SECTION 075419

POLYVINYL-CHLORIDE MEMBRANE ROOFING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

Use this section for where Fully Adhered PVC membrane Roofing is selected as the roofing system.

This roofing section includes three (3) options regarding inspections and /or warranty; two options regarding insulation type; and two options regarding insulation system attachment.

The Contracting Officer (CO) must provide direction to the Specifier on which one of the warranty options will be selected for this project. After receiving direction from the CO, the Specifier must edit the warranty sections to ensure that this option is consistently applied throughout.

The warranty options are:

WARRANTY OPTION 1, Part-Time Third-Party Inspections: these are to be provided at construction milestones as listed below. A manufacturer's warranty is optional. The Contracting Officer may choose to mandate Part-Time Third Party Inspections AND mandate manufacturer’s warranty.

WARRANTY OPTION 2, Full-time Third-Party inspections: an inspector is to be continuously present during the entire period of roofing installation. A manufacturer's warranty is optional. The Contracting Officer may choose to mandate Full-Time Third Party Inspections AND mandate manufacturer’s warranty.

WARRANTY OPTION 3, Manufacturer's Warranty: this option requires a warranty from the manufacturer. Inspections are to be provided by the manufacturer at the milestones listed below or as necessary to meet manufacturer’s requirements.

There are two options regarding primary roof insulation type. The Specifier must provide direction on which one of the options will be selected for this project. The Specifier must edit the section to ensure that this option is consistently applied throughout the section. Note that facilities with a metal roof deck are most conducive to Polyisocyanurate insulation due to the fact that a thermal barrier is not required under the insulation in order to maintain the systems fire rating (use of XPS over a metal deck would require a thermal barrier under the insulation assembly if selected). Concrete roof decks can utilize Extruded Polystyrene Insulation attached directly to the prepared roof deck without the need for a thermal barrier. The Specifier shall determine the insulation type based on existing construction; building code review; and cost analysis. The insulation type options are:

INSULATION Type OPTION 1, Polyisocyanurate.

INSULATION Type OPTION 2, Extruded Polystyrene.

There are two (2) options regarding insulation attachment. The Specifier must provide direction on which one of the options will be selected for this project. The Specifier must edit the section to ensure that this option is consistently applied throughout the section. Note that facilities with a metal roof deck are most conducive to mechanical attachment of the insulation assembly. Facilities with concrete roof decks are most conducive to adhered attachment of the insulation assembly. The Specifier shall determine the insulation type based on existing construction; building code review; and cost analysis. The insulation attachment options are:

INSULATION Attachment OPTION 1, Mechanically attached.

INSULATION Attachment OPTION 2, Adhered.

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1. GENERAL
	1. SUMMARY
		1. Section Includes:
			1. Preparation of roof deck to receive roofing membrane.
			2. Vapor/Air retarder. [Specifier to make determination of use and location within the system based on facility conditions and general environment]
			3. [Mechanically fastened] [Adhesively Applied] Roof insulation and Glass mat gypsum board.
			4. Fully Adhered PVC membrane roofing system.
			5. Flashing membrane.
			6. Accessories.
			7. Edge metal.
			8. [Warranty]
		2. Related Documents:
			1. The Contract Documents, as defined in Section 011000- Summary of Work, apply to the Work of this Section.
			2. Memorandum of Understanding (MOU) between the United States Environmental Protection Agency’s ENERGY STAR® Roof Products Program and Roofing Material Manufacturers.
			3. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
		3. Related Sections:
			1. Section 061000 - Rough Carpentry: Wood blocking, curbs, and nailers.
			2. Section 076207 - Sheet Metal for PVC Roofing.
			3. Section 077213 - Manufactured Curbs: Curbs for roof penetrations.
			4. Section 077233 -Roof Hatches: Hatch with integral curb.
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM C208 - Specification for Cellulosic Fiber Insulating Board.
			2. ASTM C1177 - Standard Specification for Glass Mat Gypsum Roof Board.
			3. ASTM C1289 - Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
			4. ASTM D570 - Test Method for Water Absorption of Plastics.
			5. ASTM D638 - Test Method for Tensile Properties of Plastics.
			6. ASTM D751 - Test Method for Coated Fabrics.
			7. ASTM D1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
			8. ASTM D1079 - Terminology Relating to Roofing and Waterproofing.
			9. ASTM D1204 - Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
			10. ASTM D2136 - Test Method for Coated Fabrics – Low Temperature Bend Test.
			11. ASTM D3045 - Practice for Heat Aging of Plastics Without Load.
			12. ASTM D4434 - Specification for Poly(Vinyl Chloride) Sheet Roofing. (Most Recent Edition) (PVC only)
			13. ASTM D6754 – Specification for KEE Based Sheet Roofing (Most Recent Edition)(KEE only)
			14. ASTM D5602 - Test Method for Static Puncture Resistance of Roofing Membrane Samples.
			15. ASTM D5635 - Test Method for Dynamic Puncture Resistance of Roofing Membrane Samples.
			16. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
			17. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
			18. ASTM E108 - Test Methods for Fire Tests of Roof Coverings.
			19. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres.
			20. ASTM G21 - Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi (KEE only).
			21. ASTM G26 - Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
			22. ASTM G53 - Practice for Operating Light- and Water – Exposure Apparatus (Fluorescent UV/Condensation Type) for Exposure of Nonmetallic Materials.
		2. Factory Mutual Global (FMG):
			1. FMG – RoofNav – Internet Based FM Roof Assembly Testing and Approvals Database
			2. FMG - Approval Guide, Building Materials
			3. FMG - Loss Prevention Data 1-28, Wind Loads to Roof Systems and Roof Deck Securement.
			4. FMG - Loss Prevention Data 1-29, Above Deck Roof Components (June 1996).
			5. FMG - Standard 4450, Class 1 Insulated Steel Deck Roofs.
			6. FMG - Standard 4470, Class 1 Roof Covers.
		3. Underwriters Laboratory (UL):
			1. Class A rated roofing system
			2. Recycled Content Certification
				1. Manufacturer's membrane product recycled content to be validated by UL Environmental (ULE)
	3. SYSTEM DESCRIPTION
		1. ENERGY STAR® Compliant Fully Adhered PVC Membrane Roofing System on Factory Primed Glass Mat Gypsum Roof Board on overlayered insulation secured to [metal or concrete] deck.
	4. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals
			1. Product Data:
				1. FM RoofNav Assembly Number certifying proposed roof system has been tested and approved by FMG for the specified FM [1-90] [1-105] [1-120] rating.
				2. Membrane materials, base flashing, vapor retarder, [fastener & plate,] adhesive materials, edge metal and insulation.
				3. [Insulation fastener layouts complying with FMG Loss Prevention Data Sheet 1-29 patterns for specified wind uplift resistance. Indicate number of insulation fasteners required and spacing of fasteners for field, perimeter, and corners for each pattern.] [Adhesively applied insulation coverage rates and layout must comply with the proposed FM RoofNav assembly number and adhesive application rates relative to that assembly. Indicate insulation adhesive application rates required and the coverage/ribbon spacing of adhesive for field, perimeter, and corners for each pattern. Insulation adhesion rates and coverage/ribbon spacing submissions must also be inclusive of the roof system manufacturer’s instructions, including cold weather installation instructions and are required for approval prior to job start.]
				4. Adhered membrane adhesive and application rates for adhering membrane roof to the overlayered insulation system with coverboard. Membrane adhesive shall be installed in compliance with roof membrane system manufacturer’s FM RoofNav assembly approval number and all of the manufacturer’s instructions including cold weather installation instructions of the proposed shall be required for approval prior to job start.
			2. Shop Drawings: Indicate setting plan for insulation including fastener pattern, layout of roofing seams, direction of laps and base flashing details.
			3. Assurance/Control Submittals:
				1. Certificates: Manufacturer is to certify that components and products meet or exceed specified standards and complies with referenced quality assurance standards in section 1.5 including the FM RoofNav assembly number.
				2. Qualification Documentation: Manufacturer certification indicating roofing applicator qualifications complying with requirements specified in Paragraph entitled "Applicator Qualifications" of this Section.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 1, Part-Time Third-Party Inspections: Include the paragraphs below if Contracting Officer mandates WARRANTY OPTION 1, Part-Time Third-Party inspections.

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* + - * 1. Field Quality Control Reports: Submit the following reports directly to Contracting Officer from the Third-Party Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 -Quality Requirements:

Preparatory inspection.

Initial inspection.

Follow-up inspections.

Final inspection.

Maintenance Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization, and those who received training. Refer to 017704 1.3, 1.4, and 1.5 for more specific training requirements.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 2, Full-time Third-Party Inspections: Include the paragraphs below if Contracting Officer mandates WARRANTY OPTION 2, Full-time Third-Party inspections.

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* + - * 1. Field Quality Control Reports: Submit daily reports directly to Contracting Officer from the Full-time Third-Party Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 -Quality Requirements.
				2. Maintenance Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization, and those who received training. Refer to 017704 1.3, 1.4, and 1.5 for more specific training requirements.

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**NOTE TO SPECIFIER**

Include the paragraphs below if Contracting Officer mandates a Manufacturer's warranty. Delete the paragraphs below if the Contracting Officer chooses to have Part-Time or Full Time Third Party inspections and No Warranty.

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* + - * 1. Sample of specified Warranty
				2. Manufacturer’s certification letter acknowledging receipt of specifications, intent to issue warranty, and intent to perform field audits as outlined in 1.4.3.d.
				3. Manufacturer's Field Reports: Submit the following reports directly to Contracting Officer from Manufacturer's Roofing Quality Control Inspector, with copy to Contractor. Prepare reports in conformance with Section 014000 -Quality Requirements:

Preparatory inspection.

Initial inspection.

Follow-up inspections.

Final inspection.

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**NOTE TO SPECIFIER**

End of WARRANTY OPTION

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* + - * 1. Written certification or product data sheet attesting that proposed roofing membrane meets the EPA ENERGY STAR® Roof Products Program specification for energy efficiency and that the manufacturer is listed as a Partner.
			1. Maintenance Instruction: Document training by furnishing a sign-in sheet with a description of the training provided, instructors name and organization and those who received training. Refer to 017704.
	1. QUALITY ASSURANCE
		1. Applicator Qualifications: Company specializing in PVC membrane roof application with minimum of 5 years documented experience and that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer’s product, and that is eligible to receive a manufacturer’s warranty.
		2. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by membrane manufacturer for specified roofing system and shall be in compliance with all applicable regulatory requirements.
		3. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in the most recent FMG “RoofNav” on-line directory or FMG’s “Approval Guide” for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

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**NOTE TO SPECIFIER**

90 pounds per square foot wind uplift minimum. Design roofing and insulation system to comply with regional requirements and special regulations of local authority having jurisdiction. Verify with USPS Contracting Officer. Contact Roofing System Manufacturer for information about 105 or 120 or greater pounds per square foot of uplift resistance.

Edit "Class" in the following paragraph for project's fire resistance and wind uplift resistance requirements. Verify availability of roofing systems that meet these classifications. “Class 1A” signifies meeting ASTM E 108, Class A fire performance for FMG-approved Class 1 roof covers. For areas having three or more hailstorms annually, FMG recommends roofing systems rated SH (severe hail) instead of MH (moderate hail).

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* + - 1. Fire/Windstorm Classification: Class 1A- [90] [105] [120].
			2. Hail Resistance: [MH] [SH].
		1. Pre‑installation Meeting:
			1. Convene a Pre‑installation Meeting at Project Site one week prior to commencing work of this Section.
			2. Require attendance of parties directly affecting work of this Section.
			3. Review preparation and installation procedures and coordinating and scheduling required with related work.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 1, Part-Time Third-Party Inspections: Include the paragraph below if Contracting Officer mandates WARRANTY OPTION 1, Part-Time Third-Party inspections.

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* + - * 1. Require the Third-Party Roofing Inspector to conduct Pre-installation Meeting along with Contractor Quality Control Representative and Contracting Officer.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 2, Full-time Third-Party Inspections: Include the paragraph below if Contracting Officer mandates WARRANTY OPTION 2, Full-time Third-Party inspections.

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* + - * 1. Require the Full-time Third-Party Roofing Inspector to conduct Pre-installation Meeting along with Contractor Quality Control Representative and Contracting Officer.

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**NOTE TO SPECIFIER**

Include the paragraph below if Contracting Officer mandates a Manufacturer's warranty.

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* + - * 1. Require Manufacturer's Roofing Quality Control Inspector to conduct Pre-installation Meeting along with Contractor Quality Control Representative and Contracting Officer.

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**NOTE TO SPECIFIER**

End of WARRANTY OPTION

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* + - 1. Agenda:
				1. Tour, inspect and discuss condition of substrate, roof drains, roof drain final locations, curbs, penetrations and other preparatory work performed by other trades.
				2. Review structural loading limitations of deck and inspect deck for loss of flatness and for required mechanical fastening.
				3. Review roofing system requirements (Drawings, Specifications and other Contract Documents).
				4. Review required submittals, both completed and yet to be completed.
				5. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
				6. Review requirements for inspections, testing, certifying, and material usage accounting procedures.
				7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
				8. Review safety precautions relating to roofing installation.
	1. DELIVERY, STORAGE AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
		2. Deliver materials in manufacturer's original unopened containers or wrappings, dry, undamaged, seals and labels intact.
		3. Store materials in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure.
		4. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.
	2. PROJECT CONDITIONS OR SITE CONDITIONS
		1. Environmental Requirements:
			1. Do not apply roofing membrane during inclement weather. When air temperature is expected to fall below 40 degrees F, follow submitted roof system manufacturer’s specified Cold Weather Application Procedures.
			2. Do not apply roofing membrane to wet, damp or frozen deck surface or when precipitation is occurring.
			3. Do not expose materials vulnerable to water or the sun in quantities greater than can be weatherproofed during same day.

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**NOTE TO SPECIFIER**

Manufacturer's warranty: Include the paragraphs below if Contracting Officer mandates a Manufacturer's warranty.

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* 1. WARRANTY
		1. Section 017704 - Closeout Submittals: Procedures for closeout submittals.
		2. Special Warranty:
			1. Submit written warranty, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks in roof membrane and base flashings resulting from defects in materials and workmanship.
			2. Warranty shall not exclude “ponding” water.
			3. Warranty Period: [20] [ \_\_\_\_ ] years.
			4. Include materials and workmanship for all manufacturer’s supplied roofing components including but not limited to:
				1. Membranes.
				2. Flashings, including edge metal, metal flashings and accessories supplied by roofing membrane manufacturer.
				3. Insulation.
				4. Fasteners.
				5. Adhesives.
				6. Vapor / Air Retarder
			5. Include the following items within Warranty:
				1. Roofing inspection by Manufacturer's Roofing Quality Control Inspector between 22 and 24 months after date of Final Acceptance.
				2. Roofing manufacturer will provide unlimited repairs on warranted items during warranty period with no cost limitation.
				3. Temporary emergency repairs may be made by United States Postal Service without voiding any warranty provisions. USPS must immediately notify roofing membrane manufacturer of such repairs.
				4. Attach copy of Record Document Roof Plan Drawings, Roof Detail Drawings, and Project Membrane Roofing Specification Section to Warranty.
			6. Wind Coverage
				1. Warranty shall cover wind gusts up to [ \_\_\_ ] miles per hour.

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End of WARRANTY OPTION

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**NOTE TO SPECIFIER**

Verify manufacturer information and availability at time of Project Manual preparation for Project.

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1. PRODUCTS
	1. ROOFING MEMBRANE
		1. Must have recycled content.
		2. Fabric or fiber reinforced Polyvinyl Chloride Roofing Membrane shall comply with ASTM D4434, Type II or Type III. KEE Membrane Shall comply with ASTM D6754.
		3. Minimum thickness of 0.059 inch (59 mil) (1.5 mm)
		4. Product must meet ENERGY STAR requirements for low-slope roofs and must be listed on the ENERGY STAR Roof Products Program Qualified Product List.
		5. Solar reflectance per Energy Star or Cool Roof Council (CRRC)
			1. Initial Reflectance: 0.65 minimum
			2. Three years after installation: 0.50 minimum
	2. ROOFING SYSTEM MANUFACTURERS
		1. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated into the Work include the following:
			1. Carlisle., Carlisle, PA (800) 479-6832
			2. Duro-Last Roofing Inc, Saginaw MI (800) 248-0280.
			3. Johns Manville Roofing Systems, Denver, CO (800) 592-6958.
			4. Seaman Corporation (Fibertite), Wooster, OH (800) 927-8578.
			5. Sika Sarnafil Division, Sika Corp, Canton, MA (800) 451-2504.
			6. Tremco Inc., Beachwood, OH (800) 852-6013.
			7. Versico, Carlisle, PA (800)992-7663
			8. GAF, Parsippany, NJ (833)423-7663
		2. Manufacturer of roofing membrane must be a Partner in the EPA ENERGY STAR® Roof Products Program for energy efficiency and membrane supplied must be listed on the ENERGY STAR Roof Products Qualified Product List.
		3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted with Contracting Officer Approval.

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**NOTE TO SPECIFIER**

Verify manufacturer information and availability at time of Project Manual preparation for Project.

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* 1. AUXILIARY MATERIALS
		1. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
			1. Liquid-type auxiilary materials shall meet VOC limits of authorities having jurisdiction.
		2. Sheet Flashing
			1. Manufacturer’s standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
			2. Manufacturer’s standard PVC clad metal - A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. PVC Clad Metal shall be a 25 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported PVC membrane laminated on one side.
		3. Perimeter Edge and Metal Flashings
			1. To be supplied by the roof system manufacturer in accordance with the rated assembly
				1. Minimum 25 gauge galvanized steel with Kynar finish – color selected by Contracting Officer OR
				2. Roof System manufacturer’s rated and approved clad metal
		4. Bonding Adhesive: Manufacturer’s standard clear or light-colored [solvent] [water]-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
	2. ROOF INSULATION

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**NOTE TO SPECIFIER**

INSULATION TYPE OPTION 1, Polyisocyanurate foam insulation assemblies: Include the paragraphs below if the Specifier chooses Polyisocyanurate insulation.

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* + 1. Flat Roof Board Insulation: Polyisocyanurate Foam Insulation which meets or exceeds FS HH-I-1972/2, both faces covered with glass fiber felt; comply with FMG Standard 4450 Approval. (ASTM C1289, Type II – Class 1 – Grade 2)
			1. Thermal Resistance: in service R-5.6 per inch of thickness in cooling conditions
			2. Thermal Resistance: in service R-5.0 per inch of thickness in heating conditions
			3. Compressive Strength: 20 PSI Minimum
			4. Maximum Board Thickness is 2 inches.
			5. Minimum Board Thickness is 1.5 inches on the base layer.
		2. Tapered Polyisocyanurate Foam Insulation: Provide crickets, saddles, and tapered insulation of same material as second layer of insulation; taper to the following slopes:
			1. Crickets and Saddles: 1/4 inch per foot or twice the slope of the roof, whichever is greater.
			2. Insulation Installed to Counterslope Roof Structure: 1/2 inch to the foot, or twice slope of roof, whichever is greater.
		3. Roof Curb Insulation: Polyisocyanurate foam; thickness to match wood nailer.
		4. Tapered Insulation: Provide crickets, saddles, and tapered insulation of same material as second layer of insulation; taper to the following slopes:
			1. Crickets and Saddles: 1/4 inch per foot or twice the slope of the roof, whichever is greater.
			2. Insulation Installed to Counterslope Roof Structure: 1/2 inch to the foot, or twice slope of roof, whichever is greater.

E. Cover Board: 1/2-inch Factory Primed Glass Mat Gypsum Roof Board: ASTM C-1177. Zero flame spread and zero smoke developed per ASTM E84. Minimum 500 pounds per square inch compressive strength.

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**NOTE TO SPECIFIER**

INSULATION TYPE OPTION 2, Extruded Polystyrene insulation assemblies: Include the paragraphs below if the Specifier chooses Extruded Polystyrene insulation.

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A. Flat Roof Board Insulation: Extruded polystyrene board to ASTM C578, Type IV, rigid, closed cell type, with integral high density skin.

1. Thermal Resistance (ASTM C518): typical 5 year aged value of R-5 per 1 inch of thickness.

2. Compressive Strength (ASTM D1621): Minimum 25 psi.

3. Water Absorption (ASTM D2842): 0.7% by volume maximum.

4. Flame Spread/Smoke Developed Values (ASTM E84): 5/165.

B. Tapered Roof Board Insulation: Extruded polystyrene board to ASTM C578, Type IV, rigid, closed cell type, with integral high density skin.

1. Thermal Resistance (ASTM C518): typical 5 year aged value of R-5 per 1 inch of thickness.

2. Compressive Strength: Minimum 25 psi.

3. Water Absorption (ASTM D2842): 0.7% by volume maximum.

4. Flame Spread/Smoke Developed Values (ASTM E84): 5/165.

C. Cover Board: 1/4-inch Factory Primed Glass Mat Gypsum Roof Board: ASTM C-1177. Zero flame spread and zero smoke developed per ASTM E84. Minimum 500 pounds per square inch compressive strength.

* 1. ACCESSORIES

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**NOTE TO SPECIFIER**

INSULATION ATTACHMENT OPTION 1, Mechanically attached insulation assemblies: Include the paragraphs below if the Specifier chooses mechanically attached insulation.

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* + 1. Roofing Insulation Fasteners: Fasteners shall be as tested and approved by FMG as part of the roofing system assembly.
			1. Mechanical Fasteners for Insulation: Coated fasteners with plates appropriate for purpose intended and approved by Factory Mutual and supplied by roofing membrane manufacturer. Thickness of insulation and roofing membrane manufacturer’s deck penetration requirements shall determine the length of the fastener.

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**NOTE TO SPECIFIER**

INSULATION ATTACHMENT OPTION 2, Adhered insulation assemblies: Include the paragraphs below if the Specifier chooses adhered insulation.

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* + 1. Roofing Insulation Adhesive: Insulation Adhesive shall be as tested and approved by FMG as part of the roofing system assembly.
			1. Insulation Adhesive: [The specifier shall reseach the requirements with respect to Volitile Organtic Compounds and temperature limitations of project to complete this specification section. The completed section will dictate Standard VOC content insulation adhesive, Low VOC content insulation adhesive, OR No VOC content insulation adhesive.]
			2. Specified adhesive shall be for purpose intended and approved by Factory Mutual and supplied by roofing membrane manufacturer.

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**NOTE TO SPECIFIER**

End of INSULATION ATTACHMENT OPTIONS

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* + 1. Walkway Pads: Walkway materials shall be provided by the roofing membrane manufacturer.
		2. Isolation Pads: Provide a piece of walkway pad as above.
		3. Termination: Use roofing membrane manufacturer’s recommended termination details and associated products to comply with Warranty requirements.
		4. Pipe Flashings: Prefabricated pipe flashings shall be supplied by the roofing membrane manufacturer.
		5. Vapor / Air Retarder: [Use and location to be determined by Specifier – Product to be recommended and supplied by roof system manufacturer]
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.

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**NOTE TO SPECIFIER**

Edit paragraph below based on Contracting Officer's selection of roofing inspections and/or manufacturer’s warranty.

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* + 1. Verification of Conditions: Verify, with [Third-Party Roofing Inspector] [Full-time Third-Party Roofing Inspector] [Manufacturer's Quality Control Inspector] present, that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
			1. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys, and eaves. Verify flutes of steel deck are evenly spaced at intersections.
			2. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, and nailing strips, and reglets are in place. Verify deck is supported and tightly secured.
			3. Verify deck surfaces are dry and free of water, snow, and ice.
		2. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		3. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
	1. PREPARATION
		1. Provide covers and other means of protection as necessary to protect building surfaces against damage during roofing work.
		2. Where work shall continue over finished roof membrane, protect surfaces according to roofing membrane manufacturer’s recommendations.
	2. ROOF INSULATION INSTALLATION

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**NOTE TO SPECIFIER**

INSULATION ATTACHMENT OPTION 1, Mechanically attached insulation assemblies: Include the paragraphs below if the Specifier chooses mechanically attached insulation.

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* + 1. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
			1. Gaps between insulation boards, nailers and penetrations of 1/4 inch (0.64 cm) or greater are not acceptable.
		2. Place roof crickets and tapered thickness insulation to the required slope pattern in accordance with manufacturer's published instructions.
		3. Mechanically Attached Installation:
			1. Maximum insulation board dimension is 4 x 8 feet.
			2. Place long edge of boards parallel to deck flutes, forming joint over solid bearing. Lay first layer insulation units with long edge joints continuous and end joints staggered.
			3. Lay second and subsequent layers of insulation with both long side and end joints offset 6 inches (15 cm) from joints below.
			4. Factory primed glass mat gypsum board and overlayered insulation may be loose laid and fastened with the same insulation fastener and plate in accordance with manufacturer’s approved assembly. Fastener and plate must be approved by the roof system manufacturer and installed at the required density to achieve the specified FMG [1A]-[90][105][120] system, in accordance with requirements of FMG Loss Prevention Data Sheet 1-29 for specified wind uplift requirements.
		4. Apply no more insulation than can be waterproofed with roofing membrane in same day.
		5. Mechanically attach a single layer of insulation to manufactured metal curbs.

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**NOTE TO SPECIFIER**

INSULATION ATTACHMENT OPTION 2, Adhered insulation assemblies: Include the paragraphs below if the Specifier chooses adhered insulation.

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* + 1. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
			1. Gaps between insulation boards, nailers and penetrations of 1/4 inch (0.64 cm) or greater are not acceptable.
		2. Place roof crickets and tapered thickness insulation to the required slope pattern in accordance with manufacturer's published instructions.
		3. Adhered Installation:
			1. 4-foot x 4-foot maximum board size for insulation boards adhered to a substrate including successive layers.
			2. Lay second and subsequent layers of insulation so that the insulation board’s joints are staggered vertically and offset from the underlying layers.
			3. Factory primed glass mat gypsum board and overlayered insulation shall be adhered in accordance with the manufacture’s recommendations and submitted FM assenbly number to achieve the specified FMG [1A]-[90][105][120] system, in accordance with requirements of FMG Loss Prevention Data Sheet 1-29 for specified wind uplift requirements.
		4. Apply no more insulation than can be waterproofed with roofing membrane in same day.

E. Mechanically attach a single layer of insulation to manufactured metal curbs.

* 1. ROOFING MEMBRANE APPLICATION
		1. Apply roofing membrane in accordance with membrane manufacturer’s published instructions for specified system.
		2. All quality control recommendations of the roofing system manufacturer shall be strictly followed.
		3. Cold Weather Application Procedures: When air temperature is expected to fall below 40 degrees F, follow Cold Weather Application Procedures as follows:
			1. Store flashing adhesive in heated storage units (minimum temperature 40 degrees F) prior to installation.
			2. Follow roofing membrane manufacturer’s recommendation for cold weather application of adhered field sheets, corner & perimeter area, and flashings.
	2. WATER CUTOFFS AND WEATHER PROTECTION
		1. Install water cut-offs according to roofing membrane manufacturer’s recommendations at end of day's operation to seal insulation and edge of roof membrane from moisture entry. If rain or foul weather appears imminent during roofing application, cease operations and protect deck, insulation, flashings, penetrations and membrane from moisture intrusion and damage with water cutoffs. Insulation and roofing materials not so protected before rain are considered damaged materials and will be rejected.
		2. Water cut-offs over steel deck must include steel deck flute plugs to prevent moisture from getting under insulation.
		3. Remove water cut-offs and other temporary weather protections prior to continuing roofing work. Remove materials that have been subject to moisture damage and return deck to clean, dry condition before proceeding with roofing operations. Remove damaged materials from job site.
		4. Water cut-offs and weather protection shall not be considered part of final roof system specified.
	3. FLASHING MEMBRANE AND ACCESSORIES
		1. Field membrane shall be terminated with fasteners and plates. Flashing membrane, mechanically attached or adhered, shall be extended past the termination of the field membrane and hot air welded on the horizontal plane.
		2. Roof Penetrations:
			1. Prefabricated pipe flashings shall be installed where the configuration of penetration will permit, including but not limited to electrical conduit, and plumbing vents.
			2. Field fabrication of flashing shall be used where the configuration of the penetration prohibits the use of prefabricated flashing.
		3. Fasten membrane and flashing terminations per roofing membrane manufacturer’s recommendations.
		4. Walkway Pads: Weld walkways to roofing membrane per manufacturer’s recommendation.
	4. ROOF SURFACING
		1. No field-applied surfacing shall be utilized with this roofing system.
	5. CONSTRUCTION
		1. Interface with Other Work:
			1. Coordinate Work with installation of associated metal counterflashings as Work of this Section proceeds.
			2. Complete installation of base flashing at roof curbs prior to setting roof top equipment.
			3. Coordinate Work with Plumbing for roof drain(s) installation.
	6. FIELD QUALITY CONTROL
		1. Section 014000 -Quality Requirements: Field inspection.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 1, Part-Time Third-Party Inspections: Include the paragraphs below if Contracting Officer mandates WARRANTY OPTION 1, Part-Time Third-Party inspections.

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* + 1. Field Services: Third-Party Roofing Inspector.
			1. Attend and conduct Pre-installation Meeting.
			2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
			3. Prepare and submit inspection reports for each inspection made.

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**NOTE TO SPECIFIER**

WARRANTY OPTION 2, Full-time Third-Party Inspections: Include the paragraphs below if Contracting Officer mandates WARRANTY OPTION 2, Full-time Third-Party inspections.

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* + 1. Field Services: Full-time Third-Party Roofing Inspector.
			1. Attend and conduct Pre-installation Meeting.
			2. Perform full-time inspections for roof insulation and roofing system.
			3. Prepare and submit inspection reports for each inspection made.

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**NOTE TO SPECIFIER**

OPTION 3, Manufacturer's warranty: Include the paragraphs below if Contracting Officer mandates OPTION 3, Manufacturer's warranty or if the Contracting Officer mandates Option 1 of Option 2 and also chooses the optional manufacturer’s warranty.

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* + 1. Manufacturer's Field Services: Manufacturer's Roofing Quality Control Inspector.
			1. Attend and conduct Pre-installation Meeting.
			2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
			3. Prepare and submit inspection reports for each inspection made.

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**NOTE TO SPECIFIER**

End Manufacturer's warranty

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* + 1. Maintenance Instruction
			1. Provide on-site instruction to review the components of the system and detail any common troubleshooting or maintenance that is required to ensure normal performance of the roofing system.
			2. Provide one complete set of installation details and component manuals that will remain at the installed location.
	1. CLEANING
		1. Section 017300 - Execution: Requirements for cleaning.
		2. Remove dirt, debris, and markings from finished surfaces. In areas where finished surfaces are soiled, consult roofing membrane manufacturer for cleaning advice and comply with their instruction.
		3. Replace defaced or disfigured finishes caused by Work of this Section.
	2. PROTECTION
		1. Where construction traffic must continue over finished roof installation, protect surfaces in manner recommended by roofing system manufacturer to protect Manufacturer's Warranty.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022