SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

Do not use this section for Adhered PVC roofing on noncombustible decks with slopes exceeding 3 inches to the foot or on combustible decks with slopes exceeding 1/2 inch per foot unless coverboard is specified.

Do not use this section for Mechanical PVC roofing on noncombustible decks with slopes exceeding 2 inches to the foot. Do not use this section on combustible decks with slopes exceeding 1/2 inch per foot.

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:

Adhered polyvinyl chloride (PVC) roofing system.

Mechanically fastened, polyvinyl chloride (PVC) roofing system.

Substrate board.

Vapor retarder.

Roof insulation.

Cover board.

Walkways.

* + - 1. DEFINITIONS
				1. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

The definition below supersedes the definition in Section 014216 for Company Field Advisor.

* + - * 1. Company Field Advisor; An individual meeting the requirements of either subparagraph below:

An employee of the company producing or manufacturing the system (or the company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in design, installation, and servicing of the required products, and has experience in the installation of the required products. Personnel involved solely in sales do not qualify.

An individual employed by an organization (other than the company producing or manufacturing the system), certified in writing by the company producing or manufacturing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as company field advisor in their behalf, and has experience in the installation of the required products. Personnel involved solely in sales do not qualify.

* + - 1. PREINSTALLATION MEETINGS
				1. Preinstallation Roofing Conference: Conduct conference at Project site.

Retain subparagraphs below if required. If retaining, revise to include Project-specific requirements. Insert additional requirements to suit Project.

Meet with Director’s Representatives,**[ Construction Manager,]** Director’s Representative's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

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

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

Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

Review structural loading limitations of roof deck during and after roofing.

Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.

Review governing regulations and requirements for insurance and certificates if applicable.

Review temporary protection requirements for roofing system during and after installation.

Review roof observation and repair procedures after roofing installation.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.
				5. Submittals Package: Submit the shop drawings, product data, samples, and quality control submittals specified below at the same time as a package. Partial submittals will not be considered.
				6. Product Data: For each type of product.

For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

Revise the membrane manufacturer’s product data as necessary to suit the requirements of the Contract Documents.

Do not use or submit manufacturer’s details unless there is a proposed deviation from the Contract Documents. In such instances, submit the revised detail, labeled as such, for approval. The revised detail shall show the existing conditions and the proposed change and shall be referenced directly to the related detail on the Contract Drawings.

 Sustainable Design Submittals:

* + - * 1. the following:

Layout and thickness of insulation.

Base flashings and membrane terminations.

Flashing details at penetrations.

Retain one or more subparagraphs below.

Tapered insulation thickness and slopes.

Submit an accurate layout of the tapered insulation showing the slopes to the drains. Show cross section drawings illustrating the location and thickness of tapered insulation pieces and filler pieces. Show thickness of the insulation at high and low points.

Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.

Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

Tie-in with air barrier.

* + - * 1. Samples:

Retain one or more subparagraphs below.

Sheet Membrane: One 6 inch square piece.

Sheet Flashing: One 6 inch square piece.

Insulation: One 6 inch square piece.

Fasteners: Two, each type.

Welded Seam: Two 12 inch square samples of welded seams that are representative of the quality of field welded seams.

Samples must be labeled “Quality Standard Samples”.

* + - * 1. Quality Control Submittals:

Fire Hazard Certification: Submit written certification that the roof system, including the specific insulation, has been tested in conjunction with the type of structural roof deck and roof slope applicable to the project and has achieved an Underwriters Laboratories Class A external fire resistance rating.

Acceptable Certification: Letter from Underwriters Laboratories, or a copy of the Underwriters Laboratories classification listing for the roofing system.

Edit uplift rating to 1-120 for downstate projects.

Wind Uplift Certification: Submit written certification that the roof system, including the specific insulation and fasteners, has been tested in conjunction with the type of structural roof deck applicable to this project, and has achieved a Factory Mutual Class 1-90 Wind Uplift rating.

Acceptable Certification: Letter from Factory Mutual, or a copy of the Factory Mutual Approval Report for the roofing system.

Material Certification: Submit a letter from the roofing membrane manufacturer certifying that the insulation and insulation fasteners are approved for use with the roofing system.

Membrane Manufacturer’s Certification:

Submit a letter certifying that the manufacturer has been actively marketing the submitted system for a minimum of 5 years.

Submit the names and addresses of 5 previous roofing projects. Include the type and size of each project, and name and telephone number of a contact person at the project locations.

Installer’s Certification:

Letter from the membrane manufacturer certifying that the installer is licensed or approved to install the roof system.

Names, address, and telephone numbers of 3 buildings where the installer has installed PVC sheet membrane roof systems that have had the manufacturer’s warranty issued. Include the membrane manufacturer’s name and the warranty number.

Letter certifying that the crew chief and at least two other members of the roofing crew have installed at least 3 PVC sheet membrane roof systems are thoroughly familiar with all aspects of the installation.

Field Test Reports:

First subparagraph below is for concrete roof decks. Second subparagraph is for roof decks requiring fastener-pullout test.

Concrete internal relative humidity test reports.

Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
				2. Contract Closeout Submittals:

Sample Warranties: For manufacturer's special warranties.

Maintenance Data: For roofing system to include in maintenance manuals.

Retain paragraph below for projects that include existing buildings with warranted roof systems interfacing with the Work of this Section.

Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

* + - 1. QUALITY ASSURANCE
				1. Manufacturer Qualifications: A qualified manufacturer that is **[UL listed] [listed in FM Approvals' RoofNav]** for roofing system identical to that used for this Project.

The manufacturer shall have the technical expertise and qualified technical representatives to quickly resolve questions or problems that may arise both during and after the Work is completed.

The manufacturer shall have been actively marketing a mechanically attached PVC roof system in the United States for a minimum of 5 years.

The manufacturer shall provide the names, addresses, and telephone numbers of at least 5 previous projects of comparable size, scope, and complexity as the Work of this Section.

The manufacturer shall require that the roof system be installed by a licensed or approved installer.

* + - * 1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

The application of the roofing system shall be performed by an installer licensed or approved by the membrane manufacturer. The licensed or approved installer shall have previously installed at least 3 PVC sheet membrane systems for which the manufacturer’s warranty was issued.

Workers: The crew chief or foreman and at least two other members of the roofing crew shall have installed at least 3 PVC sheet membrane roof systems and shall be thoroughly familiar with all aspects of the installation.

* + - * 1. Fire Hazard Classification: The sheet membrane roof system shall have an Underwriters Laboratories Class A External Fire Resistance rating; as determined by tests conducted in conformity with UL-790 “Tests for Fire Resistance of Roof Covering Materials”.

The roof system, which includes a specific generic type of insulation and in some instances a specific name brand insulation, shall have been tested in conjunction with the type of structural roof deck and roof slope applicable to this project.

* + - * 1. Material Classification Identification: All materials delivered to the site that are a component of the roofing system shall bear the UL Classification mark.
				2. Inspections:

For the purpose of the required inspections, the Contractor shall keep the Company Field Advisor and the Director’s Representative advised of the progress of the Work and the anticipated Work schedule as the Work progresses.

* + - * 1. Welded Seams (Splicing): Job site, and factory welded seams (if any) must be of the same quality and exhibit the same physical characteristics as the quality standard samples which are submitted for approval. The approved samples will be the standard of quality required for all welded seams. Failure to maintain the standard will be cause for rejection of the Work.

The approved samples must exhibit the following minimum physical characteristics:

The welded seams must be at least as strong as the parent material. The mating surfaces of each sheet must remain fully bonded to each other when sufficient peel or shear force is applied to the seam to delaminate or break the parent material.

The welded seam must be a minimum of 1-1/2 inches wide.

There must be complete fusion of the mating surfaces, with no skips, voids, or fishmouths.

Questions regarding the use of the article below should be directed to the Business Unit’s Roofing QIT Representative.

* + - 1. ROOFING MANUFACTURER’S COMPANY FIELD ADVISOR
				1. The manufacturer of the roofing system, issuing the final system guarantee on this roofing project, must supply a Company Field Advisor, as a technical representative, with the following minimum qualifications:

Five years of field experience on the same type of roofing system.

Ten projects where role was a Company Field Advisor; include contact names and phone numbers for each project.

Attendance at a roof specific instructional seminar within the last two years.

It is mandatory to discuss the use of the paragraph below with the Client, the Division of Construction, and perhaps the specified manufacturers, at project inception, particularly on downstate projects. There is a fee associated with the number of hours for a field advisor to be on a project. Include this additional cost in the project estimate beginning with the program estimate.

Edit number of days and hours below depending on size and complexity of project. Six days at 4 hours per day could work as a minimum for a simpler project. Six days or more, at more than 4 hours per day could work for a larger, more complex project.

* + - * 1. Secure the services of the Company Field Advisor for a minimum of **<Insert Value>** days at a minimum of **<Insert Value>**hours per day to inspect the workmanship of the roofing system installer.
				2. Company Field Advisor Duties and Responsibilities:

Become familiar with the Contract Documents and approved submittals prior to the pre-roofing conference.

Attend the pre-roofing conference and the beginning of the actual membrane installation for the purpose of:

Rendering technical assistance to the Contractor regarding installation procedures of the system.

Familiarizing the Director’s Representative with aspects of the system including inspection techniques.

Answering questions that might arise.

Edit remaining subparagraphs below to suit project complexity and need. Discuss appropriateness of subparagraphs with design project manager and the division of construction.

Attend each bi-weekly meeting.

Be objective, unbiased and impartial in each inspection, recommendation, conversation, action and written report.

Inspect and approve the existing substrate, flashing, blocking, and related materials as being acceptable for the installation of the roofing system.

Ensure proper fastening patterns and fastener sizes of wood blocking, insulation, edge flashing, and related components.

Immediately report non-compliant conditions, if any, to the Director’s Representative.

Provide to the Director’s Representative a written report, submitted prior to leaving the Project Site each day the Company Field Advisor is present. Each daily written report shall contain at a minimum:

Date of report and inspection.

Weather conditions at the start, middle, and end of the workday.

Work performed including Contractor activity, contractor crew size, supervisor’s name, area of activity, and progress and quality of the work as observed.

Discussions with Contractor regarding work anomalies and resolution.

Conditions that are not in compliance with the Contract documents.

Continue documenting non-compliance issues in subsequent reports until the issue has been resolved. Document resolution of non-compliance issues when resolved.

Report to the Director’s Representative in writing failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.

Confirm, after completion of the roofing work and based on the Company Field Advisor’s inspections and tests, that the Company Field Advisor has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
				2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

Store volatile liquids in separate storage building or trailer, or remove from the site at the end of each work day.

* + - * 1. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
				2. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.
			1. FIELD CONDITIONS
				1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
				2. Regardless of any temporary power provided in Section 015000, power will not be provided for heat welding equipment. The installer shall provide portable generators of the size and type recommended by the membrane manufacturer.
				3. Do not execute the Work of this Section unless the Director’s Representative is present or unless they direct that the Work be performed during their absence.
				4. Do not execute the Work of this Section unless the substrate is dry and free of dirt and debris.
				5. Moisture Protection:

Cover, seal or otherwise protect the roof and flashings so that water cannot accumulate or flow under completed portions. When and where necessary to accomplish this, provide temporary water cut-offs in accordance with the membrane manufacturer’s written specifications.

Use subparagraph below on rehabilitation work only.

Limit the removal of existing materials to areas that can be completely re-roofed or temporarily protected within the same day. At the discretion of the Director’s Representative, a watertight built-up vapor barrier may be acceptable temporary protection for a maximum of 48 hours.

* + - * 1. Do not smoke or use open flames near volatile materials.
				2. During the progress of the work every effort must be made to keep odors generated by the work from entering the building.

Coordinate the use of materials that could cause odors to permeate the building with the Director’s Representative.

Shut off and wrap all air intakes in the vicinity of the work.

Ensure that all operable windows in the vicinity of the work area closed.

* + - 1. WARRANTY
				1. Warranty Extension: The one year period required by Paragraph 9.8 of the General Conditions is extended to 2 years for the Work of this Section. Refer to Supplementary Conditions.

Include 007306 Supplementary Conditions - Warranty Extension.

* + - * 1. Manufacturer’s Warranty: In addition to the 2 year period specified above, furnish the membrane manufacturer’s printed 10 year, no dollar limit, full system warranty covering workmanship and materials for the Work of this Section. The warranty shall include, but not be limited to, repair of leakage, and the repair and/or replacement of the roofing system caused by defects in materials or workmanship.
1. PRODUCTS
	* + 1. SYSTEM DESCRIPTION

Edit below to suit system.

* + - * 1. Fully Adhered System: PVC Membrane fully adhered to coverboard with bonding adhesive and insulation mechanically attached or hot mopped or adhesively attached to the structural deck or substrate board.
				2. Mechanically Attached System: Rigid insulation and PVC sheet membrane mechanically attached to the structural deck.
			1. PERFORMANCE REQUIREMENTS
				1. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

Requirements in "Accelerated Weathering" and "Impact Resistance" subparagraphs below are required by the BCNYS for all roof coverings installed on roofs with slopes less than 2:12.

Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

* + - * 1. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

Retain "Wind Uplift Resistance" paragraph below for nonballasted roofing systems. See the Evaluations and "Roof Wind Designer" online software program, or consult Structural Engineer for determination of wind uplift pressures.

If Project has wood or wood panel roof decks, verify with roofing system manufacturers that test reports are available.

* + - * 1. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

Indicate dimensions of perimeter and corners in subparagraphs below for simple roof shapes, or on Drawings.

Zone 1 (Roof Area Field): **<Insert lbf/sq. ft. >**.

Zone 2 (Roof Area Perimeter): **<Insert lbf/sq. ft. >.**

Location: From roof edge to <Insert dimension> inside roof edge.

Zone 3 (Roof Area Corners): <**Insert lbf/sq. ft.** >.

Location**: <Insert dimension>** in each direction from building corner.

Retain "FM Approvals' RoofNav Listing" paragraph below if Project is FM Global, insured or if FM Global requirements will set a minimum quality standard. Delete paragraph if roof assembly includes a cementitious wood fiber, wood, or wood panel roof deck because FM Approvals' RoofNav does not include listing for such roof decks. Coordinate requirements in FM Approvals classification with other requirements in this Section. Loosely laid and ballasted roofing systems cannot be approved by FM Approvals but may be accepted on a project-by-project basis. For further clarification, consult FM Approvals.

* + - * 1. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

"Class 1A" signifies compliance with ASTM E108, Class A fire performance for FM Approvals-approved Class 1 roof covers. Retain Class 1A-120 for Downstate projects.

Fire/Windstorm Classification: Class 1A-90 **[Class 1A-120]**.

Retain one option in "Hail-Resistance Rating" subparagraph below based on geographical location of Project or desired rating. Verify availability of roofing systems, including specified components, that comply with these ratings using FM Approvals RoofNav.

Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 **[MH] [SH] [VSH]**.

Retain applicable "Solar Reflectance Index," "ENERGY STAR Listing," or "Energy Performance" paragraph below if "cool-roof" performance is required. Verify that PVC roof membrane specified complies before retaining.

Retain "ENERGY STAR Listing" paragraph below for roofs that must comply with the ENERGY STAR requirements. The DOE's ENERGY STAR "Roof Products Qualified Product List" is available in PDF at www.energystar.gov.

* + - * 1. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for **[low] [steep]**-slope roof products.

Usually retain "Energy Performance" paragraph below for roofs that must comply with "California Code of Regulations, Title 24." Options are values required for low-slope roofs by prescriptive approach; revise if other values are required for building-envelope trade-off approach or whole-building performance approach. A list of products tested according to CRRC-1 with their test values is available in PDF at www.coolroofs.org.

* + - * 1. Energy Performance: Roofing system shall have an initial solar reflectance of not less than **[0.70] <Insert value>** and an emissivity of not less than **[0.75] <Insert value>** when tested according to CRRC-1.
			1. POLYVINYL CHLORIDE (PVC) ROOFING

Retain 60mil thickness for adhered installations and 45mil thickness for mechanically fastened installations.

* + - * 1. PVC Sheet: ASTM D4434, Type II, reinforced, fabric backed.

Retain one thickness in "Thickness" subparagraph below or revise to suit Project. Verify availability with manufacturers.

Thickness: **[60 ][45]**mils.

Exposed Face Color: White.

* + - * 1. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
			1. AUXILIARY ROOFING MATERIALS
				1. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

* + - * 1. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

Delete below if PVC coated metal is not used. If used, cross reference material in flashing and trim section. Coordinate with drawings.

* + - * 1. PVC Coated Metal: Membrane manufacturer’s PVC coated, 0.023 inch thick, G-90 galvanized steel sheet.
				2. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
				3. Prefabricated PVC Flashing: Membrane manufacturers prefabricated flashings.

Inside and outside corners.

Pipe flashing.

Expansion joint covers.

Retain below if trim is required.

* + - * 1. Decorative PVC Trim:

Membrane manufacturers extruded PVC profile simulating the appearance of a standing seam roof and appropriate accessories.

Membrane manufacturers extruded PVC profile simulating the appearance of a batten seam roof and appropriate accessories.

* + - * 1. Roof Vents: As recommended by roof membrane manufacturer.

Size: Not less than 4-inch diameter.

* + - * 1. Bonding Adhesive: Manufacturer's standard[, water based].

Retain "Water-Based, Fabric-Backed Membrane Adhesive" or "Low-Rise, Urethane, Fabric-Backed Membrane Adhesive" paragraph below to adhere fabric-backed PVC roof membrane. First paragraph describes proprietary cold-applied adhesive. Third paragraph describes a proprietary spray-applied, low-rise urethane.

* + - * 1. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
				2. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.

Retain one of two "Slip Sheet" paragraphs below if slip sheets are required. NRCA recommends separator sheets between non-fabric-backed PVC membranes and the substrate, including extruded- and molded (expanded) polystyrene insulation, asphalt-based products, and coal-tar products. See roofing system manufacturer's specifications for requirements. Retain first paragraph over cementitious wood-fiber roof decks if required by roof membrane manufacturer.

* + - * 1. Slip Sheet: ASTM D2178, Type IV, glass fiber, asphalt-impregnated felt.

Retain "Vented Base Sheet" paragraph below for lightweight insulating concrete roof decks.

* + - * 1. Vented Base Sheet: ASTM D4897, Type II; nonperforated, asphalt-impregnated fiberglass reinforced, with mineral granular patterned surfacing on bottom surface.
				2. Use below on pipes and vent stacks
				3. Compression Clamp: Stainless steel worm drive hose clamp.
				4. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
				5. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
				6. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

Wood Decks: Factory Mutual approved, hardened, self-tapping, Phillips pan head screws with 3 inch round, square, or hexagonal steel stress plates.

Screws and plates as approved by the membrane manufacturer.

Minimum penetration one inch, minimum pull out resistance from deck 400 pounds unless specified otherwise by the membrane manufacturer.

Steel Decks: Factory Mutual approved, hardened, self-tapping, Phillips pan head screws with 3 inch round, square or hexagonal steel stress plates.

Screws and plates as approved by the membrane manufacturer.

Minimum penetration 1/2 inch, minimum pull out resistance from deck 400 pounds unless specified otherwise by the membrane manufacturer.

Do not use subparagraph below if deck is less than 2-3/4 inches thick.

Concrete Decks: Factory Mutual approved, hardened, self-tapping, Phillips pan head screws with 3 inch round, square, or hexagonal steel stress plates, or Factory Mutual approved hammer driven spike type fasteners with 3 inch round, square, or hexagonal steel stress plates.

Fasteners and plates as approved by the membrane manufacturer.

Minimum penetration one inch, minimum pull out resistance from deck 400 pounds. unless specified otherwise by the membrane manufacturer.

Edit heading in subparagraph below for the type of deck.

Structural Wood Fiber Decks/Gypsum Decks/Lightweight Concrete Decks: Factory Mutual approved, 1/4 inch diameter magnesium aluminum threadless fastener with self-piercing carbon steel mandrel, “TPR PEEL RIVET” by Creative Construction Components. Insert TPR through 3 inch round, square or hexagonal steel stress plates.

Minimum penetration 2 inches.

Edit subparagraphs below for applicable deck.

Structural Wood Fiber Decks: Minimum pullout resistance 300 pounds.

Gypsum Decks: Minimum pullout resistance 350 pounds.

Lightweight Concrete Decks: Minimum pullout resistance 350 pounds.

Use subparagraph below for PVC membrane flashings only. Do not use for PVC coated metal.

Base Flashing Fasteners (For Top Edge Of Flashing):

Edit subparagraph below for applicable surfaces.

Masonry Surfaces: Hardened masonry nails or drive pins thru 1-1/4 inch sheet metal discs.

Sheet Metal Surfaces. Hardened, self-tapping, #10 sheet metal screws thru 1-1/4 inch sheet metal discs.

Wood Surfaces: “Cap Nail” annular ring roofing nail with one inch diameter or square solid cap, by Simplex Nails Inc.

* + - * 1. Pitch Pocket Filler Materials:

Mortar: ASTM C 270, Type S.

Pourable Sealer: Membrane manufacturer’s 2 component liquid urethane.

* + - * 1. Miscellaneous Accessories: Provide night seal, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
			1. SUBSTRATE BOARDS

Use article below on all combustible decks, when using a vapor retarder on combustible decks. ½ inch should be specified for wide fluted metal decks.

* + - * 1. Substrate Board: ASTM C1177, glass-mat, water-resistant gypsum substrate or ASTM C1278, fiber-reinforced gypsum board.

Products: Subject to compliance with requirements, provide one of the following:

Georgia-Pacific Gypsum LLC; Dens Deck.

USG Corporation; Securock Glass-Fiber Roof Board.

Approved equivalent.

Thickness: 1/2 inch.

Surface Finish: **[Factory primed] [Unprimed]**.

Use paragraph below on re-roof jobs with membrane flashings unless new plywood is shown on details. Do not use on new buildings or on re-roof jobs with PVC coated metal base flashings.

* + - * 1. PVC Sheet Flashing Substrate Board: Membrane manufacturer’s polyester felt underlayment/substrate board specifically intended to isolate the PVC from asphalt contaminated surface.
				2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.
			1. VAPOR RETARDER

Use below to repair existing vapor retarder

* + - * 1. Materials For Repair Of Existing Vapor Retarder:

Primer: Quick drying asphalt primer; as identified in ASPHALT MATERIALS below.

Asphalt Fiberglass Base Sheet: Nonporous asphalt coated glass fiber base sheet: ASTM 4601, Type I.

Plastic Roof Cement: Non-asbestos bearing, fibrous, flashing grade; ASTM D 4586.

Bitumen: as identified in ASPHALT MATERIALS below.

Interply Adhesive: Membrane manufacturers cold process solvent based modified adhesive.

Asphalt content: 42 percent ASTM D 4479

Density: 8 lbs/gal ASTM D 1475

Asbestos content: None.

Retain "Glass-Fiber Felts" paragraph below if a built-up vapor retarder composed of felts and hot asphalt is required. Usually delete for sustainable projects. Verify with applicable sustainable program.

Built-up Vapor retarder is required for Steel decks (over substrate board or insulation), Concrete Deck, Wood, Structural Wood Fiber Decks, Gypsum Decks and Lightweight Concrete Fill.

* + - * 1. Glass-Fiber Felts: ASTM D2178, Type IV, asphalt impregnated.

Use below to install new vapor retarder on steel decks on mechanically fastened roofing system.

* + - * 1. Materials For Vapor Retarder:

Kraft Paper and Adhesive: Laminated high strength kraft paper and asphaltic adhesive;

Products: Subject to compliance with requirements, provide one of the following:

Owens Corning; Permstop Vapor Retarder and Permstop Adhesive.

St. Regis, Sisalkraft Division; Vaporstop 398 and Pyro-Kure Adhesive.

Approved equivalent.

Delete article below when no building expansion joint shown.

* + - 1. EXPANSION JOINT MATERIALS
				1. Prefabricated Expansion Joint Cover: Neoprene foam bellows welded to PVC cover with galvanized metal flanges.
				2. Expansion Joint Filler: Neoprene or polyethylene joint filler 25 percent wider than the width of the joint.
				3. Expansion Joint Tube: 2 inch diameter polyethylene tube.
			2. ROOF INSULATION
				1. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.
				2. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

Coordinate "Compressive Strength" subparagraph below with grade of insulation retained in "Polyisocyanurate Board Insulation" paragraph above.

Compressive Strength: 20 psi.

Adhered insulation usually requires first option in "Size" subparagraph below.

Size: **[48 by 48 inches] [48 by 96 inches]**.

Revise base layer thickness to suit Project. Insert upper layer insulation thickness to achieve required R-value of roof/ceiling assembly.

Thickness: provide thickness required to achieve R-value of roof/ceiling assembly.

* + - * 1. Tapered Insulation: Provide factory-tapered insulation boards.

Material:

Field: Match roof insulation.

Saddles and Crickets: Membrane manufacturer’s approved asphalt impregnated factory tapered wood fiberboard insulation conforming to ASTM C 208.

Minimum Thickness: 1/4 inch.

Slope:

Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.

Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

* + - 1. INSULATION ACCESSORIES
				1. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

Retain "Fasteners" paragraph below if insulation requires mechanical fastening. Retain option if separate cover boards require fastening.

* + - * 1. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
				2. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

Retain one of first three subparagraphs below.

Modified asphaltic, asbestos-free, cold-applied adhesive.

Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

Full-spread, spray-applied, low-rise, two-component urethane adhesive.

For reroofing applications where a portion of the exiting roofing system remains (re-covering), retitle these paragraphs "Recovery Board." Cover boards are usually needed over noncomposite foam insulation.

Retain “Cover Board” for combustible decks. Use paragraph below on all types of roofing systems. Coverboard insulation is also available in 1/4 inch thickness.

* + - * 1. Cover Board: ASTM C1177, glass-mat, water-resistant gypsum board or ASTM C1278 fiber-reinforced gypsum board.

Products: Subject to compliance with requirements, provide one of the following:

Georgia-Pacific Gypsum LLC; Dens Deck.

USG Corporation; Securock Glass-Fiber Roof Board.

Approved equivalent.

Thickness: **[1/4 inch] [1/2 inch]**.

Surface Finish: **[Factory primed] [Unprimed]**.

* + - 1. ASPHALT MATERIALS

Retain this article if adhering fabric-backed roof membranes or roof insulation or if creating a built-up vapor retarder from felts and hot asphalt.

* + - * 1. Roofing Asphalt: ASTM D312, Type III.

Retain "Asphalt Primer" paragraph below if priming concrete roof deck.

* + - * 1. Asphalt Primer: ASTM D41.

Retain "Interply Adhesive" paragraph below if for built up vapor retarders.

* + - * 1. Interply Adhesive: Membrane manufacturers cold process solvent based modified adhesive. Asphalt content: 42 percent ASTM D 4479.
			1. WALKWAYS
				1. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

Size: Approximately 36 by 60 inches.

Color: Contrasting with roof membrane.

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

Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.

Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

Retain first subparagraph below for steel roof deck.

Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

Retain or revise subparagraphs below for concrete roof decks.

Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.

Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than **[75] <Insert number>** percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

Test Frequency: One test probe per each **[1000 sq. ft.] <Insert area>**, or portion thereof, of roof deck, with no fewer than three test probes.

Submit test reports within 24 hours of performing tests.

Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

Retain first subparagraph below for lightweight insulating concrete roof decks.

Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.

Retain both subparagraphs below for cementitious wood fiber-roof decks.

Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.

Verify that adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch.

* + - * 1. Testing Existing Roof Drains and Conductor Pipes: Before commencing with the work, water test existing roof drains and conductor pipes and submit a written report to the Director’s Representative, indicating which drains or conductors, if any, are not functioning properly. Repair of existing drains and conductors is not included in the Work. Repair Work (if any) may, at the Director’s option, be accomplished by an Order on Contract.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. PREPARATION
				1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
				2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

Retain first paragraph below for lightweight insulating concrete roof decks, wood and wood panel roof decks, poured gypsum roof decks, cementitious wood-fiber plank roof decks, and steel roof decks less than 0.0295 inch thick.

* + - * 1. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

Before commencing with the roofing work, in the presence of the Director’s Representative, install 3 fasteners thru a sample of the approved insulation into the structural deck. Test the pull out resistance of each fastener with a pull out tester such as “Fabco Pull Tester” by Fabco Fastening Systems.

Test the fasteners at locations selected by the Director’s Representative.

Do not proceed with the roofing work if the pull out resistance of the fasteners is less than that specified in this Section.

Submit test result within 24 hours of performing tests.

Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

Retain paragraph below if acoustical roof deck rib insulation, shaped to fit into topside ribs of acoustical roof deck, is installed in this Section.

* + - * 1. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

Use paragraph below with existing roof removal to repair existing vapor retarder. All decks except steel.

Patching Existing Vapor Retarder: Remove all loose and/or deteriorated portions of the existing vapor retarder. Patch all defective areas with fiberglass felt embedded in and coated with asphalt plastic roof cement. Extend the patch a minimum of 6 inches beyond the defect on all sides.

Use paragraph below when existing roofing membrane is to remain. Edit for type of roofs.

* + - * 1. Preparing Existing Roof Membrane:

Gravel Surfaced Roofs: Remove loose aggregate surfacing, dirt, debris and surface moisture by power sweeping and vacuuming. Only firmly bonded gravel may be left in place. Remove high spots of the gravel to produce a reasonably level and smooth surface.

Smooth Surface Roofs: Remove dirt, debris, and surface moisture.

Cut open blisters so they lay flat. Where blisters will not lay flat, cut off raised or loose portions.

Use paragraph below only when there are known wet areas of existing insulation. Coordinate with drawings.

Where shown and directed cut open the existing roofing membrane and remove wet insulation. Fill the void left by the removals, with insulation to match the existing thickness.

If roofing system is not installed the same day, patch all defective areas with 2 plies of fiberglass felt embedded in and coated with asphalt plastic cement. Extend the patch a minimum of 6 inches beyond the defect on all sides.

* + - 1. INSTALLATION OF ROOFING, GENERAL
				1. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
				2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

Retain first paragraph below if tie-ins to existing roofing are required.

* + - * 1. Install roof membrane and auxiliary materials to tie into existing roofing to maintain weathertightness of transition**[ and to not void warranty for existing roofing system]**.

Retain paragraph below when air barriers are part of Project. Drawing details should specifically illustrate transition between different air barrier components.

* + - * 1. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under **[Section 072713 "Modified Bituminous Sheet Air Barriers."] [Section 072715 "Nonbituminous Self-Adhering Sheet Air Barriers."] [Section 072726 "Fluid-Applied Membrane Air Barriers."]**
				2. Phasing of Membrane Installation:

At the end of each working day temporarily seal the loose edge of the membrane so that water does not flow beneath the completed portion. Spud off existing aggregate (if any) in the area to be sealed, remove dirt, dust and foreign matter. Install the temporary seal.

Apply the membrane manufacturer’s night seal over the area to be sealed. Embed the membrane into the night seal. Apply a continuous weight over the membrane and note seal. Before the work resumes cut off and discard all portions of the membrane that have been embedded in the night seal.

Install flashings as the membrane is being installed (same working day). If the flashing cannot be completely installed in one day, progress the installation until the flashing is in a watertight condition.

* + - 1. INSTALLATION OF SUBSTRATE BOARD
				1. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

Retain first subparagraph below for steel roof decks.

At steel roof decks, install substrate board at right angle to flutes of deck.

Locate end joints over crests of steel roof deck.

Tightly butt substrate boards together.

Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Retain one of first two subparagraphs below if mechanical fastening of substrate board to steel roof deck is required. Substrate board is usually attached when base layer of roof insulation, which overlays substrate board, is attached.

Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.

Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

* + - 1. INSTALLATION OF VAPOR RETARDER

Edit the following subparagraphs below to suit the type of vapor retarder attachment.

Use paragraph below on steel decks.

* + - * 1. Installing Vapor Retarder and Vapor Retarder Substrate Board On Steel Decks:

Install one layer of vapor retarder substrate board over the steel deck. Install the substrate with the long edges running in the same direction as the flutes of the deck with edge joints bearing on the solid portions of the deck. Stagger end joints. Butt edges and ends snugly.

Secure the substrate to the deck in accordance with FM Loss prevention Data 1-28 including enhanced perimeter and corner fastener spacing. Set the fasteners with sufficient force to hold the board firmly against the deck surface. Check each fastener to ensure that it is securely anchored to the deck.

Over the substrate install 2 plies of fiberglass felt. Install the felts shingle fashion. Lap the felts 19 inches over each preceding ply.

Embed each ply of felt in a solid mopping of hot steep asphalt applied at the rate of 25 pounds per square. Broom the surface for complete embedment.

Select above or below in accordance with application method

Embed each ply in interply adhesive applied to the substrate in accordance with the manufacturer’s printed instructions.

If insulation will not be installed the same day the vapor barrier is installed, apply a glaze coat of asphalt or adhesive over the vapor barrier.

Use paragraph below to install vapor retarder over concrete decks and existing vapor retarders.

* + - * 1. Installing Vapor Retarder On Concrete Decks or Existing Vapor Retarders:

Apply asphalt primer at the rate of one gallon per square before application of vapor retarder.

Install 2 plies of asphalt fiberglass felt shingle fashion. Lap plies 19 inches over each preceding ply.

Embed each ply in a solid mopping of hot steep asphalt applied at the rate of 20 pounds per square. Broom in each ply to complete embedment.

If the insulation will not be installed the same day the vapor retarder is installed, apply a glaze coat of steep asphalt over the vapor retarder.

Use paragraph below for gypsum decks and lightweight concrete fill.

* + - * 1. Install one ply of asphalt fiberglass base sheet over the entire deck surface. Lap edges and ends a minimum of 2 inches.

Install one ply of asphalt fiberglass base sheet over the entire deck surface. Lap edges and ends a minimum of 2 inches.

Use subparagraph below with adhered roofing systemsNail the base sheet to the deck with nails spaced 9 inches on center along edges and end laps. Place 2 additional rows of nails spaced 11 inches apart down the longitudinal center of each sheet. Stagger nails on 18-inch centers.

Use subparagraph below with mechanically attached roofing system.

Adhere the base sheet to the deck with one-foot diameter spots of hot steep asphalt spaced 24 inches apart, or with nails spaced 24 inches apart.

Over the base sheet install one ply of fiberglass felt. Lap edges and ends 2 inches.

Embed the felt in a solid mopping of hot steep asphalt applied at the rate of 20 pounds per square. Broom the felts for complete embedment.

Retain paragraph below for wood and structural wood fiber decks.

* + - * 1. Install one ply of rosin paper over the deck. Lap edges and ends 2 inches and fasten with occasional nailing.

Install one ply of asphalt fiberglass base sheet. Lap plies 2 inches over each preceding ply.

Secure the base sheet to the deck with occasional nailing.

Over the base sheet install one ply of fiberglass felt. Lap edges and ends 2 inches.

Embed the felt in a solid mopping of hot steep asphalt applied at the rate of 20 pounds per square. Broom the felts for complete embedment.

Glaze coat the entire surface with hot steep asphalt applied at the rate of 20 pounds per square.

* + - * 1. Extend the vapor retarder at all curbs, walls, and wood blocking to a height equal to the thickness of the insulation.

Unless approved otherwise by the Director’s Representative follow immediately with the installation of the insulation and roofing membrane.

Always retain paragraph below. To function effectively, vapor retarders or air barriers must prevent air movement into roofing system.

* + - * 1. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.
			1. INSTALLATION OF INSULATION
				1. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at end of workday.
				2. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
				3. Installation Over Metal Decking:

In first subparagraph below, retain first option for 48-by-48-inch insulation boards. Retain second option for 48-by-96-inch insulation boards. Retain third option with second option when insulation is installed directly over metal roof decks.

Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows] [ and with long joints continuous at right angle to flutes of decking]**.

Retain first subparagraph below when insulation is installed directly over metal decking.

Locate end joints over crests of decking.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below if base layer is mechanically attached, or if corner and perimeter insulation is attached beneath loosely laid and aggregate-ballasted roofing systems.

Mechanically attach base layer of insulation**[ and substrate board]** using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.

Retain option in first subparagraph below if tapered insulation is applicable.

Install upper layers of insulation**[ and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.

Retain first subparagraph below for 48-by-48-inch insulation boards.

Staggered end joints within each layer not less than 24 inches in adjacent rows.

Retain first subparagraph below and delete last subparagraph above for 48-by-96-inch insulation boards.

Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Usually retain first subparagraph below for loosely laid and ballasted roofing systems.

Loosely lay each layer of insulation units over substrate.

Retain first subparagraph below with mechanically attached base layer insulation.

Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - * 1. Installation Over **[Wood] [Wood Panel]** Decking:

A mechanically fastened slip sheet is required when an adhesive or hot asphalt is used as a means of attaching roof insulation. Verify, with manufacturer, for other conditions requiring use of a slip sheet over wood or wood panel decking.

Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to **[wood] [wood panel]** decks.

Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

In first subparagraph below, retain first option for 48-by-48-inch insulation boards; second option for 48-by-96-inch insulation boards.

Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below if base layer is mechanically attached, or if corner and perimeter insulation is attached beneath loosely laid and aggregate-ballasted roofing systems.

Mechanically attach base layer of insulation**[ and substrate board]** using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to **[wood] [wood panel]** decks.

Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

Retain option in first subparagraph below if tapered insulation is applicable.

Install upper layers of insulation**[ and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.

Retain first subparagraph below for 48-by-48-inch insulation boards.

Staggered end joints within each layer not less than 24 inches in adjacent rows.

Retain first subparagraph below and delete last subparagraph above for 48-by-96-inch insulation boards.

Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below with mechanically attached base layer insulation.

Adhere each layer of insulation to substrate using adhesive according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - * 1. Installation Over Concrete Decks:

In first subparagraph below, retain first option for 48-by-48-inch insulation boards; second option for 48-by-96-inch insulation boards.

Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below if base layer of insulation is adhered to roof deck or to vapor retarder, or if corner and perimeter insulation is attached beneath loosely laid aggregate-ballasted roofing systems.

Adhere base layer of insulation to [concrete roof deck] [vapor retarder] according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain one or both of first two subparagraphs below for hot-asphalt application. Retain both subparagraphs for application directly over concrete roof decks. Retain only second subparagraph for applications over vapor retarder. Usually delete for sustainable projects. Verify with applicable sustainable program.

Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.

Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of first two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

Retain option in first subparagraph below if tapered insulation is applicable.

Install upper layers of insulation**[ and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.

Retain first subparagraph below for 48-by-48-inch insulation boards.

Staggered end joints within each layer not less than 24 inches in adjacent rows.

Retain first subparagraph below and delete last subparagraph above for 48-by-96-inch insulation boards.

Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below with adhered base layer insulation.

Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - * 1. Installation Over Cementitious Wood-Fiber Decks:

Retain first subparagraph below if a slip sheet is required. NRCA recommends a mechanically fastened slip sheet over cementitious wood-fiber roof decks. However, some roof membrane manufacturers allow insulation to be directly attached to the cementitious wood-fiber roof deck of not less than 2 inches in thickness with either mechanical fasteners or cold adhesive. The use of hot asphalt as a means of attaching roof insulation requires a slip sheet over cementitious wood-fiber roof decks.

Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to cementitious wood-fiber decks.

Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

In first subparagraph below, retain first option for 48-by-48-inch insulation boards; second option for 48-by-96-inch insulation boards.

Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below if base layer of insulation is adhered to slip sheet.

Adhere base layer of insulation to slip sheet according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of first two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

Retain option in first subparagraph below if tapered insulation is applicable.

Install upper layers of insulation**[ and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.

Retain first subparagraph below for 48-by-48-inch insulation boards.

Staggered end joints within each layer not less than 24 inches in adjacent rows.

Retain first subparagraph below and delete last subparagraph above for 48-by-96-inch insulation boards.

Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Retain first subparagraph below with adhered base layer insulation.

Adhere each layer of insulation to substrate using adhesive according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - * 1. Installation Over Lightweight Insulating Concrete Decks:

Mechanically fasten vented base sheet to lightweight insulating concrete roof deck, with vented side down, using mechanical fasteners specifically designed and sized for fastening to lightweight insulating concrete decks.

Fasten vented base sheet according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.

Retain board insulation layers from subparagraphs below if additional insulation is required over lightweight insulating concrete roof deck.

In first subparagraph below, retain first option for 48-by-48-inch insulation boards; second option for 48-by-96-inch insulation boards.

Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Retain first subparagraph below if base layer of insulation is adhered to vented base sheet, or if corner and perimeter insulation is attached beneath loosely laid aggregate-ballasted roofing systems.

Adhere base layer of insulation to vented base sheet according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of first two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

Retain option in first subparagraph below if tapered insulation is applicable.

Install upper layers of insulation**[ and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.

Retain first subparagraph below for 48-by-48-inch insulation boards.

Staggered end joints within each layer not less than 24 inches in adjacent rows.

Retain first subparagraph below and delete last subparagraph above for 48-by-96-inch insulation boards.

Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Make joints between adjacent insulation boards not more than 1/4 inch in width.

At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

Trim insulation so that water flow is unrestricted.

Fill gaps exceeding 1/4 inch with insulation.

Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

Usually retain first subparagraph below for loosely laid and ballasted roofing systems.

Loosely lay each layer of insulation units over substrate.

Retain first subparagraph below with adhered base layer insulation.

Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - 1. INSTALLATION OF COVER BOARDS

For reroofing applications where a portion of exiting roofing system remains (re-covering), retitle this Article "Installation of Recovery Board," revise "cover board" to "recovery board" in subsequent paragraphs and subparagraphs, and revise associated text accordingly.

Retain first paragraph below if cover boards will be field installed over roof insulation and immediately below roof membrane. Cover boards are not recommended with a ballasted system.

* + - * 1. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

At internal roof drains, conform to slope of drain sump.

Trim cover board so that water flow is unrestricted.

Cut and fit cover board tight to nailers, projections, and penetrations.

Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

Retain first subparagraph below for hot-asphalt application. Usually delete for sustainable projects. Verify with applicable sustainable program.

Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

Retain one of two subparagraphs below and delete last subparagraph above for low-rise urethane adhesive application. Coordinate with product selected.

Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

* + - 1. INSTALLATION OF ADHERED ROOF MEMBRANE
				1. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
				2. Unroll roof membrane and allow to relax before installing.

Retain first paragraph below if applicable.

* + - * 1. Start installation of roofing in presence of roofing system manufacturer's technical personnel**[ Director’s Representative's testing and inspection agency]**.
				2. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

Retain "Bonding Adhesive" paragraph below for adhesive bonding roof membrane to substrate.

* + - * 1. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
				2. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
				3. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
				4. Apply roof membrane with side laps shingled with slope of roof deck where possible.
				5. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.

Revise number of seam tests in first subparagraph below to suit Project.

Verify field strength of seams a minimum of twice daily, and repair seam sample areas.

Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

* + - * 1. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
			1. INSTALLATION OF MECHANICALLY FASTENED ROOF MEMBRANE

NRCA does not recommend seam-fastened, mechanically fastened roof systems over cementitious wood-fiber roof decks or lightweight insulating concrete roof decks.

* + - * 1. Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
				2. Unroll roof membrane and allow to relax before installing.

Retain first paragraph below for installations where steel roof deck is the structural substrate and wide roof membrane sheets may be used. Limit roof membrane sheet width after reviewing manufacturers' criteria used to establish fastener patterns. See the Evaluations.

* + - * 1. For in-splice attachment, install roof membrane with long dimension perpendicular to steel roof deck flutes.

Retain first paragraph below if applicable.

* + - * 1. Start installation of roofing in presence of roofing system manufacturer's technical personnel**[ and Director’s Representative's testing and inspection agency]**.
				2. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
				3. Mechanically fasten or adhere roof membrane securely at terminations, penetrations, and perimeter of roofing.
				4. Apply roof membrane with side laps shingled with slope of roof deck where possible.

Coordinate installation method with manufacturer and revise if required.

* + - * 1. In-Seam Attachment: Secure one edge of PVC sheet using fastening plates or metal battens centered within seam, and mechanically fasten PVC sheet to roof deck.
				2. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.

Revise number of seam tests in first subparagraph below to suit Project.

Verify field strength of seams a minimum of twice daily, and repair seam sample areas.

Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

* + - * 1. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

Delete the next two paragraphs below when there are no gravel stops.

At gravel stops turn the membrane over the front edge of the nailer. Secure the membrane to the vertical portion of the nailer.

* + - * 1. At parapet walls, intersecting building walls and curbs secure the membrane to the structural deck with fasteners 12 inches oc.
			1. INSTALLATION OF FLASHING
				1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.
				2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
				3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
				4. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
				5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

Where base flashing does not terminate beneath a cap flashing, seal the top edge as follows:

Install a continuous metal termination bar over the top edge of flashing and secure one foot o.c. Leave a 1/4 inch gap between ends for expansion and do not span across expansion joints.

Apply a bead of sealant along the top edge.

Use below on all re-roof jobs with membrane flashings unless new plywood is shown on details. Do not use on new buildings. Or on re-roof jobs with PVC coated metal base flashings.

* + - * 1. Bonding PVC Membrane Underlayment and Flashing:

Before installing flashing, adhere PVC sheet flashing underlayment to the substrate with bonding adhesive so that all contaminated surfaces are completely hidden.

Adhere the PVC membrane flashing to the underlayment with bonding adhesive.

Applying Bonding Adhesive:

Apply bonding adhesive to both mating surfaces at the rate recommended by the manufacturer. Do not leave any skips or voids.

Allow the adhesive to dry in accordance with the manufacturer’s instructions.

Install the flashing so it is free of wrinkles, voids, and blisters.

Do not allow bonding adhesive to come in contact with areas to be hot air welded.

Do not allow the flashing to bridge where it changes direction from vertical to horizontal.

* + - * 1. Installing and Flashing Retrofit Roof Drains:

Before installing retrofit drain, apply water cut off mastic on the bottom side of the drain flange.

Place drain over the membrane and into existing drain conductor.

Tighten backflow seal rod nuts.

Fasten drain flange to the roof deck.

Hot air weld PVC flashing to the drain flange and to the membrane.

Install drain strainer.

Use paragraph below for new and existing drains.

* + - * 1. Flashing Roof Drains:

Remove the existing clamping ring, and flashings. Clean the contact area of the drain body down to bare metal. Residual contaminants including bitumen will not be permitted.

Form drain sump with tapered edge strips. Apply the manufacturer’s water cut off mastic around the perimeter of the drain body at clamping ring location.

Use below subparagraph on existing drain bodies.

Secure the clamping ring with the existing bolts. Provide bolts to match the existing to replace any bolts damaged or broken during the Work. Before installing the clamping ring clean the contact areas of the ring down to the bare metal so that there is no trace of bituminous material.

Embed the membrane flashing into the mastic. Install the clamping ring and strainer.

Secure the clamping ring with the existing bolts. Provide bolts to match existing to replace any bolts damaged or broken during the Work.

* + - * 1. Installing Formed PVC Pipe Flashing:

Wherever possible flash pipes with the manufacturer’s premolded pipe flashing.

Clean existing pipe of all contaminates or wrap pipe with manufacturers separation tape.

Install flashing over the membrane extending a minimum of 2 inches out from the pipe base. Turn the flashing up 1/2 inch onto the pipe.

Coat the pipe, with bonding adhesive.

Wrap a second piece of flashing around the pipe. Extend the flashing 1/2 inch onto the horizontal portion of previously installed flashing. Hot air weld the flashing to the membrane and to the wrapped flashing. Install compression clamp around top of flashing. Apply lap sealant at the top edge of the flashing.

Use below for PVC membrane base flashing. Coordinate with drawing.

* + - * 1. Installing Reinforced PVC Base Flashing:

Install the flashing so it extends onto the roof surface a min of 3 inches beyond the fasteners which secure the roofing membrane. Terminate the flashing on the vertical surface where shown on the drawings.

Adhere the flashing to the vertical surface with bonding adhesive. Splice the flashing to the roof membrane.

At inside and outside corners splice a PVC patch over the corners. Position the patch so it wraps around the corner onto each vertical surface and onto the roof surface a min of 3 inches.

Secure the top edge of the flashing with fasteners 12 inches oc.

* + - 1. INSTALLATION OF MISCELLANEOUS MATERIALS

Use paragraph below for PVC coated metal gravel stops. Coordinate with drawings.

* + - * 1. Installing Coverstrips At PVC Coated Metal Gravel Stop:

Install the gravel stop over the roofing membrane. Strip in the horizontal portion of the gravel stop with a reinforced PVC coverstrip. Extend the coverstrip onto the roof surface a minimum of 3 inches beyond the horizontal metal flange.

Hot air weld the coverstrip to the PVC coated metal gravel stop and to the roofing membrane.

Use paragraph below for cant type gravel stops. Coordinate with drawings.

* + - * 1. Installing PVC Gravel Stop Flashing:

Install the canted water dam portion of the gravel stop over the roofing membrane. Strip in the water dam with one strip of reinforced sheet flashing. Extend the flashing over the front edge of the water dam a minimum of one inch and out past the base of the cant a minimum of 3 inches.

Adhere the flashing to the water dam with bonding adhesive and hot air weld the flashing to the roofing membrane.

Install the fascia portion of the gravel stop.

* + - * 1. Installing PVC Coated Metal Pitch Pocket:

Fasten the PVC coated metal pitch pocket over the roofing membrane and into wood nailers.

Install PVC sheet flashing over the pitch pocket flange and a minimum of 3 inches beyond the horizontal flanges of the pitch pocket.

Hot air weld the flashing to the roofing membrane and to the pitch pocket.

Fill the bottom half of the pitch pocket with mortar. Fill the remaining portion of the pitch pocket with the membrane manufacturer’s pourable sealer.

* + - * 1. Installing PVC Flashing at Building Wall Expansion Joint:

Adhere the flashing to the vertical surface with bonding adhesive and secure the top edge of the flashing as detailed on the drawings. Extend the flashing into the expansion joint.

Install the roof membrane down into the expansion joint and up the wall. Mechanically attach the membrane and flashing to the wall 12 inches on center.

Install expansion joint filler tube at intersection of deck and building wall.

Secure membrane to the deck with anchor bar and edge retainer secured with fasteners 12 inches oc.

Install reinforced flashing so it extends onto the roof surface a minimum of 2 inches beyond the anchor bar and 2 inches up the wall past the joint filler. Hot air weld the flashing to the membrane and wall flashing.

Use paragraph below for expansion joints in field of roof.

* + - * 1. Installing PVC Flashing at Expansion Joint Thru Field of Roof:

Fasten prefabricated expansion joint thru the membrane into wood blocking. Hot air weld the integral PVC flashing to the membrane.

Use paragraph above for prefabricated expansion joint flashing .

Use paragraphs below to fabricate expansion joint flashing.

Extend roof membrane across and down into the structural expansion joint. Fasten anchor bars on each side of joint thru the membrane into wood blocking.

Install expansion joint filler tube into membrane depression.

Install PVC flashing so it extends over the filler tube on each side of and onto the roof membrane a minimum of 3 inches beyond the fasteners that secure the roof membrane.

Hot air weld the flashing to the roofing membrane.

Select type of decorative trim if required.

* + - * 1. Installing Decorative PVC Trim:

Hot air weld decorative standing seam trim directly to the membrane where indicated on the drawings. Utilize welders specifically intended for welding this trim. Join sections of trim with the manufacturers supplied dowels.

Hot air weld posts for batten seam type trim directly to the membrane where indicated on the drawings. Fasten base rail to each post. Install trim over base rail and rivet trim end lap to base rail. Install membrane joint cover over trim end laps.

* + - 1. INSTALLATION OF WALKWAYS

Retain this article if walkways are required.

* + - * 1. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

Install flexible walkways at the following locations:

Retain one or more subparagraphs below. Revise to suit Project.

Perimeter of each rooftop unit.

Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.

Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.

Top and bottom of each roof access ladder.

Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.

Locations indicated on Drawings.

As required by roof membrane manufacturer's warranty requirements.

Provide 6-inch clearance between adjoining pads.

Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

* + - 1. FIELD QUALITY CONTROL
				1. Perform the following test in the presence of the Director’s Representative:

Examine and probe seams in the membrane and flashing.

Probe the edges of welded seams with a blunt tipped cotter pin removal tool. Use sufficient hand pressure to detect, marginal welds, voids, skips, and fishmouths. Repair defective areas.

Each day seams are welded, a minimum of two, 2 inch wide x 8 inch long cross section sample must be taken thru the completed seams. Cut the sample in the presence of and where directed by the Director’s Representative. Failure of the samples to maintain the standard of quality of the approved samples will be cause for rejection of the Work.

Repair areas of welded seams where samples have been taken.

A roof inspection is required by manufacturer before warranty issue. Revise scope of inspection and source of report to a qualified roofing consultant or an independent testing and inspection agency if preferred.

* + - * 1. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Director’s Representative, and to prepare inspection report.
				2. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
				3. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.
			1. PROTECTING AND CLEANING
				1. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Director’s Representative.
				2. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

Retain paragraph below if coating membrane or if using fluid-applied bonding materials.

* + - * 1. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419