UNIFIED FACILITIES GUIDE SPECIFICATION

References are in agreement with UMRL dated January 2021
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SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

05/17, CHG 2: 08/20

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.3 SUBMITTALS
1.4 MISCELLANEOUS REQUIREMENTS
1.4.1 Shop Drawings
1.4.2 Product Data
1.4.3 Mockup
1.4.4 Test Reports
1.5 DELIVERY, STORAGE, AND HANDLING
1.5.1 Delivery
1.5.2 Storage
1.6 CAPILLARY MOISTURE TEST
1.7 FIELD PEEL ADHESION TEST
1.8 AIR BARRIER TESTING
1.9 QUALITY ASSURANCE
1.9.1 Qualifications of Manufacturer
1.9.2 Qualifications of Installer
1.10 PRECONSTRUCTION MEETING
1.11 ENVIRONMENTAL CONDITIONS
1.11.1 Temperature
1.11.2 Exposure to Weather

PART 2 PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER
2.1.1 Physical Properties
2.2 PRIMERS, ADHESIVES, AND MASTICS
2.3 TRANSITION MEMBRANE
2.4 SHEET METAL FLASHING
2.5 JOINT SEALANTS
2.6 REINFORCEMENT

PART 3 EXECUTION

3.1 EXAMINATION
3.2 PREPARATION
3.3 INSTALLATION
3.3.1 Installation of Transition Membrane
3.3.2 Installation of Flashing
3.3.3 Installation of Fluid-Applied Membrane Air Barrier
3.3.4 Installation of Reinforcement
3.4 FIELD QUALITY CONTROL
3.4.1 Site Inspections and Testing
3.5 PROTECTION AND CLEANING
3.5.1 Protection
3.5.2 Cleaning of Adjacent Surfaces
3.6 CLEANUP OF SPILLS

-- End of Section Table of Contents --

Preparing Activity: NAVFAC

UNIFIED FACILITIES GUIDE SPECIFICATION

References are in agreement with UMRL dated January 2021

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS
05/17, CHG 2: 08/20

NOTE: This guide specification covers the requirements for fluid-applied membrane air barriers for use inside exterior wall cavities. This air barrier will serve as the primary component of the air barrier system and, depending on the system specified, may also serve as a vapor retarder. The designer must determine whether a vapor permeable or a vapor retarding system is appropriate for the project. The designer must also verify the appropriate location within the wall assembly by using the tools described in UFC 3-101-01 Architecture, Section "Vapor Retarders."

Compatibility with other materials and components is critical to the success of the air barrier. Coordinate with other building enclosure components (such as wall assemblies, doors, windows) to ensure a complete barrier system that adheres to performance, requirements, primarily air leakage. Coordinate with materials that will penetrate the barrier such as flashing, embed items, and ties for brick veneer.

Use this section in conjunction with Section 07 27 10.00 10, BUILDING AIR BARRIER SYSTEM and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS and coordinate requirements across these sections.

Performance requirements for products herein must contribute to the sustainable goals of the project, including but not limited to Energy Policy Act of 2005 (EPACT 2005), Energy Independence and Security Act of 2007 (EISA 2007), Executive Order (EO) 13423, Executive Order (EO) 13514, UFC 1-200-02 High Performance and Sustainable Building Requirements, UFGS Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING, and other energy and water conservation requirements applicable to the project.

Specify fluid-applied membrane air barriers where

the type of construction favors its economical use, where application would be less difficult than other air barrier applications, and where inclement weather does not dominate site logistics.

When considering the use of vapor retarding air barriers, IBC 2015 introduces a change to the location within wall cavities of class I, II and III vapor retarders depending on their climate zone to avoid condensation within wall assemblies. See IBC Section 1405.3, and the new International Energy Conservation Code (IECC) 2015 referenced by this section of the IBC, coordinate dewpoint with mechanical design, and specify type and location within the cavity accordingly.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes to this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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NOTE: On the drawings, show:

1. Locations where various barriers, retarders and insulation will be used.

2. Transitions between various materials of the building air barrier system.

3. Method of attachment of barriers, retarders and insulation.

4. Location and size of ventilation openings where required.

5. Details for each type of penetration through the air barrier.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the

publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

ABAA Accreditation	Accreditation
ABAA QAP	Quality Assurance Program

ASTM INTERNATIONAL (ASTM)

ASTM C836/C836M	(2015) High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use With Separate Wearing Course
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4541	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D5590	(2000; R 2010; E 2012) Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2016) Standard Test Methods for Water

	Vapor Transmission of Materials
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E2178	(2013) Standard Test Method for Air Permeance of Building Materials
ASTM E2357	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285	(2012) Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.2 RELATED REQUIREMENTS

Coordinate the requirements of Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM[, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS,] and other building enclosure sections to provide a complete building air barrier system. Submit all materials, components and assemblies of the air barrier system together as one complete submittal package.

1.3 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office

(Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications of Manufacturer; G[, [_____]]

Qualifications of Installer; G[, [_____]]

SD-02 Shop Drawings

Fluid-Applied Membrane Air Barrier; G[, [_____]]

SD-03 Product Data

Fluid-Applied Membrane Air Barrier; G[, [_____]]

Transition Membrane; G[, [_____]]

Primers, Adhesives, and Mastics; G[, [_____]]

Reinforcement; G[, [_____]]

Safety Data Sheets; G[, [_____]]

SD-04 Samples

Fluid-Applied Membrane Air Barrier Mockup; G[, [_____]]

SD-06 Test Reports

Capillary Moisture Test; G[, [_____]]

Field Peel Adhesion Test; G[, [_____]]

Flame Propagation of Wall Assemblies; G[, [_____]]

Flame Spread and Smoke Developed Index Ratings; G[, [_____]]

Site Inspections Reports; G[, [_____]]

SD-07 Certificates

Fluid-Applied Membrane Air Barrier; G[, [_____]]

Transition Membrane; G[, [_____]]

SD-08 Manufacturer's Instructions

Fluid-Applied Membrane Air Barrier; G[, [_____]]

Transition Membrane; G[, [_____]]

Primers, Adhesives, and Mastics; G[, [_____]]

1.4 MISCELLANEOUS REQUIREMENTS

For fluid-applied membrane air barriers provide the following:

1.4.1 Shop Drawings

Submit fluid-applied membrane air barrier shop drawings showing locations and extent of barrier assemblies, transition membranes, details of all typical conditions, intersections with other envelope assemblies and materials, and membrane counterflashings. Show details for bridging of gaps in construction, treatment of inside and outside corners, expansion joints, methods of attachment of materials covering the self-adhered barrier without compromising the barrier. Indicate how miscellaneous penetrations such as conduit, pipes, electric boxes, brick ties, and similar items will be sealed.

1.4.2 Product Data

Submit manufacturer's technical data indicating compliance with performance and environmental requirements, manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions, safety requirements for installation, and Safety Data Sheets. Indicate flame and smoke spread ratings for all products.

1.4.3 Mockup

Provide a mockup of the fluid-applied membrane air barrier. Apply product in an area designated by the Contracting Officer. Apply an area of not less than 5 square meters 54 square feet. Include all components specified as representative of the complete system. Notify the Contracting Officer a minimum of 48 hours prior to the test application. Select a test area representative of conditions to be covered including window or door openings, wall to ceiling transitions, flashings, and penetrations, as applicable.

1.4.4 Test Reports

Submit test reports indicating that capillary moisture tests and field peel adhesion tests on all substrate materials have been performed and the changes made, if required, in order to achieve successful and lasting adhesion. Submit test reports for flame propagation of wall assemblies

tested in accordance with NFPA 285. Submit test reports for flame spread and smoke developed index ratings of barrier materials tested in accordance with ASTM E84.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver and store materials in sufficient quantity to allow for uninterrupted flow of work. Inspect materials delivered to the site for damage and store out of weather. Deliver materials to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand designation, description of contents, and shelf life of containerized materials. Store and handle to protect from damage.

1.5.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Protect stored materials from direct sunlight.

1.6 CAPILLARY MOISTURE TEST

Perform a capillary moisture test by plastic sheet method in accordance with ASTM D4263 on the construction mockup and substrate materials. Perform test after curing period as recommended by the air barrier manufacturer. Record mode of failure and area which failed in accordance with ASTM D4263. Once the air barrier material manufacturer has established a minimum adhesion or moisture level for the product on the particular substrate, indicate on the inspection report whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion or moisture value for their product and substrate combination, the inspector must record actual values.

1.7 FIELD PEEL ADHESION TEST

Perform a field peel adhesion test on a construction mockup. Test the applied product for adhesion in accordance with manufacturer's recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D4541. When the manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report must indicate whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product/substrate combination, the inspector must record actual values.

1.8 AIR BARRIER TESTING

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NOTE: Choose first bracketed specification section to address air barrier requirements of the building enclosure. Choose the second bracketed option for projects where the particular service branch requires pressure testing the building enclosure for airtightness. See UFC 3-101-01 for more information.

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Perform air barrier testing in accordance with[Section 07 27 10.00 10

BUILDING AIR BARRIER SYSTEM][Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS].

1.9 QUALITY ASSURANCE

1.9.1 Qualifications of Manufacturer

Submit documentation verifying that manufacturer of fluid-applied membrane air barrier is currently accredited by the Air Barrier Association of America (ABAA Accreditation https://www.airbarrier.org/).

1.9.2 Qualifications of Installer

Submit documentation verifying that installers of the fluid-applied membrane air barrier are currently certified in accordance with the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/).

1.10 PRECONSTRUCTION MEETING

Conduct a preconstruction meeting a minimum of two weeks prior to commencing work specified in this Section. Agenda must include, at a minimum, construction and testing of construction mock up, sequence of construction, coordination with substrate preparation, 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, adjacent materials, and materials and components of the fluid-applied membrane air barrier.

1.11 ENVIRONMENTAL CONDITIONS

1.11.1 Temperature

Install fluid-applied membrane air barrier within the range of ambient and substrate temperatures as recommended in writing by the fluid-applied membrane air barrier manufacturer. Do not apply fluid-applied membrane air barrier to a damp or wet substrate. Do not apply during inclement weather or when ice, frost, surface moisture, or visible dampness is present on surfaces to be covered, or when precipitation is imminent.

1.11.2 Exposure to Weather

Protect fluid-applied membrane air barrier products from direct exposure to rain, snow, sunlight, mist, and other extreme weather conditions. Replace, at no additional cost to the government, barrier products that have been exposed to ultraviolet (sun)light longer than allowed by manufacturer's written requirements.

PART 2 PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

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NOTE: IBC 2015 introduces a change to the location within wall cavities of class I, II and III vapor retarders depending on their climate zone to avoid condensation within wall assemblies. See IBC Section 1405.3, and the new International Energy Conservation Code (IECC) 2015 referenced by this

section of the IBC, coordinate dewpoint with mechanical design, and specify type and location within the cavity accordingly.

NOTE: Choose first bracketed option for vapor permeable barriers. Choose second bracketed option for vapor retarding barriers.

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Provide a fluid-applied, vapor[permeable][retarding], air barrier. This barrier must exhibit no visible water leakage when tested in accordance with ASTM E331 and must perform as a liquid water drainage plane with thru-wall flashing to discharge incidental condensation and water penetration to the exterior of the building enclosure. Provide products suitable for use within temperature ranges specified by manufacturer for the location of the project.

2.1.1 Physical Properties

a. Air Permeance (ASTM E2178): [in accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM][less than 0.02 L per s-m2 at 75 Pa 0.004 CFM per sf at 1.57 psf.]

b. Air Leakage (ASTM E2357, ASTM E283): [in accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM[and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS]][Less than 0.2 L per s-m2 at 75 Pa 0.04 CFM per sf at 1.57 psf at 25 mm one inch].

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NOTE: Provide vapor permeable or vapor retarding barrier in accordance with building enclosure analysis. Choose first bracketed option for vapor permeable barriers. Choose second bracketed option for vapor retarding barriers.

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[c. Water Vapor Permeance (Vapor Permeable Membrane) (ASTM E96/E96M, desiccant method A): 570 ng/Pa s m2 10.0 perms.

][c. Water Vapor Permeance (Vapor Impermeable Membrane) (ASTM E96/E96M, desiccant method A): 5.7 ng/Pa s m2 0.1 perms or less.

] d. Tensile Strength (ASTM D412): Not less than 0.95 MPa 138 psi.

e. Elongation (ASTM D412): Not less than 300 percent.

f. Low temperature Flexibility and Crack Bridging (ASTM C836/C836M): Pass at minus 26 degrees C minus 15 degrees F.

g. Solids by Volume: minimum 50 percent.

h. Flame propagation of wall assemblies (NFPA 285): Pass

i. Surface Burning Characteristics (ASTM E84):

(1) Flame Spread Index Rating not higher than 75 [_____].

(2) Smoke Developed Index Rating not higher than 150 [_____].

j. Resistance to Mold, Mildew and Fungal Growth (ASTM D5590): 0, No growth.

2.2 PRIMERS, ADHESIVES, AND MASTICS

Provide primers, adhesives, mastics, sealants and other accessories as recommended by manufacturer of fluid-applied membrane air barrier for a complete installation.

2.3 TRANSITION MEMBRANE

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NOTE: Transistion membrane materials typically consist of self-adhering membrane products therefore specifier must also edit Section 07 27 19.01 SELF-ADHERING AIR BARRIERS.

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Provide as specified in Section 07 27 19.01 SELF-ADHERING AIR BARRIERS.

2.4 SHEET METAL FLASHING

Provide as specified in Section 07 60 00 FLASHING AND SHEET METAL.

2.5 JOINT SEALANTS

Provide as specified in Section 07 92 00 JOINT SEALANTS.

2.6 REINFORCEMENT

Provide fiberglass mesh tape, or fluid-applied air barrier manufacturer's approved comparable equal product, reinforcement at seams, edges, projections and penetrations. Reinforce all joints exceeding 6 mm1/4 inch with fiberglass mesh.

PART 3 EXECUTION

3.1 EXAMINATION

Before installing fluid-applied membrane air barrier, examine substrates, areas, and conditions under which fluid-applied membrane air barrier assemblies will be applied, with installer present, for compliance with requirements. Ensure the following conditions are met:

a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the membranes.

b. Concrete and masonry surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions. Do not proceed with installation until after minimum concrete curing period recommended by fluid-applied membrane air barrier manufacturer.

c. Fill voids, gaps and spalled areas in substrate to provide an even plane. Strike masonry joints full flush.

d. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263 and take suitable measures until substrate passes moisture

test.

e. Verify sealants used in substrates, and in joints between substrates, are compatible with fluid-applied membrane air barrier.

3.2 PREPARATION

Clean, prepare, and treat substrate in accordance with manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for fluid-applied membrane air barrier application.

a. Remove dust, dirt and other contaminants from joints and cracks before coating surfaces.

b. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through fluid-applied membrane air barrier.

c. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under transition membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.

d. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Continuously support membrane with substrate.

e. For exterior sheathing substrates, ensure that exterior sheathing is stabilized, with corners and edges fastened with appropriate screws. Treat all joints in accordance with the air barrier manufacturer's instructions prior to application of air barrier material. Allow sufficient time for joint treatments to fully cure before application of transition membranes and fluid-applied membrane air barrier.

f. For concrete and masonry substrates, fill all voids and holes, particularly in mortar joints, with non-shrinking grout.

g. Mask off and cover adjacent surfaces to protect from spillage and overspray.

3.3 INSTALLATION

3.3.1 Installation of Transition Membrane

Install transittion membrane materials in accordance with the details on the drawings, Section 07 27 19.01 SELF-ADHERING AIR BARRIERS, and the following:

a. Install transition membrane at all required locations prior to installation of the fluid-applied membrane air barrier.

b. Verify transition membrane is fully adhered to substrate and that its surface is clean, dry and wrinkle free prior to installation of the fluid-applied membrane air barrier.

c. Verify transition membrane completely covers all transition areas and will provide continuity of the finished fluid-applied membrane air barrier without gaps or cracks.

3.3.2 Installation of Flashing

Counterflash upper edge of thru-wall flashing and fluid-applied air barrier. Counter flashing and thru-wall flashing are specified in Section 07 60 00 FLASHING AND SHEET METAL.

3.3.3 Installation of Fluid-Applied Membrane Air Barrier

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NOTE: Select the bracketed option in item b with consideration of the following. Common required finished dry film minimum thickness for smooth surface substrates (e.g. gypsum sheathing) is 40 mils. For rough surface substrates (e.g. CMU block) the required measurable dry film thickness might be 60 mils in order to achieve 40 mil thickness in surface depressions. But, both can vary depending on product and manufacturer requirements. Wet film requirements to develop a required dry film thickness will vary based on the fluid-applied membrane product, application substrate and its surface roughness, application method (spray, roller, brush), and number of coats required by the product manufacturer for the substrate. A thicker wet film will typically be required to assure a minimum finished dry film across a rough surface substrate whereas a smooth surface might require a lesser wet film thickness to develop the required finished dry film. Commonly not less than 40 mil finished dry film is sufficient for smooth surfaces. Not less than 60 mil measurable dry film is recommended over rough surfaces to develop a sufficient full coverage within depressions of the rough surface where the film is not measurable and may be thinner.

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Install materials in accordance with manufacturer's recommendations and the following:

a. Apply fluid-applied membrane air barrier in single or dual coat application by spray or roller. Apply fluid-applied membrane air barrier within manufacturer's recommended temperature range for application.

b. Apply fluid-applied membrane air barrier in manner and at rate and wet film thickness recommended by manufacturer to yield a finished dry film thickness of not less than [1][1.5][_____] mm [40][60][_____] mils or as otherwise required by the manufacturer for the application substrate material and surface roughness..

c. Apply fluid-applied membrane air barrier around all penetrations ensuring a complete and continuous air barrier. Lap fluid-applied membrane air barrier a minimum of 75 mm 3 inch over transition membrane to seal leading edge.

d. Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, HVAC assemblies, plumbing and

electrical assemblies, doors, windows, louvers, and other assemblies penetrating the fluid-applied membrane air barrier with a termination sealant recommended by the fluid-applied membrane air barrier manufacturer.

e. Notify the Contracting Officer and Testing Agency upon completion of fluid-applied membrane air barrier installation. Air barrier materials and assemblies must remain exposed until tested and inspected by the ABAA.

f. Do not allow materials to come in contact with chemically incompatible materials.

3.3.4 Installation of Reinforcement

Install reinforcement at projections, corners, joints, and penetrations where applicable.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Inspections and Testing

Provide site inspections and testing in accordance with ABAA protocol to verify conformance with the manufacturer's instructions, the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/), Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM[, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS,] and this section.

a. Conduct inspections and testing at 5, 50, and 95 percent completion of this scope of work. Forward written inspection reports to the Contracting Officer within five working days of the inspection and test being performed.

b. If the inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Government.

3.5 PROTECTION AND CLEANING

3.5.1 Protection

Protect fluid-applied membrane air barrier assemblies from damage during application and remainder of construction in accordance with manufacturer's written instructions.

Coordinate installation, testing, and inspection procedures to ensure exposure period does not exceed that recommended by the product manufacturer. Remove and replace, at no additional cost to the government, membrane products that exceed manufacturer's allowed exposure limits.

3.5.2 Cleaning of Adjacent Surfaces

Clean excess product from adjacent construction using cleaning agents and procedures as recommended in writing by the manufacturer of each type of affected construction and as acceptable to same.

3.6 CLEANUP OF SPILLS

Conduct cleanup of uncured product spillage in accordance with

manufacturer's written safe handling instructions.

-- End of Section --