DISCLAIMER: The manufacturer has reviewed the product information contained in this short form specification. The information is organized and presented to assist the specification writer working on a construction project to select the appropriate products and to save time in writing the project specification Section. The specification writer is responsible for product selection as well as the use and application of this information, and should contact the manufacturer to ensure that all options are available and that the associated specification information is valid and correct.

SPEC NOTE: Insert the required paragraphs into the Section under the noted Articles, and make any required selections. Where selection is indicated with an [OR] statement, select the appropriate paragraph and delete the inappropriate statement. Delete all SPEC NOTEs and [OR] statements prior to final printing.

SECTION 07 2800

FLUID APPLIED MEMBRANE AIR AND WATER BARRIERS

**TIPS:**

To view non-printing **Editor's Notes** that provide guidance for editing, click on MasterWorks/Single‑File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on MasterWorks/Supporting Information.

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

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

DuPont Safety & Construction Guide Specifications have been written as an aid to the professionally qualified Specifier and Design Professional. Use of Guideline Specification requires sole professional judgment and expertise of qualified Specifiers and Design Professionals to adapt information to specific needs for Building Owner and the Project, who coordinate with the construction document process, and meet each applicable building codes, regulations and laws. DUPONT EXPRESSLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THIS PRODUCT FOR THE PROJECT.

Please contact your local DuPont™ Tyvek® Specialist at (800) 44-TYVEK or visit. www.weatherization.tyvek.com.

1. GENERAL
	* + 1. RELATED DOCUMENTS

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

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section includes vapor-permeable, fluid-applied air and water barriers.
				2. Related Requirements:

Refer to "Facade/Exterior Considerations" in the DuPont™ Tyvek® Fluid Applied WB+™ Wall and Substrate Guidelines for specific weather barrier installation information for related types of cladding. See information at [http://commercialspecs.tyvek.com](http://dupontspecs.tyvek.com).

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Coordinate with Section 013100 "Project Management and Coordination" for preinstallation conference and LEED coordination meeting. Coordinate with Section 014000 "Quality Requirements" for preconstruction testing and mockup requirements.

Section 042000 "Unit Masonry" for masonry ties and flashing installation.

Section 042613 "Masonry Veneer" for masonry ties and flashing installation.

Section 044200 "Exterior Stone Cladding" for stone masonry ties and flashing installation.

Section 044313.13 "Anchored Stone Masonry Veneer" for stone masonry ties and flashing installation.

Section 044313.16 "Adhered Stone Masonry Veneer" for stone masonry ties and flashing installation.

Section 047200 "Cast Stone Masonry" for stone masonry ties and flashing installation.

Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

Section 072100 "Thermal Insulation" for installation of exterior insulation.

Section 072413 "Polymer-Based Exterior Insulation and Finish System (EIFS)" for installation of exterior insulation and finish system.

Section 072419 "Water-Drainage Exterior Insulation and Finish System (EIFS)" for installation of exterior insulation and finish system.

Section 072500 "Weather Barriers" for weather barriers, including [**building paper**] [**flexible flashing**] [**and**] [**building wraps with air-barrier properties**].

Section 074624 "Wood Shingle and Shake Siding" for installation of wood shingle and shake siding.

Section 074646 "Fiber-Cement Siding" for installation of fiber-cement board siding.

Section 092400 "Cement Plastering" for installation of stucco.

* + - 1. DEFINITIONS

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

* + - * 1. Weather Barrier: A combination of materials and accessories that do the following:

Prevent the accumulation of water as a water-resistive barrier.

Minimize the air leakage into or out of the building envelope as a continuous air barrier.

Provide sufficient water vapor transmission to enable drying as a vapor permeable membrane.

* + - * 1. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly in accordance with IBC Section 1403.2.

Primary Layer: Water-resistive barrier (fluid-applied) installed closest to building interior with all flashings and terminations integrated to this layer.

Secondary Layer: Outermost part of a double-layer system and where drainage is required behind claddings such as stucco, adhered masonry, and installation methods utilizing a lath.

* + - * 1. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of building envelope in accordance with ASHRAE 90.1 Section 5.4.3.1.
				2. Vapor-Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E 96 in accordance with definition in International Building Code. Vapor-permeable material permits passage of moisture vapor through vapor diffusion.
				3. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
			1. PREINSTALLATION MEETINGS
				1. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

Meet with Owner, Architect, Manufacturer's Certified Installer, [**weather barrier manufacturer's designated field representative**,] and installers of work that interfaces with or affects weather barrier.

Review methods and procedures related to weather barrier installation, including manufacturer's written instructions.

Review and finalize construction, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Examine substrate conditions and finishes for compliance with requirements.

Review flashings, special weather barrier details, weather barrier penetrations, and condition of other construction that affects weather barrier.

Review weather barrier manufacturer's Project registration and observation process.

Retain two subparagraphs below if seeking LEED EQ Credit: Construction Indoor Air Quality Management Plan (1 point), Construction "Moisture Protection for Absorbent Materials."

Review Construction Indoor Air Quality Management Plan "Moisture Protection for Absorbent Materials."

Review temporary protection requirements for weather barrier during and after installation.

* + - 1. ACTION SUBMITTALS
				1. Product Data: For each type of product.

For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

* + - * 1. Sustainable Design Submittals:

Retain "Test Reports" Subparagraph below if seeking LEED Energy & Atmosphere (EA) Prerequisite; Fundamental Commissioning and Verification. Full envelope commissioning is not required unless the Project team pursues LEED EA Credit, Enhanced Commissioning, Option 2.

Delete "Test Reports" Subparagraph below if Owner is responsible for Field Quality Control Testing.

Test Reports: Envelope testing and verification of the following:

Water-Spray Test.

Air Infiltration Test.

Water Penetration Test.

Product Data: Including the following information:

Provide Health Product Declarations (HPDs).

Provide Environmental Product Declarations (EPDs).

Retain first subparagraph below if seeking LEED Indoor Environmental Quality (EQ) Credit: Low-Emitting Materials.

SDS (formerly MSDS), third-party certifications, or product technical data confirming systems that meet or exceed emissions guidelines for volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), as follows:

Retain one or more of three subparagraphs below in accordance with Project requirements. LEED v4 Healthcare and LEED v4 Schools require that exterior applied adhesives, sealants, coatings, roofing, and waterproofing applied on site be included in VOC content calculations.

Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.

Adhesives and sealants wet-applied on-site that meet/exceed VOC content requirements for wet applied products comply with SCAQMD Rule 1168.

Flashing systems comply with SCAQMD Rule 1168 on VOC limits.

Retain "Preconstruction Laboratory Mockup Testing Submittals" Paragraph below if specifying Project-specific preconstruction testing in "Preconstruction Laboratory Mockups" Paragraph as Contractor's responsibility. Testing agency is at expense of Owner or Contractor. Only retain these tests if appropriate for Project's size, scope, and budget.

Field testing of mockups is addressed in "Field Quality Control" Article in Part 3.

* + - * 1. Preconstruction Laboratory Mockup Testing Submittals:

[**Engage**] [**Owner will engage**] in a third-party testing program: Develop[**ed**] specifically for Project.

Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.

Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

* + - * 1. Shop Drawings:

Show details of weather barrier at terminations, openings, and penetrations.

Show details of weather barrier applications.

* + - 1. INFORMATIONAL SUBMITTALS

Information described in paragraphs below can be found at <http://commercialspecs.tyvek.com>.

* + - * 1. Manufacturer's Instructions: For installation of each product specified.
				2. Qualification Data: For Installer [**and laboratory mockup testing agency**] [**and field testing agency**].
				3. Sample Warranty: For manufacturer's warranty.

Retain "Reports" Paragraph below if required by "Preconstruction Laboratory Mockups" or "Field Quality Control."

* + - * 1. Reports: Field test and inspection reports.
				2. Installer’s weather barrier manufacturer training certificate.
			1. QUALITY ASSURANCE

DuPont weatherization systems certified installers receive classroom and on-site training on proper installation techniques and safety practices from a DuPont™ Tyvek® Specialist, and must pass written and hands-on installation tests to become certified.

* + - * 1. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer’s product.

Retain "Laboratory Mockup Testing Agency Qualifications" Paragraph below if Project-specific preconstruction mockup testing is specified in "Preconstruction Laboratory Mockup Testing Submittals" Paragraph above.

* + - * 1. Laboratory Mockup Testing Agency Qualifications: Qualified in accordance with ASTM E 699 for testing indicated[**and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025**].

Retain "Mockups" Paragraph below if in-place or stand-alone mockup of exterior wall construction is required. Coordinate requirements for materials in other Sections that are part of exterior wall assembly. If preconstruction field or lab testing of exterior wall assemblies is required, coordinate mockup requirements with "Field Quality Control" in Part 3 and Section 014000"Quality Requirements."

Retain "Mockups" Paragraph below if preconstruction testing is required.

* + - * 1. Mockups: Build mockups to set quality standards for materials and execution.

Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.

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

Include junction with roofing membrane[**, building corner condition,**] [**and**] [**foundation wall intersection**] [**fenestration and wall surface**].

If Architect determines that mockups do not comply with requirements, reconstruct mockups and apply weather barrier until mockups are approved.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 014000 "Quality Requirements" for demolishing and removing mockups.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

Typically, delete "Preconstruction Laboratory Mockups" Paragraph below. Include only if Project is large, complex, or has atypical performance requirements. If retaining this paragraph, consult manufacturers and testing agencies for guidance on appropriate requirements for Project.

* + - * 1. Preconstruction Laboratory Mockups:

Preconstruction Testing Service: [**Owner will engage**] [**Engage**] a qualified testing agency to perform testing on preconstruction laboratory mockups.

Build preconstruction laboratory mockups at testing agency facility; use personnel, products, and methods of construction that will be used at Project site.

Usually indicate size and other details of preconstruction laboratory mockups on Drawings. ASTM E 2099 includes recommendations for minimum sizes and configurations.

Size and Configuration: As indicated on Drawings.

Retain first subparagraph below if required for Project.

Notify Architect [**seven**] <**Insert number**> days in advance of the dates and times when preconstruction laboratory mockups will be constructed and tested.

Revise example test methods and sequence of tests in "Preconstruction Laboratory Mockup Testing Program" Subparagraph below to suit Project. Coordinate with performance requirements in "Performance Requirements" Article in Part 2. See AAMA 501 and ASTM E 2099, and consult testing laboratories' default testing methods and sequences. Coordinate test results with performance requirements for fenestration products.

Preconstruction Laboratory Mockup Testing Program: Test preconstruction laboratory mockups in accordance with requirements in "Performance Requirements" Article in Part 2. Perform the following tests on base wall to conform to ASTM E2357 Section A2.2.1.2 Specimen 2 for penetrated assemblies.

Retain "ASTM E 331 Test Parameters" or "AAMA 501.1 Test Parameters” Subparagraph below to evaluate water-resistance performance of assembly. Within selected subparagraph, select pressure option or provide another pressure as required to suit Project requirements. Pressure options below represent standard (first option) and high pressure (second option) using corresponding testing standard. Duration listed is a common or standard timeframe for the test method. See fenestration manufacturer for pressure rating limits.

ASTM E 331 Test Parameters: [**2.86 psf (137 Pa)**] [**12.5 psf (575 Pa)**] pressure for [**15**] <**Insert time**>-minute duration.

AAMA 501.1 Test Parameters: [**2.86 psf (137 Pa)**] [**12.5 psf (575 Pa)**] <insert pressure> pressure for [**15**] <**Insert time**>-minute duration.

Retain first subparagraph below to evaluate Structural Air Pressure Performance. Select a pressure option or provide another pressure as required to suit Project requirements. Pressure options below represent standard (first option) and high pressure (second option) using corresponding testing standard. Duration listed is a common or standard timeframe for the test method. See fenestration manufacturer for pressure rating limits.

ASTM E 330 Test Parameters: [**2.86 psf (137 Pa)**] [**75 psf (3500 Pa)**] <**Insert pressure**> pressure for [**10-second**] <**Insert time**> duration.

If including performance of AAMA 501.5, also include a repeated test of water-resistance performance or structural air pressure performance of the assembly to evaluate and maintain required performance after-thermal cycling. Retain one of two cycle options in "Number of Cycles" Subparagraph below, which represents the standard (first option) and high number (second option) of cycles using AAMA 501.5.

AAMA 501.5 Test Parameters:

Cycle Temperature Range: 0 to 180 deg F (-18 to +82 deg C).

Number of Cycles: [**3**] [**28**] <**Insert number of cycles**>.

Repeat test [**ASTM E 331**] [**AAMA 501**] [**ASTM E 330**] after thermal cycling.

Edit "Test Results" Subparagraph below based on individual or collective results of above tests as required to meet system performance criteria.

Test Results: Laboratory mockup passes if the following results are achieved by the above tests [**individually**][**collectively**]:

The following subparagraphs are examples only. Retain one or more of the following test results or include additional test results to suit Project requirements.

No water penetration.

Include definition of structural failure to suit Project requirements.

No structural failure.

Include definition of expansion or contraction failure to suit Project requirements.

No expansion or contraction failures.

<**Insert test results**>

Retain "Manufacturer's Field Service" below if retaining "Manufacturer's Product Warranty" Paragraph in "Warranty" Article below. See editing notes in "Warranty" Article for additional information.

* + - * 1. Manufacturer's Field Service: Register Project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project Registration and Observation process.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Remove and replace liquid materials that cannot be applied within their stated shelf life.
				2. Protect stored materials from direct sunlight.
				3. Store in a dry environment between 50 and 80 deg F (10 and 27 deg C).
			2. WARRANTY

"Manufacturer's Product Warranty" Paragraph below covers repair or replacement of defective weather barrier only and does not cover repair and replacement of other damaged materials. Specific details for DuPont™ Tyvek® Weatherization product warranties can be found at <http://commercialspecs.tyvek.com>.

If retaining paragraph below, retain manufacturer's field representative requirements in "Preinstallation Meetings" and "Quality Assurance" articles in Part 1, and the "Field Quality Control" Article in Part 3.

* + - * 1. Manufacturer's Product Warranty: Manufacturer agrees to repair or replace weather barrier product that fails in materials within specified warranty period.

Verify available warranties and warranty periods. DuPont weatherization products provide warranties to Builders, General Contractors, or Professional Installers.

Warranty Period: 10 yearsfrom date of product purchase.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Avitru. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. MANUFACTURERS
				1. Source Limitations: Obtain weather barrier assembly components, including weather barrier[**, weather barrier flashing**] [**and**] [**foam insulation**] <**Insert products**> from [**same manufacturer as weather barrier**] [**or**] [**manufacturer approved by weather barrier manufacturer**].
			2. PERFORMANCE REQUIREMENTS

High-performance installations are defined as building envelope design requirements that exceed ASTM E 1677, 65 mph (104.6 km/h) equivalent structural load, and 15 mph (24.14 km/h) equivalent wind-driven rainwater infiltration resistance. Certain construction types are more appropriate for high-performance weather-barrier products and installation methods.

"Low-Rise Construction" can be characterized by performance, utilizing ASTM E 1677 as a reference point. Low-rise construction should be limited to building envelope design requirements that do not exceed ASTM E 1677, 65 mph (104.6 km/h) equivalent structural load, and 15 mph (24.14 km/h) equivalent wind-driven rainwater infiltration resistance; and that use wood-framed walls on buildings less than 60 ft. (18.3 m) in height.

Refer to White Paper "DuPont™ Tyvek® Commercial Air Barrier Assemblies - ASTM E 1677 vs. ASTM E 2357" by Maria Spinu, Ph.D. See <http://commercialspecs.tyvek.com>.

* + - * 1. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.

Retain "High Performance Installations" Paragraph below for buildings 60 feet (18.3 m) or more in height or for buildings of any height that require high-performance weather-barrier assembly.

* + - * 1. High-Performance Installations:

For installation with one of the following building envelope performance or structural characteristics:

Exceeding 65 mph (100 km/h) equivalent structural load.

Exceeding 15 mph (24 km/h) equivalent wind-driven rain water infiltration.

Buildings with 60 feet (18 m) or more total height above grade plane, as defined by the IBC.

Construction with gypsum or cement-based exterior sheathing.

Non-wood based primary structure such as steel, light-gauge steel, masonry, or concrete.

* + - 1. WEATHER BARRIER

DuPont™ Tyvek® Fluid Applied WB+™ is based on a unique formulation using silyl-terminated polyether polymer technology. It offers low shrinkage during curing, superior elongation, and recovery, and can be easily applied in one coat.

DuPont™ Tyvek® CommercialWrap® D is a durable air and water barrier that offers a specially engineered surface texture designed to provide superior water drainage and durability under a variety of facades in climates that may require additional drainage. It offers high tear and wind load resistance, nine months of UV resistance, and the ideal balance of air and water protection and vapor permeability.

* + - * 1. Basis-of-Design Product: DuPont de Nemours Inc. DuPont™ Tyvek® Fluid Applied WB+™ or comparable product by one of the following:

<**Insert manufacturer's name**>.

* + - * 1. Fluid-Applied Membrane: ASTM E 2357 passed, Air Barrier Association of America (ABAA) evaluated air barrier assembly, and assembly water resistance in accordance with ASTM E 331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E 84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

Air barrier performance can be shown at multiple levels: Product, assembly, and whole building. Product must have general air barrier properties as determined by ASTM E 2178, where measured air is forced through the field of the air barrier membrane. Assembly air barrier performance is determined by ASTM E 2357, where the membrane and accessories are pressurized and measured on various 8 by 8 feet (2438 by 2438 mm) test walls with openings, penetrations, and seams representative of actual construction methods.

ASTM E 2357 is far more stringent than the requirement in the ASTM E 1677 assembly test, which allows for 50 percent more air infiltration than the limit for air barriers in many energy codes. Results of ASTM E 2357 can also be third-party evaluated via the ABAA. Whole building air performance can be verified through ASTM E 779 and should be coordinated with "Field Quality Control Testing" Paragraph in Part 3, as well as Section 014000 "Quality Requirements."

Product air permeance units can be shown in many ways, such as a value of 0.001 cfm/sq. ft. at 0.3-inch wc, which is equal to the value specified in first subparagraph below. Only the unit of measure is different. If needed, the value of 0.001 cfm/sq. ft at 0.3-inch wc can be used instead of that indicated in first subparagraph below.

Air Permeance, Product: Not more than 0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. m at 75 Pa) when tested in accordance with ASTM E 2178.

Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA) when tested in accordance with ASTM E 2357 and evaluated by the ABAA.

Water-resistance performance can be shown at multiple levels including product, assembly, and field test. Product must resist water penetration through the membrane from hydrostatic pressure from a water column utilizing AATTC 127.

Assembly water penetration can utilize the same lab-based representative construction assemblies as those described above for ASTM E 2357, and then apply calibrated water spray on the depressurized wall to draw water into vulnerable joints using ASTM E 331. Field or project water testing can also be performed to mirror the lab assembly, utilizing ASTM E 1105.

Coordinate ASTM E 1105 requirements with ASTM E 331 values in "Water Penetration Resistance, Product" Subparagraph below, and with "Water Penetration" Subparagraph "Field Quality Control Testing" Paragraph in Part 3.

Water Penetration Resistance, Product: Hydrostatic-head resistance greater than 92.5 inches (235 cm) in accordance with AATTC 127.

Coordinate specified design pressure with design pressures specified for the window systems. Specified value in first subparagraph below should not be greater than pressure specified for window systems.

Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E 2357 to water resistance in accordance with ASTM E 331 to [**2.86 lbf/sq. ft. (137 Pa)**] [**6.24 lbf/sq. ft. (300 Pa)**] [**10.4 lbf/sq. ft. (500 Pa)**] [**12.5 lbf/sq. ft. (575 Pa)**].

Refer to white paper "Vapor Permeable or Impermeable Building Envelope Materials. Does It Matter?" by Maria Spinu, Ph.D. for information regarding moisture vapor control through the building envelope. See <http://commercialspecs.tyvek.com>.

Water-Vapor Permeance: Not less than 10 perms (570 ng/Pa x s x sq. m) in accordance with ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 20 perms (1100 ng/Pa x s x sq. m) in accordance with ASTM E 96/E 96M, Water Method (Procedure B).

Allowable UV Exposure Time: Not less than nine months, when tested in accordance with ASTM G 155 (accelerated weathering).

Retain "Flame Propagation Test" Subparagraph below if required. NFPA 285 compliant assemblies using DuPont™ Tyvek® Commercial Air and Water Barrier Systems can be found at <http://commercialspecs.tyvek.com>. Coordinate with Division 01 for assembly and building compliance.

Flame Propagation Test: Test materials and construction in accordance with NFPA 285.

Retain subparagraph below if required for LEED Credit.

Weather barrier system shall have a VOC content of 30 g/L or less.

* + - 1. WEATHER BARRIER FLASHING

Flashing adhesives are typically made from modified asphalt (bitumen) or butyl rubber compounds, and a release liner. Accelerated weathering with UV light, heat, and moisture degrades flashings with asphalt adhesives significantly more than those with DuPont butyl-based adhesives.

Conformable flashing is flexible and has butyl adhesive on one side. Conformable flashing can be stretched to seamlessly cover complex shapes like round top or custom shaped windows, 3-D sill protection, and wall interruptions such as dryer vents and hose bibs.

* + - * 1. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure of 176 deg F (80 deg C) for seven days.

Basis-of-Design Product: DuPont de Nemours Inc. DuPont™ FlexWrap™ NF or comparable product by one of the following:

<**Insert manufacturer's name**>.

Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.

ASTM E 331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.

Water Penetration: No leakage at 15 psf (720 Pa) in accordance with ASTM E 331.

Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (‑4 deg C) as Class A (without primer use).

Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

Strip Flashing is flexible and has butyl adhesive on one side for DuPont™ Tyvek® StraightFlash™. Tyvek® StraightFlash™ is typically used at jambs and heads of rectangular windows. DuPont™ Tyvek® StraightFlash™ VF (versatile flange) has butyl adhesive on portions of two sides of the flashing and is typically used at brick mold windows and doors.

* + - * 1. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure of 176 deg F (80 deg C) for seven days.

Basis-of-Design Product: DuPont de Nemours Inc. [**DuPont™** **Tyvek®** **StraightFlash™**] [**DuPont™** **Tyvek®** **StraightFlash™ VF**] or comparable product by one of the following:

<**Insert manufacturer's name**>.]

ASTM E 331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.

Water Penetration: No leakage at 15 psf (720 Pa) in accordance with ASTM E 331.

Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (-4 deg C) as Class A without primer use.

Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

* + - * 1. Primer for Flashings: Synthetic rubber-based product. Spray applied. Strengthen the adhesive bond at low temperature applications between weather products, such as self-adhered Flashing Products, Commercial Building Wraps, and common building sheathing materials.

Basis of Design Product: DuPont de Nemours Inc. DuPont™ Adhesive/Primer or comparable product by one of the following.

<**Insert manufacturer's name**>.

Peel Adhesion Test: Passes ASTM D 3330, Test Method F, for the following:

Peel Angles: 0, 25, 72, and 180 degrees.

Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.

Chemical Compatibility per AAMA 713: Pass.

Flame Spread Index per ASTM E 84: 5.

Smoke Development Index per ASTM E 84: 0.

* + - 1. FLUID APPLIED FLASHING AND SEALANT
				1. Fluid Applied Flashing: Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material.

Basis-of-Design Product: DuPont de Nemours Inc. DuPont™ Tyvek® Fluid Applied Flashing and Joint Compound+ or comparable product by one of the following:

<**Insert manufacturer's name**>.

VOC Content: ASTM C 1250, less than 2 percent by weight and less than 30 g/L.

Water Vapor Transmission: ASTM E 96, Method B, greater than 20 perms at 25 mils (0.64 mm) thick.

Minimum Tensile Strength: ASTM D 412, 165 psi (1140 kPa).

Minimum Elongation at Break: ASTM D 412, 360 percent.

* + - * 1. Fluid Applied Sealant: ASTM C 920

Extension-Recovery/Adhesion per ASTM C 736: 100 percent recovery.

Accelerated Weathering/Low Temperature Flexibility per ASTM C 793: Pass.

VOC Percentage by Weight per ASTM C 1250: Less than 2 percent.

VOC per ASTM C 1250: Less than 30 g/L.

Retain "Drainage Layer" Article below when specifying both DuPont™ Tyvek® Fluid Applied WB+™ and DuPont™ Tyvek® CommercialWrap® D as two parts of a double-layer system, because drainage is required behind claddings such as stucco, adhered masonry, or installation methods utilizing a lath. Retain Tyvek® CommercialWrap® D option when weather barrier is required to provide for water drainage behind cladding or exterior insulation. Retain "Drainage Layer" Article below and specify drainage product below if a two-layer weather barrier is required for enhanced drainage and protection. Retain "Drainage Layer" Article below only when Tyvek® CommercialWrap® D is part of the weather barrier system; otherwise, delete.

* + - 1. DRAINAGE LAYER
				1. Drainage Layer: Weather barrier membrane with drainage.

Basis-of-Design Product: DuPont de Nemours Inc. [**DuPont™ Tyvek®** **Fluid Applied WB+™ and**] DuPont™ Tyvek® CommercialWrap® D or comparable product by one of the following:

<**Insert manufacturer's name**>.

Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.

1. EXECUTION
	* + 1. EXAMINATION

Suitable substrates for DuPont™ Tyvek® Fluid Applied products include CMU, concrete (48 hours for green concrete), exterior gypsum, oriented strand board (OSB), plywood, wood, treated wood, and metal. See DuPont™ Tyvek® Fluid Applied WB+™ Wall and Substrate Guidelines at [http://commercialspecs.tyvek.com](http://dupontspecs.tyvek.com).

* + - * 1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

Verify that substrates have cured and aged for minimum time recommended in writing by weather barrier manufacturer.

Verify that substrates are visibly dry and frost-free.

Fluid-applied weather barrier may be applied to damp surfaces.

Surfaces are considered damp if there is no visible water on the surface, and no transfer of water to the skin when touched.

Apply accessory products only to clean and dry surfaces.

Verify that substrates are free of efflorescence and mold.

Verify that masonry joints are flush and filled with mortar.

Verify that top-of-wall system has been capped or covered to prevent water getting behind the facade and into wall cavity.

Verify continuous path for moisture drainage.

Verify that continuous path for drainage is not blocked or disrupted, which results in excess moisture buildup in wall cavity.

Verify that surfaces to receive weather barrier are above grade.

* + - * 1. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.

Verify that rough sill framing for doors and windows slopes downward towards the exterior and is level across width of opening.

* + - * 1. Verify air and surface temperatures are above 25 deg F (4 deg C) with a maximum surface temperature of 140 deg F (60 deg C). Do not install once ambient temperature exceeds 95 deg F (35 deg C), unless surface is shaded.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. PREPARATION
				1. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
				2. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
				3. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
				4. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
				5. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
				6. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

Treatment at expansion joints, isolation joints, and other discontinuous joints varies. Not only primary architectural expansion joints but also building expansion joints may need continuous air barriers. Grouted joints between similar materials do not need to be treated. Coordinate expansion-joint treatment with Section 079513.13 "Interior Expansion Joint Cover Assemblies," and Section 079513.16 "Exterior Expansion Joint Cover Assemblies."

* + - * 1. When spraying is method of application, taper ends of the joint treatment to assist maintaining a wall system free of pinholes and voids.
				2. Treat all non-moving transition joints to beams, columns, and dissimilar materials by applying a 2‑inch- (50-mm-) wide by 60-mil- (1.5-mm-) thick coat of fluid-applied flashing across the joint.
				3. Apply 25-mil- (0.6-mm-) thick coat of fluid-applied flashing, extending a minimum 2 inches (51 mm) on each surface, and treat the following conditions:

Joints up to 1/4 inch (6 mm).

Joints 1/4‑ to 1/2‑inch (6- to 13-mm); reinforce with fiberglass-mesh tape.

Joints and transitions up to 1 inch (25 mm); treat using strip flashing.

* + - * 1. Bridge [**isolation joints**] [**expansion joints**] [**and**] discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.
				2. When spraying is method of application, taper ends of fluid applied corner treatment to wall substrate.
				3. Treat inside and outside corners by applying a 25-mil- (0.6-mm-) thick coat of fluid applied weather barrier a minimum 2 inches (50 mm) on each adjoining surface. Apply fillet bead of fluid-applied sealant to inside corners to ensure continuity. Alternatively, treat corners using strip flashing. Press strip flashing into inside corners; ensure that it is fully adhered to substrate.
				4. Seal penetrations using fluid-applied flashing or sealant. Extend fillet bead 1/2 inch (13 mm) onto both surfaces.
				5. Treat embedded masonry anchors by applying a coat of fluid-applied weather barrier or fluid-applied flashing around base of the anchor.
			1. ACCESSORIES INSTALLATION
				1. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

Coordinate installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

Install transition strip on roofing membrane or base flashing, for a minimum 3 inches (75 mm) coverage over each substrate.

Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow to dry.

Retain first subparagraph below when using DuPont product as basis of design.

Use recommended primer when applying self-adhered flashing products on concrete, masonry, and fiber faced exterior gypsum board substrates. Priming is generally not required for adhering self-adhered flashing products to wood. However, adverse weather conditions or colder temperatures may require a primer to promote adhesion. Priming is not required when applying fluid-applied products, except on cut edges of exterior gypsum sheathing.

Apply pressure along entire surface of strip flashing for good bond using a J-roller or firm hand pressure. Remove all wrinkles and bubbles by smoothing surface and repositioning as necessary.

* + - * 1. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

Retain first paragraph below when using DuPont™ Self-Adhered Flashing and DuPont™ Tyvek® Fluid Applied WB+™ product as basis of design.

* + - * 1. When applying self-adhered flashing products over a cured fluid-applied membrane, first apply a wet bed of fluid-applied product.

Retain first paragraph below for buildings 60 feet (18.3 m) or more in height, or for buildings of heights requiring high-performance weather-barrier assemblies.

* + - * 1. Seal fasteners of mechanically attached supports or furring strips in high-performance building envelope designs.

Retain applicable subparagraph(s) below when using DuPont product as basis of design.

Apply double-sided butyl tape to back of support bracket at fastener location.

Embed support bracket into an additional wet bed of fluid applied product.

Adhere butyl-based flashing patch to wall at fastener location.

Use alternate method as approved by the manufacturer.

* + - * 1. At end of each working day, seal top edge of strips and transition strips to substrate with manufacturer approved product.
				2. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
				3. Flashing Sill Area for Windows and Doors:

Use 6‑inch- (150-mm-) wide conformable flashing for 2- by 4‑inch (50- by 100-mm) framing and 9‑inch- (220-mm-) wide conformable flashing for 2- by 6‑inch (50- by 150-mm) framing. When rigid back dams are required or desired, one option to use is a 3/4‑inch (19 mm) corner guard (back dam), cut to length of sill, and nailed into place on interior edge of sill prior to installation of 9‑inch- (220-mm-) wide conformable flashing. Afterward, install 9‑inch- (220-mm-) wide conformable flashing over sill and corner guard back dam.

Install without stretching conformable flashing when installing along sills or jambs. Conformable flashing is intended to be stretched when covering corners or curved sections.

* + - * 1. Apply fluid-applied flashing products from head of opening down. Use a corner trowel to smooth corners.
				2. Repairs:

Coat small damaged areas with layer of fluid-applied product.

Reinforce large damaged areas with fiberglass mesh or replace damaged substrate before reapplying fluid-applied product.

* + - 1. PRIMARY AIR-BARRIER MATERIAL INSTALLATION
				1. Apply air-barrier material to form a seal with strips and transition strips, and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

Fluid applied products may be overcoated once a touch-free skin has formed. Exterior insulation and cladding may be installed once the membrane has cured sufficiently to resist damage during installation.

DuPont™ Tyvek® Fluid Applied WB+™ may be sprayed, brushed, or rolled. See DuPont™ Tyvek® Fluid Applied WB+™ Wall and Substrate Guidelines at [http://commercialspecs.tyvek.com](http://dupontspecs.tyvek.com).

* + - * 1. Apply air barrier material in accordance with air-barrier manufacturer's written instructions and recommendations.

Roller Application:

Nap rolling: Use a roller cover with a 1/2- to 3/4-inch (13- to 19-mm) nap.

Spray Application:

Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

Use spray guard.

Retain "Back Rolling" Subparagraph below when using DuPont™ Tyvek® Fluid Applied WB+™ product as basis of design.

Back Rolling: Use a roller cover with a 1-1/2- to 3/4-inch (13- to 19-mm) nap. Apply fluid-applied product in a single coat at 25 mils (0.64 mm) thick. Control thickness by applying appropriate volume over a marked area and spot checking with a wet-mil gauge.

Retain first paragraph below when using DuPont™ Tyvek® Fluid Applied WB+™ product as basis of design.

* + - * 1. Integrate fluid-applied product with through-wall flashing and window and door flashing by overlapping flashing with fluid-applied product a minimum 2 inches (50 mm).
				2. Inspect surfaces to ensure that fluid-applied products are continuous and free of any voids or pinholes.
				3. Do not cover air barrier until it has been tested and inspected by the testing agency.
				4. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.
			1. FIELD QUALITY CONTROL

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

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

Coordinate test and inspection requirements in this article with Owner.

Retain "Testing Agency" Paragraph below to identify who shall perform tests and inspections. If retaining second option in paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article in Part 1. Testing agency is at expense of Owner or Contractor.

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

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

* + - * 1. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.[**Inspections may include the following:**]

Continuity of air-barrier system has been achieved throughout the building envelope without gaps, holes, or pinholes.

Air-barrier dry film thickness.

Continuous structural support of air-barrier system provided.

Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

Site conditions for application temperature, and dryness of substrates are maintained.

Maximum exposure time of materials to UV deterioration not exceeded.

Surfaces primed, where applicable.

Laps in strips and transition strips comply with minimum requirements, are shingled in correct direction (or mastic applied on exposed edges), and are without fishmouths.

Termination mastic applied on cut edges.

Strips and transition strips firmly adhered to substrate.

Compatible materials used.

Transitions at changes in direction and structural support at gaps provided.

Connections between assemblies (air-barrier and sealants) comply with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.

Each penetration sealed.

* + - * 1. Field Quality Control Testing: Perform the following test on [**representative areas of structural sealant glazed curtain walls**] [**mockups**] <**Insert requirements**>.

In "Air Infiltration Whole Building" Subparagraph below, first option meets minimum code requirements in accordance with ASHRAE 90.1, and second and third options are often required by United States Army Corps of Engineers, and by some state building codes. Consult local authority having jurisdiction to verify air infiltration requirements before editing.

Air Infiltration Whole Building: ASTM E 779 at not more than [**0.40 cfm/sf (2.00 L/s per sq. m)**] [**0.25 cfm/sf (1.25 L/s per sq. m)**] [**0.15 cfm/sf (0.75 L/s per sq. m)**] at 1.57 lb/sq. ft. (75 Pa).

Coordinate test result values below with those called out in "Water Penetration Resistance, Assembly" Subparagraph in "Weather Barrier" Article in Part 2.

Water Penetration: ASTM E 1105 at a minimum [**uniform**] [**and**] [**cyclic**] static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article in Part 2, but not less than [**2.86 lbf/sq. ft. (137 Pa)**] [**6.24 lbf/sq. ft. (300 Pa)**] [**10.4 lbf/sq. ft. (500 Pa)**] [**12.5 lbf/sq. ft. (600 Pa)**]. No water penetration shall occur as defined in ASTM E 1105.

Retain one of first two subparagraphs below.

Perform a minimum of [**two**] [**three**] <**Insert number**> tests in areas as directed by Architect.

Perform tests in each test area as directed by Architect. Perform a minimum three tests, prior to [**10, 30, and 70 percent completion**] <**Insert requirements**>.

Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D 4541 for each [**600 sq. ft. (56 sq. m)**] <**Insert value**> of installed air barrier or part thereof.

See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

* + - * 1. Air barriers will be considered defective if they do not pass tests and inspections.

Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.

Remove and replace deficient air-barrier components for retesting as specified above.

* + - * 1. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

Retain paragraph below if Contractor is responsible for engaging a qualified testing agency to perform tests and inspections. Otherwise, delete this paragraph.

* + - * 1. Prepare test and inspection reports.
			1. CLEANING AND PROTECTION
				1. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.

Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

* + - * 1. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
				2. Remove masking materials after installation.

END OF SECTION[[1]](#footnote-1)

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