

SECTION 072723

BOARDSTOCK AIR BARRIER

RIGID CELLULAR THERMAL INSULATION BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes the following:

1. Boardstock air barrier – rigid cellular thermal insulation board 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 boardstock 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 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 boardstock air barrier.
8. 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.
 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. Boardstock air barriers shall not displace adjacent materials in the air barrier 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.
- D. Samples: Submit clearly labeled samples, three (3) inch by four (4) inch [75 mm by 100 mm] minimum size of each material specified.
- E. Shop Drawings of Mock-Up: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and air barrier transitions and terminations.

- F. 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.
- G. 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.
- H. 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.
- I. 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. Boardstock air barrier Installers 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.
- J. Manufacturer: Obtain primary ABAA Evaluated Materials from a single ABAA Evaluated Manufacturer regularly engaged in manufacturing specified rigid cellular thermal insulation board. Obtain secondary materials from a source acceptable to the primary material manufacturer.
- K. 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).
- L. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

- M. 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. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
- N. 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.
- O. 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.

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

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, and loss of attachment.

PART 2 – PRODUCTS

A. AIR BARRIER MATERIAL PROPERTIES - GENERAL:

- 1. Air permeance for this material has been tested and reported as being 0.0001 cubic feet per minute per square foot under a pressure differential of 1.57

pounds per square foot (0.0001 cfm/ft² @ 1.57 psf), [0.00049 liters per square meter per second under a pressure differential of 75 Pa (0.00049 L/(s·m²) @ 75 Pa)] at 0.75" [18.75 mm] when tested in accordance with ASTM E2178 (unmodified).

2. Water vapor permeance for this material has been tested and reported as being 0.88 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (0.88 ng/(Pa·s·m²) [0.02 US perms] at 2" [50 mm] when tested in accordance with ASTM E96 (desiccant method - unmodified).

2.1 AIR BARRIER MATERIALS

- A. Boardstock Air Barrier System: Subject to compliance with requirements, provide the following system in total, or comparable system in total by manufacturer addressed under Basis of Design Air Barrier Board Product:

1. Boardstock Air Barrier System: ECOMAXci™ Wall Solution using ECOMAXci™ FR Air Barrier rigid polyiso boardstock by Rmax. R-value per the construction documents. Boards installed horizontally or vertically, Rmax Solution shield logo facing the exterior, typically 48 inch wide by 96 inch to 192 inch long. www.Rmax.com/ECOMAXci.

- B. Boardstock Air Barrier Board Material - Foil-Faced, Polyisocyanurate-Foam Sheathing and Air Barrier: ASTM C1289, Type I, Class 1 and Class 2, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually. Tested as a component of a Water Resistant Barrier and ABAA Evaluated Air Barrier System.

1. Basis-of-Design Air Barrier Board Product: Subject to compliance with requirements: Provide ECOMAXci™ Wall Solution, using Rmax; ECOMAXci™ FR Air Barrier (formerly ECOMAXci), or comparable product by one of the following:

- a. Carlisle Coatings & Waterproofing Inc.
- b. Dow Chemical Company (The).
- c. Hunter Panels.
- d. **<Insert manufacturer's name>**.

2. Properties:

- a. Compressive Strength: 25 psi (172 kPa), ASTM D1621.
- b. Flame Spread Index (core): 25 or less, ASTM E84.
- c. Smoke Developed Index (core): less than 450, ASTM E84.
- d. Air Permeance: less than 0.02 L/(s·m²), ASTM E2178.
- e. Water Vapor Permeance: less than 0.03 perm, ASTM E96.
- f. Water Absorption: less than 0.2% by volume, ASTM C209.

- g. Service Temperatures: 250°.
 - h. Sheathing Assembly Air Leakage: Maximum [**0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa)**] <Insert value> when tested according to ASTM E2357.
- 3. Fire Propagation Characteristics: Complies with NFPA 285 testing as part of an approved assembly.
 - 4. Insulation Nominal Thickness and R-Value: [**Insulation to provide not less than R-6.5 at 1 inch thickness and R-13.1 at 2 inch thickness**], [As indicated on the drawings], [R-Value [] Thickness []].
- C. AIR BARRIER ACCESSORY MATERIALS:
- 1. Insulation Fasteners: Provide self-taping steel screws with minimum 2 inch diameter solid plastic washer.
 - a. [[RM1]Acceptable Products: Rodenhouse Inc. THERMAL-GRIP® ci Prong Washer and Grip-Deck® corrosion resistant, Self-drilling Screw or equivalent, as determined by component manufacturer.
 - 2. Insulation Tape: Provide insulation manufacturer's recommended tape for sealing joints, fasteners, seams, and minor facer repair penetrations through the insulation layer.
 - a. Required Products: Rmax R-SEAL 3000 dead soft aluminum foil tape with cold weather acrylic pressure sensitive adhesive, 4 inch or 5 inch wide.
 - 3. Insulation Flashing: Provide insulation manufacturer's recommended flashing for sealing at corners, ceiling and floor transitions, windows, doors, rough openings, control joints, and other through wall penetrations.
 - a. Required Products: Rmax R-SEAL 6000 woven polyethylene flashing membrane with a butyl rubber adhesive, 9 inch or 12 inch wide.
 - 4. Insulation Liquid Flashing: Provide insulation manufacturer's recommended liquid flashing for sealing joints, fasteners, seams, sealing at corners, ceiling and floor transitions, windows, doors, rough openings, other through wall penetrations, and minor facer repair penetrations through the insulation layer.
 - a. Required Products: Rmax R-SEAL 2000 LF Liquid Flashing, one-component, non-sag, flexible, flashing and water barrier sealant.
 - 5. Insulation Caulk: Provide insulation manufacturer's recommended caulk for sealing small penetrations and anchors.
 - a. Required Products for alternative liquid flashing system: Rmax R-SEAL 2000 LF, Liquid Flashing or equivalent
 - 6. Brick Ties: Provide insulation manufacturer's recommended brick ties and sealing washers.
 - a. Acceptable Products: BLOK-LOK BL-607, Heckmann Building Products Pos-I-Tie or equivalent, used in conjunction with Rodenhouse Thermal-Grip Brick-Tie Washer or equivalent.

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. Notify Architect in writing of anticipated problems using boardstock air barrier over substrate prior to proceeding.
 6. Verify sealants are compatible with boardstock air barrier material proposed for use.

3.2 INSTALLATION

- 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.
 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. Installation Instructions for Boardstock Air Barrier – Rigid Cellular Thermal Insulation Board: Install boardstock air barrier in a way that provides continuity throughout the building envelope. Install materials in accordance with manufacturer's instructions and the following (unless manufacturer requires other procedures in writing based on project conditions or particular requirements of their recommended materials):
1. Install over framing materials or substrates.
 2. Where possible, have a sill plate gasket installed under the bottom steel track or bottom wood plate before the framed wall is put into place. Where this sill gasket has not been installed, install a bead of sealant to seal between the steel track or wood plate and the floor.
 3. Install the boardstock air barrier with the printed side out.
 4. If the boardstock has shiplap edges, install with the top shiplap edge up and against the steel framing.
 5. Install boards with the eight or twelve foot length perpendicular to the vertical studs. Use maximum board lengths to minimize number of joints. Locate end joints parallel to and on a framing flange. Center end joints over supports and stagger in each course
 6. Abut boardstock tightly around openings and penetrations.
 7. Anchor to exterior face of exterior metal stud wall framing with appropriate fastener. Fastener is to penetrate the framing material a minimum of ½ inch (12 mm).
 8. Fasten boardstock to each framing material with fasteners spaced 12 inches (300 mm) on center at perimeter of wall and 16 inches (400 mm) horizontally and vertically within the boardstock.
 9. The washer part of the fastener may be used to bridge a maximum of two adjoining boards.
 10. Set fasteners back 3/8 inch (10 mm) from the boardstock edge and ends.
 - a. When recommended by the manufacturer, center the fastener in the vertical insulation board joint, and insure that the washer spans equally onto both tightly abutted adjacent boards.
 11. Drive fasteners to bear washer tight and flush with surface of boardstock. Do not countersink.
 12. Seal all edge and end joints and through wall penetrations such as doors and windows with self-adhered flashing, approved sealant foam or sealant tape.
 - a. As an alternative, liquid flashing may be used when installed in accordance with manufacturer's recommendations.
 13. Install self-adhered flashing or sealant tape in a shingle fashion over all joints. Overlap the joints in the tape by the width of the tape (i.e. 4 inch (100 mm) tape is overlapped 4 inch (100 mm).
 14. Repair all damage to boardstock air barrier. If the repair is large, cut out a section of the boardstock air barrier the width of the stud spacing. Install a section of new boardstock the same size as cut out. Seal any gaps with sealant foam. Install self-adhered flashing or sealant tape in a shingle fashion over all joints. For small holes, fill the small hole first with sealant

foam then cover with self-adhered flashing, or sealant tape in a shingle fashion over all joints.

15. If recommended by manufacturer, use liquid flashing or insulation caulk as counterflashing to horizontal self-adhered flashing above rough openings and other penetrations.

3.3 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 inspections 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.

16. 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.
17. Forward written audit reports to the Architect within 10 working days of the audit and test being performed.
18. If the audit reveals any defects, promptly remove and replace defective work at no additional cost to the Owner.

3.4 PROTECTING AND CLEANING

- 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 material manufacturer.

END OF SECTION