, medium density spray polyurethane foam. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

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- J. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).
- K. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.
- L. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
- M. Field Quality Assurance: Implement the site Quality Assurance Program requirements used by ABAA. Cooperate with ABAA Auditors and any independent testing and inspection agencies engaged by the Owner. Do not cover the air barrier assembly until it has been inspected, tested and accepted.
- N. Mock-Ups: Build mock-up representative of primary air barrier assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Architect. Mock-up shall be dimensioned no less than eight (8) feet long by eight (8) feet high [2.50 meters long by 2.50 meters high] and include the air barrier materials and air barrier accessories proposed for use in the exterior wall assembly. Mock-ups shall be suitable for testing as specified in the following paragraph.

SPEC NOTE: COORDINATE TESTING WITH PROJECT REQUIREMENTS. DELETE PARAGRAPH BELOW IF NOT REQUIRED, OR IF OWNER'S INDEPENDENT TESTING AGENT WILL PERFORM TESTING.

- O. Mock-Up Tests for Air and Water Infiltration: The third party testing agency shall test the mock-up for air and water infiltration in accordance with ASTM E1186 (air leakage location), ASTM E783 (air leakage quantification) at a pressure differential of 1.57 lb/ft² (75 Pa) and ASTM E1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, the air barrier Contractor shall reconstruct mock-up at their cost for retesting until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
 - 1. Perform the air leakage test and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements.

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- P. **Mock-Up Tests for Spray Polyurethane Foam Adhesion:** The third party testing agency shall test the mock-up for spray polyurethane foam adhesion in accordance with ASTM D4541 (modified) using a type II pull tester except that the spray polyurethane foam shall be cut through to separate the material attached to the disc from the surrounding material. Perform test after curing period recommended by the material manufacturer. Record mode of failure and area where the material failed in accordance with ASTM D4541. When the air barrier material manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met. Where the material manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.
- Q. **Air Barrier Assembly Testing:** Verify air barrier assembly testing by the material Manufacturer by visiting the ABAA website to ensure a ASTM E2357 test has been completed and to obtain results. Visit the ABAA website for the reported air barrier assembly leakage rate and illustrations or CAD details which includes the methods in which the assembly test mock-ups shall be assembled.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with the material manufacturer's name, product, date of manufacture, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by material manufacturer. Protect stored materials from direct sunlight and other sources of ultra-violet light.
- C. Handle materials in accordance with material manufacturer's recommendations.

1.5 PROJECT CONDITIONS

- A. **Temperature:** Install closed cell, medium density spray polyurethane foam within range of ambient and substrate temperature, and moisture content recommended by the primary material manufacturer. Do not apply air barrier to a damp or wet substrate.
- B. **Field Conditions:** Do not install air barrier materials in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the material manufacturer.
- C. **Sequencing.** Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building.

- D. Compatibility. Do not allow air barrier materials to come in contact with chemically incompatible materials.
- E. Ultra-violet exposure. Do not expose air barrier materials to sunlight longer than as recommended by the material manufacturer.

1.6 WARRANTY

SPEC NOTE: VERIFY WARRANTY LENGTH WITH MANUFACTURERS SPECIFIED.

- A. Material Warranty: Provide primary material manufacturer's standard product warranty, for a minimum three (3) years from date of Substantial Completion.
- B. Subcontractor (approved by ABAA and Manufacturer) Installation Warranty: Provide a two (2) year installation warranty from date of Substantial Completion, including all accessories and materials of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of attachment, loss of cohesion/adhesion and failure to cure properly.

PART 2 - MATERIALS

2.1 AIR BARRIER MATERIALS

- A. Medium Density Closed Cell Spray Polyurethane Foam Air Barrier: Subject to compliance with requirements, provide one of the following:

- 1. Material: Permax 2.0 by Henry www.henry.com:

- a. AIR BARRIER MATERIAL PROPERTIES:

- i. Air permeance for this material has been tested and reported as being 0.000098 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000098 cfm/ft² @ 1.57 psf), [0.0005 liters per square meter per second under a pressure differential of 75 Pa (0.0005 L/(s·m²) @ 75 Pa)] at 1.0" [25mm] when tested in accordance with ASTM E2178 (unmodified).

- ii. The water vapor permeance for this material has been tested and reported as being 27 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (27 ng/(Pa·s·m²) [0.472 US perms] at 2.0 inches (53 mm)

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when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 84 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential ($84 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ [1.46 US perms] at 2.5 inches (64 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. HENRY Blueskin SA – Self Adhesive Air/Vapor Barrier Membrane
2. HENRY Blueskin SA LT – Low Temp SA Air/Vapor Barrier Membrane
3. HENRY 925 BES Sealant
4. HENRY LVC Adhesive
5. HENRY Blueskin Spray Prep
6. HENRY Blueskin Adhesive
7. HENRY Aquatac Primer

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. HENRY Blueskin TWF – SA Thru-Wall Flashing Membrane
2. HENRY 925 BES Sealant
3. HENRY Blueskin Spray Prep
4. HENRY Blueskin Adhesive
5. HENRY Aquatac Primer

2. Material: EcoBay CC and EcoBay CC Polar by Bayer MaterialScience LLC
www.bayermaterialscience.com:

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a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.000023 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000023 cfm/ft² @ 1.57 psf), [0.00011 liters per square meter per second under a pressure differential of 75 Pa (0.00011 L/(s·m²) @ 75 Pa)] at 1.0" [25mm] when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 34.5 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (34.5 ng/(Pa·s·m²) [0.603 US perms] at 1.3 inches (33 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 56 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (56 ng/(Pa·s·m²) [0.979 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. HENRY Blueskin SA – Self Adhesive Air/Vapor Barrier Membrane
2. HENRY Blueskin SA LT – Low Temp SA Air/Vapor Barrier Membrane
3. Perm-A-Barrier Flashing by Grace Construction Products.
4. CCW-705 TWF by Carlisle Coatings and Waterproofing
5. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
6. ExoAir 110 by Tremco, Inc.
7. Air Shield by W R Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

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iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. HENRY Blueskin SA – Self Adhesive Air/Vapor Barrier Membrane
2. HENRY Blueskin SA LT – Low Temp SA Air/Vapor Barrier Membrane
3. Perm-A-Barrier Flashing by Grace Construction Products.
4. CCW-705 TWF by Carlisle Coatings and Waterproofing
5. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
6. ExoAir 110 by Tremco, Inc.
7. Detail Strip by W. R. Meadows, Inc.

3. Material: ThermalStop or InsulStar by NCFI Polyurethanes www.ncfi.com:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.00005 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00005 cfm/ft² @ 1.57 psf), [0.00032 liters per square meter per second under a pressure differential of 75 Pa (0.00032 L/(s·m²) @ 75 Pa)] at 1.0" (25 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 56.0 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (56.0 ng/(Pa·s·m²) [0.97 US perms] at 0.8 inches (20 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 134 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (134 ng/(Pa·s·m²) [2.35 US perms] at 0.8 inches (20 mm) when tested in accordance with ASTM E96 (water method - unmodified).

a. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

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1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

4. Material: Corbond III by Johns Manville www.jm.com:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.00072 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00072 cfm/ft² @ 1.57 psf), [0.00032 liters per square meter per second under a pressure differential of 75 Pa (0.00032 L/(s·m²) @ 75 Pa)] at 1.5" (39 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 49.0 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (49.0 ng/(Pa·s·m²) [0.80 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 90.0 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure

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differential (90.0 ng/(Pa·s·m²) [1.58 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

5. Material: CERTASPRAY CC by CertainTeed Corporation www.certainteed.com:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.000152 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000152 cfm/ft² @ 1.57 psf), [0.00076 liters per square meter per second under a pressure differential of 75 Pa (0.00076 L/(s·m²) @ 75 Pa)] at 1.06" (27 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 56.0 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential ($56.0 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ [0.98 US perms] at 1.42 inches (36 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 102 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential ($102 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ [1.79 US perms] at 1.85 inches (47 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

6. Material: MD-C-200 by Icynene Inc. www.icynene.com

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.00016 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00016 cfm/ft² @ 1.57 psf), [0.0008 liters per square meter per second under a pressure differential of 75 Pa (0.0008 L/(s·m²) @ 75 Pa)] at 2.05" (52 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 50.6 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (50.6 ng/(Pa·s·m²) [0.884 US perms] at 1.5 inches (39 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 2748 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (2748 ng/(Pa·s·m²) [48.09 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.

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2. Perm-A-Barrier Flashing by Grace Construction Products.
 3. Blueskin TWF by Henry.
 4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
 5. ExoAir TWF by Tremco, Inc.
 6. Detail Strip by W. R. Meadows, Inc.
7. Material: HEATLOK Soy 200 by Demilec (USA) LLC www.demilecusa.com:
- a. AIR BARRIER MATERIAL PROPERTIES:
 - i. Air permeance for this material has been tested and reported as being 0.0002 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0002 cfm/ft² @ 1.57 psf), [0.001 liters per square meter per second under a pressure differential of 75 Pa (0.001 L/(s·m²) @ 75 Pa)] at 1.5" (39 mm) when tested in accordance with ASTM E2178 (unmodified).
 - ii. The water vapor permeance for this material has been tested and reported as being 45.1 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (45.1 ng/(Pa·s·m²) [0.789 US perms] at 1.5" (39 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).
 - iii. Water vapor permeance for this material has been tested and reported as being 91.9 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (91.9 ng/(Pa·s·m²) [1.61 US perms] at 1.5" (39 mm) when tested in accordance with ASTM E96 (water method - unmodified).
 - b. AIR BARRIER ACCESSORY MATERIALS:
 - i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:
 1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
 2. Perm-A-Barrier Flashing by Grace Construction Products.
 3. Blueskin SA by Henry.
 4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
 5. ExoAir 110 by Tremco, Inc.
 6. Air Shield by W. R. Meadows, Inc.
 - ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier

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manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

8. Material: FOAM-LOK AB2000 by Lapolla Industries Inc.
<http://www.lapolla.com>:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.0002 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0002 cfm/ft² @ 1.57 psf), [0.001 liters per square meter per second under a pressure differential of 75 Pa (0.000244 L/(s·m²) @ 75 Pa)] at 2.0" (50 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 53.0 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (53.0 ng/(Pa·s·m²) [0.927 US perms] at 2.0" (50 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 120 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (120 ng/(Pa·s·m²) [2.0 US perms] at 1.0" (25 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

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1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

9. Material: WALLTITE US by BASF www.basf.com:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.000064 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000064 cfm/ft² @ 1.57 psf), [0.00032 liters per square meter per second under a pressure differential of 75 Pa (0.00032 L/(s·m²) @ 75 Pa)] at 1.3" (32 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 79.6 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (79.6 ng/(Pa·s·m²) [1.39 US perms] at 1.0 inches (25 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 241 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure

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differential (241 ng/(Pa·s·m²) [4.22 US perms] at 1.0 inches (25 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin SA by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir 110 by Tremco, Inc.
6. Air Shield by W. R. Meadows, Inc.

ii. Transition Membrane between Air Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier manufacturer's recommendations and material manufacturer's recommendations.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

10. Material: Gaco WallFoam 183M by Gaco Western www.gaco.com:

a. AIR BARRIER MATERIAL PROPERTIES:

i. Air permeance for this material has been tested and reported as being 0.0003 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0003 cfm/ft² @ 1.57 psf), [0.0013 liters per square meter per second under a pressure differential of 75 Pa (0.0013 L/(s·m²) @ 75 Pa)] at 1.42" (36 mm) when tested in accordance with ASTM E2178 (unmodified).

ii. The water vapor permeance for this material has been tested and reported as being 35.9 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential ($35.9 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$) [0.628 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (desiccant method - unmodified).

iii. Water vapor permeance for this material has been tested and reported as being 63 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential ($63 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$) [1.1 US perms] at 2.0 inches (50 mm) when tested in accordance with ASTM E96 (water method - unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

i. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the Spray Polyurethane Foam Air Barrier Manufacturer:

- a. Air Shield by W. R. Meadows, Inc.
- b. Blueskin SA by Henry.
- c. CCW-705 TWF by Carlisle Coatings and Waterproofing.
- d. ExoAir 110 by Tremco, Inc.
- e. Perm-A-Barrier Flashing by Grace Construction Products.
- f. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.

ii. Transition Membrane between Air Barrier Material, Roofing and Other Adjacent Materials: Comply with both air barrier material manufacturer's instructions and other material manufacturer's instructions.

iii. Counter-flashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the Spray Polyurethane Foam Air Barrier Material Manufacturer:

- a. Blueskin TWF by Henry.
- b. CCW-705 TWF by Carlisle Coatings and Waterproofing.
- c. Detail Strip by W. R. Meadows, Inc.
- d. ExoAir TWF by Tremco, Inc.
- e. Perm-A-Barrier Flashing by Grace Construction Products.
- f. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.

iv. Primers, Mastics and Sealants for Transition Membranes and Counter-flashing for Through-Wall Flashing: A material deemed acceptable to the manufacturer of that material.

- v. Substrate Joint Treatment Materials: Prepare the substrate joints with the following materials:
 - a. Air Shield by W. R. Meadows, Inc.
 - b. Blueskin SA by Henry.
 - c. CCW-705 TWF by Carlisle Coatings and Waterproofing.
 - d. ExoAir 110 by Tremco, Inc.
 - e. Perm-A-Barrier Flashing by Grace Construction Products.
 - f. Poly Wall Self Adhering Flashing by Polyguard Products, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The ABAA Certified Air Barrier Contractor shall examine substrates, areas, and conditions under which the air barrier assembly will be installed, with General Contractor, ABAA Certified Installer present, for compliance with the following requirements.
 - 1. Confirm site access logistics and scheduling requirements, including but not limited to use of scaffolding, lifts and staging.
 - 2. At the end of each working day the General Contractor shall provide weather protection at the top of parapet walls and non finished roofs to prevent moisture migration into walls and damage to installed air barrier systems.
 - 3. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 4. Ensure that the following conditions are met:
 - a. Surfaces are sound, dry, even, and free of excess mortar or other contaminants.
 - b. Inspect substrates to be smooth without large voids or sharp protrusions. Inform General Contractor if substrates are not acceptable and need to be repaired by the concrete sub-trade.
 - c. Inspect masonry joints to be reasonably flush and completely filled, and ensure all excess mortar sitting on masonry ties has been removed. Inform General Contractor if masonry joints are not acceptable and need to be repaired by the mason sub-trade.
 - 5. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263 and take suitable measures until substrate passes moisture test.
 - 6. Verify sealants are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.

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7. Notify Architect in writing of anticipated problems using closed cell, medium density spray polyurethane foam over substrate prior to proceeding.

3.2 SURFACE PREPARATION

- A. The Air Barrier Contractor shall ensure the substrate is clean, dust-free, dry and prepared in accordance with the air barrier material manufacturer's written instructions. The General Contractor shall be notified if this is not the case.
 1. Ensure that penetrating work by other trades is in place and complete.
 2. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the closed cell, medium density spray polyurethane foam.
 3. Wipe down metal surfaces to remove release agents or other non-compatible coatings using clean sponges or with a material chemically compatible with the primary air material.
- B. Prime substrate for installation of sheet membrane transition strips if required by material manufacturer and as follows:
 1. Prime masonry, concrete substrates with primers.
 2. Prime glass-fiber surfaced gypsum sheathing with an adequate number (if applicable) of coats to achieve required bond, with adequate drying time between coats.
 3. Prime wood, metal, structural steel, sheet metal, and painted substrates with primer.
 4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and protrusions.
- C. Protection from Closed Cell, Medium Density Spray Polyurethane Foam:
 1. Mask and cover adjacent areas and materials that aren't being sprayed to protect from over-spray.
 2. Ensure any required foam stop or back up material are in place and complete to prevent over spray and achieve complete seal.
 3. Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes are removed from the spray location to exterior of the building. Provide for make-up air.
 4. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.

3.3 INSTALLATION

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- A. Transition Strip Installation: Install air barrier accessories and closed cell, medium density spray polyurethane foam to provide continuity throughout the building envelope. Install materials in accordance with manufacturer's instructions and the following:
1. Apply primer for transition membrane at rate recommended by material manufacturer. Allow primer to dry completely before membrane application. Apply as many coats as necessary for proper adhesion.
 2. Position subsequent sheets of membrane applied above so that it overlaps the membrane sheet below by a minimum of 2.0 inches (50 mm), unless greater overlap is recommended by material manufacturer. Roll into place with roller ensuring all transition membranes are free of fish-mouths, wrinkles, delaminations, bubbles and voids.
 3. Overlap horizontally adjacent pieces of membrane a minimum of 2.0 inches (50 mm), unless greater overlap is recommended by material manufacturer. Roll all areas of membrane including seams with roller.
 4. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counter-flashing or other procedure in accordance with material Manufacturer's recommendations.
 5. Connect air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors and other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.
 6. To bridge gaps >1/8" (3 mm) in wall construction at changes in substrate plane or changes in adjoining materials, provide transition membranes or other material recommended by spray polyurethane foam material manufacturer.
 7. Provide transition membrane, sealant, mastic, membrane counter-flashing or other material recommended by spray polyurethane foam manufacturer at 90 degree inside or outside corners. Follow spray polyurethane foam manufacturer's instructions for instructions on how to treat interlocked CMU or structurally-attached 90 degree cast-in place concrete corners.
 8. Provide mechanically fastened non-corrosive metal sheet to span gaps greater than 1.0 inch (25 mm) in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
 9. At through-wall flashings, provide an additional 6.0 inch (150mm) wide strip of manufacturer's recommended membrane counter-flashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.
 10. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
 11. At expansion and seismic joints provide transition to the joint assemblies.

12. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer when membrane will be exposed to the elements.
 13. At end of each working day, seal top edge of self-adhered membrane to substrate with termination mastic if exposed.
 14. Do not allow materials to come in contact with chemically incompatible materials.
 15. Do not expose membrane to sunlight longer than as recommended by the manufacturer.
 16. Ensure that membranes at terminations have a pull adhesive of 16 psi or greater.
 17. Inspect installation prior to enclosing assembly and repair damaged areas with closed cell, medium density spray polyurethane foam as recommended by manufacturer.
- B. Installation of Spray Polyurethane Foam: Install materials in accordance with manufacturer's instructions and the following:
1. The Installer(s) and those within the work area shall use proper personal protective equipment (PPE) during the installation of material in accordance with US Government regulation 29 CFR 1910.134.
 2. The Installer(s) shall follow all OSHA requirements when working on a job-site.
 3. Warning signs shall be displayed on each job site in the spray area warning of health and safety hazards for those personnel who do not comply with the personal protective equipment as required by Federal law.
 4. Equipment used to spray polyurethane foam shall comply with the manufacturer's instructions for the specific type of application and type of material being sprayed. Record equipment settings on the ABAA Daily Job Site Report. Each proportioner unit shall supply only one spray gun.
 5. Apply only when surfaces and environmental conditions are within limits instructed by the material manufacturer.
 6. Apply in consecutive passes as required by material manufacturer to thickness as indicated on drawings. Passes shall be not less than ½ inch (12 mm) and not greater than 50 mm (2 inches) or greater than the maximum thickness required by the SPF manufacturer. An additional pass of 2.0 inches (50 mm) shall only be done after the first pass has had time to cool down. At no time shall more than 4.0 inches (100 mm) be installed in a single day. There are no exceptions to this requirement as it is a health and safety requirement.
 7. Install within material manufacturer's tolerances, but not more than minus ¼ inch (6 mm).
 8. Do not install closed cell, medium density spray polyurethane foam within 3.0 inches (75 mm) of heat emitting devices such as light fixtures and chimneys.
 9. Finished surface of foam insulation to be free of voids and embedded foreign objects.

10. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.
11. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.
12. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.
13. Complete connections to other air barrier components and repair any gaps, holes or other damage using material in a manner approved by primary air barrier material manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Owner's Inspection and Testing: Cooperate with Owner's testing agency. Allow access to work areas and staging. Notify Owner's testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted.
- B. Air Barrier Association of America Installer Audits: Cooperate with ABAA's testing agency. Allow access to work areas and staging. Notify ABAA in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted. Arrange and pay for site audit by ABAA to verify conformance with the material Manufacturer's instructions, the site Quality Assurance Program used by ABAA, and this section of the project specification.
 1. Audits and subsequent testing shall be carried out at the following rate:
 - a. Up to 10,000 ft² of air barrier contract requires one (1) audit.
 - b. 10,001 – 35,000 ft² of air barrier contract requires two (2) audits.
 - c. 35,001 – 75,000 ft² of air barrier contract requires three (3) audits.
 - d. 75,001 - 125,000 ft² of air barrier contract requires four (4) audits.
 - e. 125,001 – 200,000 ft² of air barrier contract requires five (5) audits.
 - f. 200,001 ft² and over of air barrier contract requires six (6) audits.
 2. Forward written audit reports to the Architect within 10 working days of the audit and test being performed.
 3. If the audit reveals any defects, promptly remove and replace defective work at no additional cost to the Owner.

3.5 PROTECTING AND CLEANING

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- A. Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.
 - 1. Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the air barrier material manufacturer.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION