

SECTION 07 27 08

MECHANICALLY ATTACHED FLEXIBLE SHEET AIR BARRIERS (BUILDING WRAPS)

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| *Specifier Note: This guide specification is written according to the Construction Specifications Canada (CSC) Format. The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project. Coordinate this section with other specification sections and the drawings.* |

1. **GENERAL**
	1. SECTION INCLUDES

Mechanically attached flexible sheet air barrier (building wraps) air barrier located in the non-accessible part of the wall.

Materials to bridge and seal the following air leakage pathways and gaps:

Connections of the walls to the roof air barrier.

Connections of the walls to the foundation air barrier.

Seismic and expansion joints.

Openings and penetrations of window frames, storefront, curtain wall.

Barrier precast concrete and other envelope systems.

Door frames.

Piping, conduit, duct and similar penetrations.

Masonry ties, screws, bolts and similar penetrations.

All other air leakage pathways in the building envelope.

*Specifier Note: Coordinate related work requirements with contents of referenced specification sections.*

Section [014000] [Quality Requirements; coordination with Owner’s independent testing and inspection agency.]

Section [014339] [Mock-Ups; exterior wall mock-ups.]

Section [015000] [Temporary Facilities and Controls; requirement to schedule work to prevent sunlight and weather exposure of materials beyond limits established by manufacturer; requirement to protect materials from damage after installation and prior to installation of enclosing work.]

Section [033000] [Cast-In-Place Concrete; requirement that backup concrete be smooth without protrusions.]

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.]

Section [061600] [Sheathing; requirement that backup gypsum sheathing has been installed.]

Section [075000] [Membrane Roofing; requirement for coordination with sequencing of membrane roofing; requirement to seal roof membrane to wall air barrier.]

* 1. PERFORMANCE REQUIREMENTS

Material Performance: Provide air barrier materials which have an air permeance not to exceed 0.02 litres per square metre per second under a pressure differential of 75 Pa (0.02 L/(s·m2) @ 75 Pa) [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)], when tested in accordance with ASTM E2178 (unmodified).

The water vapour permeance shall be determined in accordance with ASTM E96 and shall be declared by the material manufacturer.

*Specifier Note: The water vapour permeance is declared by the manufacturer and included in this document so that the design professional has this information readily available.*

Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.2 litres per square metre per second under a pressure differential of 75 Pa (0.2 L/(s·m2) @ 75 Pa) [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)] 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.

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.

Materials of the air barrier assembly shall not displace adjacent materials in the assembly under full load.

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.

Connections to Adjacent Materials: Provide air barrier accessory materials to prevent air leakage at the following locations:

Foundation and walls, including penetrations, ties and anchors.

Walls, windows, curtain walls, storefronts, louvers and doors.

Different assemblies and fixed openings within those assemblies.

Wall and roof connections.

Floors over unconditioned space.

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

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

Seismic and expansion joints.

All other potential air leakage pathways in the building envelope.

* 1. SUBMITTALS

Submittals: Submit in accordance with Division 1 requirements.

Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the National Air Barrier Association’s (NABA) Quality Assurance Program (QAP). Submit accreditation number of the Contractor and certification number(s) of the NABA Certified Installer(s).

Product Data: Submit material manufacturer’s Product Data, instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.

Samples: Submit clearly labeled samples, 75 mm by 100 mm [three (3) inches by four (4) inches] minimum size of each material specified.

Shop Drawings of Mock-Up: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and connections to the test apparatus.

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 (see Section 1.3, .16), including retesting if initial results are not satisfactory.

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.

Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.

Air Barrier Subcontractor Qualifications: Air barrier Subcontractor(s) shall be accredited at the time of bidding and during the complete installation, period by the National Air Barrier Association (NABA) whose Installer(s) are certified in accordance with the site Quality Assurance Program used by NABA.

Mechanically attached flexible sheet air barrier Installer(s) shall be certified by BPQI (Building Performance Quality Institute) for the NABA Quality Assurance Program in accordance with the requirements outlined in the QAP program used by NABA. Installers shall have their photo-identification air barrier certification cards in their possession and available on the project site, for inspection upon request.

Manufacturer: Obtain primary NABA Evaluated Materials from a single NABA Listed Manufacturer regularly engaged in manufacturing specified mechanically attached flexible sheet air barriers. Obtain secondary materials from a source acceptable to the primary material manufacturer.

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).

VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

Field Quality Assurance: Implement the site Quality Assurance Program requirements used by NABA. Cooperate with NABA 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.

Air Barrier Assembly Testing: Verify air barrier assembly testing by the material manufacturer by visiting the NABA website to ensure a ASTM E2357 test has been completed and to obtain results. Visit the NABA 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. DELIVERY, STORAGE, AND HANDLING

Deliver materials to Project site in original packages with seals unbroken, labeled with material manufacturer's name, product, date of manufacture, and directions for storage.

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.

Handle materials in accordance with material manufacturer’s requirements.

* 1. PROJECT CONDITIONS

Temperature: Install mechanically attached flexible sheet air barriers within range of ambient and substrate temperatures, and moisture content recommended by material manufacturer.

Field Conditions: Do not install air barrier materials in snow, rain, fog, or mist.

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.

Compatibility. Do not allow air barrier materials to come in contact with chemically incompatible materials.

Ultra-Violet Exposure. Do not expose air barrier materials to sunlight longer than as recommended by the material manufacturer.

* 1. WARRANTY

*Specifier Note: Verify warranty length with manufacturers specified.*

Material Warranty: Provide material manufacturer’s standard product warranty, for a minimum three (3) years from date of Substantial Completion.

Subcontractor (approved by ABAA and manufacturer) Installation Warranty: Provide a two (2) year installation warranty from date of Substantial Completion, including all materials of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of attachment, loss of cohesion.

* 1. PRE-CONSTRUCTION MEETING

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.

* 1. MOCKUPS

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 dimensions no less than 2.50 metres long by 2.50 metres high [eight (8) feet long by eight (8) feet high] and include the materials and accessories proposed for use in the exterior wall assembly. Mock-ups shall be suitable for testing as specified in the following paragraph.

*Specifier Note: Coordinate testing with project requirements. Delete paragraph below if not required, or if Owner’s independent testing agent will perform testing.*

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 difference 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 for retesting until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.

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.

Mock-Up Tests for Membrane Adhesion: Test mock-up for transition membrane adhesion in accordance with ASTM D4541 (modified), using a type II pull tester except that the membrane 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 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.

1. **MATERIALS**

*Specifier Note: Retain manufacturers listed below. Note that both water-based and solvent-based primers are typically used on a single project based on the substrate and weather conditions.*

*Specifier Note: Use regular, high temperature or low-temperature formulation depending on site conditions, within temperature ranges specified by material Manufacturer.*

* 1. Material: <trade name> by <company name>: [company website hyperlink](http://www.airbarrier.org)

Air Barrier Material Properties:

Air permeance for this material has been tested and reported as being 0.0002 litres per square metre per second under a pressure differential of 75 Pa (XX L/(s·m2) @ 75 Pa), [XX cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (XX cfm/ft2 @ 1.57 psf)], when tested in accordance with ASTM E2178 (unmodified).

Water vapour permeance for this material has been tested and reported as being XX nanograms of water vapour passing through each square metre of area per second for each Pascal of vapour pressure differential (XX ng/(Pa·s·m2)  [XX US perms] when tested in accordance with ASTM E96 (desiccant method - unmodified).

Water vapour permeance for this material has been tested and reported as being XX nanograms of water vapour passing through each square metre of area per second for each Pascal of vapour pressure differential (XX ng/(Pa·s·m2)  [XX US perms] when tested in accordance with ASTM E96 (water method - unmodified).

Air Barrier Accessory Materials:

Water-Based Primer:

Solvent-Based Primer:

Solvent-Based Aerosol Primer:

Termination Mastic:

Sealants:

Transition Membrane for expansion joints and fenestration:

Reinforcing/Joint Tape:

Flashing at Transition Membrane:

Counter-flashing for Metal Wall Flashings:

Through-Wall Flashings or Shelf Angle Flashings:

Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane:

Water-Based Primer for Flashing, Transition Strip and Detail Membrane:

Substrate Joint Treatment:

1. **EXECUTION**
	1. EXAMINATION

The Air Barrier Contractor shall examine substrates, areas, and conditions under which the Air Barrier Assembly will be installed, with NABA Certified Installer(s) present, for compliance with requirements.

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.

Ensure that the following conditions are met:

Surfaces are sound, dry, even, and free of excess mortar or other contaminants.

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.

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.

Notify Architect in writing of anticipated problems using the air barrier material over substrate prior to proceeding.

* 1. INSTALLATION

Installation instructions for Mechanically Attached Flexible Sheet Air Barrier: Install flexible sheet air barrier in a way that provides continuity throughout the building envelope. Install materials in accordance with manufacturer's recommendations and the following: (Note: In the event of a conflict, the air barrier manufacturer’s installation instructions shall govern)

Install building wrap underneath or over structural sheathing board, insulation or directly to framing members.

Begin by aligning the bottom edge of the roll approximately 4 inches (100 mm) below the base of the wall, approximately 24 inches (610 mm) from a corner, with the print side facing out. Fold greater than 4 inches (100 mm) of material under itself and fasten securely to a stud, structural sheathing or through insulation board to an underlying framing member.

Ensure air barrier material is plum and level with foundation, and unroll extending over window and door openings.

Ensure air barrier material is applied over back edge of weep screed for proper water drainage.

Unroll the air barrier material with the printed side facing out, wrapping the entire building, including door and window openings.

Attach to wood, insulated sheathing board or exterior gypsum with plastic cap nails, staples with a minimum 1 inch (25 mm) crown every 12 inches (300 mm) on vertical stud line with wood stud framing, or screws with washers to metal stud framing. If smaller crown staples are used, then more fasteners must be used.

When attaching to masonry, use adhesive recommended by the air barrier material manufacturer.

When installing the air barrier material over non-structural sheathing such as insulation board or directly to studs, fasteners must penetrate the framing member a minimum of 1/2 inch (12 mm).

Fasteners used to hold Mechanically Attached Flexible Sheet Air Barriers in place need to be spaced accordingly to ensure material is fastened to building when negative pressures are exerted on materials. Fasteners need to be installed along every stud vertically and 12” (300 mm) apart horizontally to maintain integrity of air barrier assembly.

Install with drainage plane surface pattern in vertical position for proper draining. Install lower level air barrier material prior to upper layers of air barrier material to ensure proper shingling of layers.

Overlap at all corners of building by a minimum of 12 inches (300 mm).

Overlap vertical seams by a minimum of 6 inches (150 mm).

Prepare each window and door rough opening as recommended by the air barrier Manufacturer or prepare by cutting a modified “I” pattern and wrap excess material to the inside of the rough opening and fasten securely to a framing member. At the window header, make a 6 to 8 inch (150 – 200 mm) diagonal cut at the corners of the air barrier and fold the material up above the rough opening, exposing the underlying sheathing. This will allow for installation of the head flashing material, which will then be covered by the air barrier material when it is folded down and the diagonal cuts are taped. If windows are already in place when installing air barriers, trim as close to them as possible and tape all edges. Use of window flashing materials is required as described in the International Building Code. Check local building codes to determine whether window flashing is a local requirement.

When the end of a roll is reached, fold the edge of the building wrap under itself and attach to the structural sheathing or through non-structural sheathing to the nearest framing member.

Tape all horizontal and vertical seams with manufacturer approved construction tape.

Seal all tears and cuts with manufacturer approved construction tape.

* 1. FIELD QUALITY CONTROL

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.

National Air Barrier Association Installer Audits: Cooperate with NABA’s testing agency. Allow access to work areas and staging. Notify NABA 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 audits by NABA to verify conformance with the material Manufacturer’s instructions, the site Quality Assurance Program used by NABA, and this section of the project specification.

Audits and subsequent testing shall be carried out at the following rate:

$1 - 50,000 Air Barrier Contract Value - 1 audit required

$50,001 - 150,000 Air Barrier Contract Value - 2 audits required

Over $150,000 Air Barrier Contract Value – 1 audit required for every $100,000 in Air Barrier Contract Value.

Additional field audits may be required on a specific project as required by NABA QAP Administrator.

Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed.

If the inspections reveal any defects, promptly remove and replace defective work at no additional cost to the Owner.

* 1. PROTECTING AND CLEANING

Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.

Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the material manufacturer.

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