SECTION 07 53 23

ETHYLENE PROPYLENE DIENE MONOMER (EPDM) MEMBRANE ROOFING

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\*\* NOTE TO SPECIFIER \*\* Johns Manville Roofing System; Ethylene Polypropylene Diene Monomer (EPDM) Membrane Roofing.
This section is based on the products of Johns Manville Roofing System, which is located at:717 17th St., P. O. Box 5108Denver, CO 80217-5108Toll Free Tel: 800-654-3103Tel: 303-978-2000Fax: 303-978-2071Email: [request info (rsspecservices@jm.com)](https://arcat.com/rfi?action=email&company=Johns%252BManville%252BRoofing%252BSystem&message=RE%253A%2520Spec%2520Question%2520(07532jma)%253A%2520&coid=43020&spec=07532jma&rep=&fax=303-978-2071)
Web: <https://www.jm.com>
 [ [Click Here](https://arcat.com/company/johns-manville-roofing-system-43020) ] for additional information.
Johns Manville is a leading manufacturer and marketer of premium-quality insulation and commercial roofing, along with glass fibers and nonwovens for commercial, industrial, and residential applications. Our history goes back to 1858, when the H.W. Johns Manufacturing Company began operations out of a tenement building in New York City.
Today, our products are used in a wide variety of industries including building products, aerospace, automotive and transportation, filtration, commercial interiors, waterproofing and wind energy. A proud member of the Berkshire Hathaway family of companies, we serve customers in more than 80 countries around the globe.
In business for more than 160 years, our commitment to our stakeholders is stronger than ever. We are dedicated to long-term partnerships with our customers and suppliers. We are passionate about providing a safe and equitable workplace for our 8,000 global employees. And we are committed to making a positive impact in the communities where we live and work.
Our goal is to live by our core values of People, Passion, Perform and Protect.
Our global headquarters is in Denver, Colorado. We also have 44 manufacturing facilities across North America and Europe. We continuously invest in our people and our infrastructure to anticipate employee, customer and community needs and provide long-lasting solutions. This approach gives us the strength we need to be the Employer of Choice and the Supplier of Choice in the markets we serve worldwide.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Adhered EPDM membrane roofing system.
		2. Mechanically fastened EPDM membrane roofing system.
		3. Ballasted EPDM membrane roofing system.
		4. Self-Adhered EPDM membrane roofing system.
		5. Cover board.
		6. Roof insulation.
		7. Vapor retarder.
		8. Base sheet.
		9. Substrate board.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Division 03 Section - Lightweight Insulating Concrete for lightweight insulating concrete.
		2. Division 03 Section - Concrete for concrete.
		3. Division 05 Section - Steel Decking for steel roof deck.
		4. Division 06 Section - Miscellaneous Rough Carpentry for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels.
		5. Division 07 Section - Sheet Metal Flashing and Trim for flashings and counter flashings.
		6. Division 22 Section - Storm Drainage Piping Specialties for roof drains.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Society of Civil Engineers (ASCE):
			1. ASCE-7 - Minimum Design Loads for Buildings & Other Structures.
		2. ASTM International (ASTM):
			1. ASTM C728 - Standard Specification or Perlite Thermal Insulation Board.
			2. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
			3. ASTM C1278 - Standard Specification for Fiber-Reinforced Gypsum Panel.
			4. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
			5. ASTM D41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing and Waterproofing.
			6. ASTM D312 - Standard Specification for Asphalt Used in Roofing.
			7. ASTM D 1079 - Standard Terminology Relating to Roofing and Waterproofing.
			8. ASTM D2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
			9. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
			10. ASTM D4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
			11. ASTM D4897 - Standard Specification for Asphalt-Coated Glass-Fiber Benting Base Sheet Used in Roofing.
			12. ASTM D6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
			13. ASTM D6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
			14. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
		3. American National Standards Institute (ANSI) / Single Ply Roofing Industry (SPRI):
			1. ANSI/SPRI FX-1 - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
			2. ANSI/ SPRI 1A-1 - Standard Field Test Procedure for Determining the Uplift Resistance of Insulation and Insulation Adhesives over Various Substrates.
			3. ANSI/ SPRI RP-4 - Wind Design Standard for Ballasted Single-Ply Roofing Systems.
		4. FM Global:
			1. FMG Approval 4470 - Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.
		5. Underwriters Laboratories (UL):
			1. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.
		6. Underwriters Laboratory of Canada (CAN/ULC):
			1. CAN/ULC S770 - Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.
		7. Glossary of NRCA's - The NRCA Roofing and Waterproofing Manual.
		8. Roof Consultants Institute - Glossary of Building Envelope Terms.
		9. International Building Code (IBC).
		10. Sheet Metal Terminology and Techniques: SMACNA - Architectural Sheet Metal Manual.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00.
		2. Product Data:
			1. Manufacturer's data sheets on each product to be used.
			2. Preparation instructions and recommendations.
			3. Storage and handling requirements and recommendations.
			4. Typical installation methods.

\*\* NOTE TO SPECIFIER \*\* Delete if not applicable to product type.

* + 1. Verification Samples: Two representative units of each type, size, pattern, and color.
		2. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction, attachments to other work, and the following:
			1. Base flashings and membrane terminations.
			2. Tapered insulation, including slopes.
			3. Crickets, saddles, and tapered edge strips, including slopes.
			4. Insulation fastening and adhesive patterns.
		3. Installer Certificates: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturers product who is eligible to receive manufacturers special guarantee.
		4. Maintenance Data: Submit manufacturer's latest published documents.
		5. Guarantees: Submit manufacturer's current guarantee.
		6. Roofing sub-contractor will submit copy of the final System Assembly Letter issued by manufacturer, indicating that products and system installed are eligible to receive the specified manufacturer's guarantee when installed by a manufacturer certified contractor in accordance with manufacturer's application requirements, inspected and approved by manufacturer's Technical Representative.
		7. Prior to roofing system installation, roofing sub-contractor will provide a copy of the Guarantee Application Confirmation document issued by the manufacturer indicating project has been reviewed for eligibility to receive specified guarantee, and registered.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.
			1. Qualified domestic U.S. owned and based manufacturer that has UL listing, or accredited testing agency listing for roofing system identical to that used for this Project.
		2. Installer Qualifications: Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and who is eligible to receive the specified manufacturer's guarantee.
		3. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct testing indicated, as documented according to ASTM E329.
		4. Test Reports:
			1. Roof drain and leader test or submit plumber's verification.
			2. Core cut, if required.
			3. Roof deck fastener pullout test, if required.
			4. Bond pull test, if required.
		5. Moisture Survey, if Required:
			1. Submit prior to installation, results of a non-destructive moisture test of roof system completed by approved third party.
			2. Utilize one of the approved methods:
				1. Infrared Thermography.
				2. Nuclear Backscatter.
		6. Source Limitations: Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system must be labeled by the single source roofing manufacturer issuing the guarantee.
	2. PRE-INSTALLATION CONFERENCE
		1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
		2. Store and handle EPDM roofing assembly components in strict compliance with manufacturer's written instructions and recommendations. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
		3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, weather, excessive temperature, construction operations and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
		4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
	4. COORDINATION
		1. Coordinate work of this Section with existing warranties with building Owner's representative to verify compliance.
		2. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday or when rain is imminent.
			1. Tie-off and cover exposed roofing membrane sheets and insulation at end of each day's work.
			2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
			3. Remove and discard temporary seals before beginning work on adjoining roofing.
	5. PROJECT CONDITIONS
		1. Maintain environmental temperature, humidity, and ventilation conditions within limits recommended by manufacturer for optimum results Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.
	6. GUARANTEE
		1. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.

\*\* NOTE TO SPECIFIER \*\* Delete roofing system components listed below if not required for installation, and not required as part of manufacturer's guarantee. Delete guarantee period not required.

* + - 1. Single-source special guarantee includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, adhesives, cover board, substrate board, vapor retarder, base sheet, walkway products, manufacturer's expansion joints, manufacturer's edge metal products, and other approved single-source components of roofing system marketed by the manufacturer.
			2. Guarantee Period:
				1. 10 years from date of Substantial Completion.
				2. 15 years from date of Substantial Completion.
				3. 20 years from date of Substantial Completion.
				4. 25 years from date of Substantial Completion.
				5. Contractor is required to list Insert Firm Name as Specifier/Consultant of record in the appropriate fields, Specifier Account, when applying for the manufacturer's guarantee.
		1. Installer's Guarantee: Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:
			1. Guarantee Period:

\*\* NOTE TO SPECIFIER \*\* Delete guarantee period not required

* + - * 1. Two years from date of Substantial Completion.
				2. Five years from date of Substantial Completion.
		1. Existing Guarantees: Guarantees on existing building elements should not be affected by scope of work.
			1. Installer is responsible for coordinating with building owner's representative to verify compliance.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Johns Manville Roofing System, which is located at:717 17th St., P. O. Box 5108Denver, CO 80217-5108Toll Free Tel: 800-654-3103Tel: 303-978-2000Fax: 303-978-2071Email: [request info (rsspecservices@jm.com)](https://arcat.com/rfi?action=email&company=Johns%252BManville%252BRoofing%252BSystem&message=RE%253A%2520Spec%2520Question%2520(07532jma)%253A%2520&coid=43020&spec=07532jma&rep=&fax=303-978-2071);Web: <https://www.jm.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00.
	1. PERFORMANCE AND DESIGN REQUIREMENTS
		1. General: Installed roofing membrane system will remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
		2. Material Compatibility: Roofing materials must be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
		3. Installer must comply with current code requirements based on authorities having jurisdiction.
		4. Wind Uplift Performance: Roofing system will meet the intent of systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE-7.
		5. FMG Listing: Roofing membrane, base flashings, and component materials shall comply with requirements in FMG 4450 and DMF 4470 as part of a roofing system and that are listed in FMG's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
			1. Roofing system shall comply with RoofNav No: \_\_\_\_\_\_\_
			2. Fire/Windstorm Classification: Class 1 A.
			3. Fire/Windstorm Classification: Class NC A.
			4. Hail Resistance: MH.
			5. Hail Resistance: SH.
			6. Hail Resistance: VSH.
		6. Fire-Test-Response Characteristics: Roofing materials with fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials must be identified with appropriate markings of applicable testing and inspecting agency.

\*\* NOTE TO SPECIFIER \*\* Delete exterior fire-test exposure options not required.

* + - 1. Exterior Fire-Test Exposure: Class A; UL 790, for application and roof slopes indicated.
			2. Exterior Fire-Test Exposure: Class B; UL 790, for application and roof slopes indicated.
			3. Exterior Fire-Test Exposure: Class C; UL 790, for application and roof slopes indicated.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required or delete paragraph option not required

* 1. ETHYLENE PROPYLENE DIENE MONOMER ROOFING MEMBRANE - EPDM
		1. Non-reinforced uniform, flexible sheet made from Ethylene Propylene Diene Monomer, ASTM D 4637, Type I.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design, membrane thickness, and tape width options not required.

* + - 1. Basis of Design: JM EPDM NR.
				1. Exposed Face Color: Black.
			2. Basis of Design: JM EPDM NR FIT SYSTEMS.
				1. Exposed Face Color: Black.
			3. Basis of Design: JM WHITE EPDM NR.
				1. Exposed Face Color: White.
			4. Minimum Membrane Thickness: 45 mils (1.1 mm).
			5. Minimum Membrane Thickness: 60 mils (1.5 mm).
			6. Minimum Membrane Thickness: 90 mils (2.2 mm).
			7. Factory Inseam Tape: Butyl splice tape with release film.
				1. Width: 4 inches (101.6 mm).
				2. Width: 6 inches (150 mm).
		1. Scrim or fabric internally reinforced uniform, flexible sheet made from Ethylene Propylene Diene Monomer, ASTM D 4637, Type II.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design, membrane thickness, and tape width options not required.

* + - 1. Basis of Design: JM EPDM R.
			2. Basis of Design: JM EPDM R FIT SYSTEMS.
			3. Minimum Membrane Thickness: 60 mils (1.5 mm).
			4. Minimum Membrane Thickness: 75 mils (1.9 mm).
			5. Exposed Face Color: Black.
			6. Factory Inseam Tape: Butyl splice tape with release film.
				1. Width: 4 inches (101.6 mm).
				2. Width: 6 inches (150 mm).
		1. Self-Adhered: Ethylene Propylene Diene Monomer Self-Adhered Membrane with Factory Inseam Tape ASTM D4637, Type I.
			1. Basis of Design: JM EPDM FIT SA.
			2. Minimum Membrane Thickness: 60 mils (1.5 mm).
			3. Exposed Face Color: Black.
			4. Factory Inseam Tape: Butyl splice tape with release film.
				1. Width: 3 inches (76 mm).
			5. Serviceable Installation Temperature: 20 degree F (-7 degree C) and above.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. AUXILARY ROOFING MATERIALS
		1. General: Auxiliary materials recommended by roofing system manufacturer for intended use, compatible with membrane roofing.
			1. Liquid-type auxiliary materials meeting VOC limits of authorities having jurisdiction.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design flashing, primer, and adhesive options not required.

* + 1. Sheet Flashing: Manufacturer's internally reinforced or scrim reinforced.
			1. Basis of Design: JM EPDM Peel and Stick Flashing
			2. Basis of Design: JM White EPDM Peel and Stick Flashing.
		2. Primer Material: Manufacturer's standard synthetic-rubber polymer primer.
			1. Basis of Design: JM EPDM Tape Primer Plus.
			2. Basis of Design: JM EPDM Tape Primer Plus - Low VOC.
			3. Basis of Design: JM Single Ply Membrane Primer - Low VOC.
		3. Basis of Design: JM SP Liquid Applied Flashing Resin and JM SP Liquid Applied Flashing Scrim: Manufacturer's single ply liquid and fabric reinforced flashing system with fleece polyester scrim and two-component polyurethane-based liquid applied flashing material, consisting of a liquid resin and a curing agent.
		4. Manufacturer's Single Ply Liquid Flashing Primer:
			1. Basis of Design: JM Single Ply Membrane Primer - Low VOC.
			2. Basis of Design: JM SP Liquid Flashing Concrete Primer.
			3. Basis of Design: JM SP Liquid Applied Flashing Metal and Wood Primer.
			4. Basis of Design: JM EPDM Taper Primer Plus.
			5. Basis of Design: JM EPDM Taper Primer Plus - Low VOC.
		5. Seaming Material: Manufacturer's standard width butyl splice tape with release film.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design and width options not required.

* + - 1. Basis of Design: JM EPDM Seam Tape Plus.
				1. Width: 3 inches (75 mm).
				2. Width: 6 inches (150 mm).
			2. Basis of Design: JM White EPDM Seam Tape Plus.
				1. Width: 3 inches (75 mm).
				2. Width: 6 inches (150 mm).
		1. Sealing Strip: Manufacturer's standard 45 mil (1.14 mm) thick, cured EPDM with factory-laminated, self-adhering seam tape.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design and width options not required.

* + - 1. Basis of Design: JM EPDM Peel and Stick Sealing Strip:
				1. Width: 6 inches (150 mm) wide.
				2. Width: 9 inches (200 mm) wide.
				3. Width: 12 inches (300 mm) wide.
			2. Basis of Design: JM White EPDM Peel and Stick Sealing Strip:
				1. Width: 6 inches (150 mm) wide.
				2. Width: 9 inches (200 mm) wide.
				3. Width: 12 inches (300 mm) wide.
		1. Basis of Design: JM All Season Sprayable Bonding Adhesive: Self-Adhered Primer: Low VOC, aerosol, penetrating primer for self-adhering membranes.
			1. Serviceable Installation Ambient Air Temperature: 25 degrees F (-4 degrees C) and rising.
		2. Basis of Design: JM LVOC Membrane Adhesive: Bonding Adhesive: Manufacturer's standard synthetic polymer-based bonding adhesive for membrane and flashing.
			1. Serviceable Installation Ambient Air Temperature: 25 degrees F (-4 degrees C) and rising.
		3. Basis of Design: JM Membrane Bonding Adhesive (TPO and EPDM): Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane and flashing.
			1. Serviceable Installation Ambient Air Temperature: 25 degrees F (-4 degrees C) and rising.
		4. Basis of Design: JM EPDM Water Based Membrane Adhesive: Bonding Adhesive: Manufacturer's standard water-based bonding adhesive for membrane and flashing.
			1. Serviceable Installation Ambient Air Temperature: 40 degrees F (4 degrees C) and rising.
		5. Self-Adhered Primer: One-art penetrating primer solution to enhance the adhesion of self-adhering membranes. Basis of Design:

\*\* NOTE TO SPECIFIER \*\* Delete primer option not required.

* + - 1. SA Primer
			2. SA Primer Low VOC

\*\* NOTE TO SPECIFIER \*\* Delete fastener and plate option not required.

* + 1. Basis of Design: High Load Fasteners and Plates: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
		2. Basis of Design: All Purpose Fasteners and High Load Plates: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
		3. Basis of Design: Extra High Load Fasteners and Plates: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
		4. Basis of Design: JM Purlin Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
		5. Polymer Fasteners: Glass-Reinforced nylon fasteners with 1/4 inch (6 mm) square drive and 1 inch (25 mm) head with Galvalume-coated 2 inch (51 mm) metal stress plates, designed to lock into the fastener head. Fasteners designed for fastening roof insulation to substrate and furnished by roofing system manufacturer.
			1. Basis of Design: Polymer Auger Fasteners and Plates.
		6. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
		7. Basis of Design: JM EPDM Protective Stone Mat: Protection Mat: Nominal 7.0 oz per sq yd (237.34 grams per sq m) needle-punched UV-resistant polypropylene fabric.
		8. Basis of Design: JM Termination Systems: Metal Termination Bars: Manufacturer's standard predrilled termination bars with anchors.

\*\* NOTE TO SPECIFIER \*\* Delete stainless steel or aluminum, whichever option is not required.

* + - 1. Manufacturer's standard stainless steel.
			2. Manufacturer's standard aluminum.
		1. Basis of Design: Membrane Battens: Manufacturer's standard polymer or aluminum-zinc-alloy-coated steel sheet, pre-punched.
		2. Miscellaneous Accessories: All accessories required to meet roofing manufacturer's guarantee requirements.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. AGGREGATE BALLAST
		1. Aggregate Ballast: Aggregate ballast capable of withstanding weather exposure without significant deterioration or contributing to membrane degradation, of the following type and size:
			1. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone.
				1. Crushed gravel or crushed stone not allowed without protection mat.
			2. Size: ASTM D448, Size 4, ranging in size from 3/4 inch (19 mm) to 1-1/2 inches (38 mm).
			3. Size: ASTM D448, Size 2, ranging in size from 1-1/2 to 2-1/2 inches (38 x 654 mm).

\*\* NOTE TO SPECIFIER \*\* Delete article if not required or delete paragraphs not required.

* 1. REFLECTIVE COATING
		1. Elastomeric Coating: ASTM D 6083. Multipurpose, acrylic elastomeric coating for various substrates.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design option not required.

* + - 1. Basis of Design: TopGard 4000.
			2. Basis of Design: TopGard 5000.
		1. Basis of Design: TopGard Base Coat: One-part acrylic elastomeric with bleed-blocking properties for asphalt surfaces.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. WALKWAYS
		1. Basis of Design: JM EPDM Peel and Stick Walkpads: Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.
	2. COVER BOARD

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required.

* + 1. Basis of Design: RetroPlus Roof Board: Perlite Board: ASTM C728, Type 3; expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
		2. Basis of Design: SeparatoR: Polyisocyanurate Board: ASTM C 1289, Type II, polyisocyanurate bonded in-line to fiber glass reinforced facer.
			1. Class 1.
			2. Grade 2 (20 psi).
			3. Thickness: 1/2 inch (13 mm).
			4. R-value: 2.8.
		3. Basis of Design: SeparatoR CGF: Polyisocyanurate Board: ASTM C1289, Type II, polyisocyanurate bonded in-line to inorganic coated glass facer.
			1. Class 2.
			2. Grade 3 (25 psi).
			3. Thickness: 1/2 inch (13 mm).
			4. R-value: 2.9.
		4. Basis of Design: ProtectoR HD: High-Density Polyisocyanurate: ASTM C1289, Type II, Class 4, Grade 1, High-density Polyisocyanurate bonded in-line to inorganic coated glass facers with greater than 80 lbs of compressive strength.
			1. Thickness: 1/2 inch (13 mm).
			2. R-value: 2.5.
		5. Glass Mat Roof Board Gypsum Board: ASTM C1177, coated glass-mat facer, water-resistant gypsum substrate for mechanically attached roof applications.
			1. Basis of Design: Securock Ultralight Glass-Mat Roof Board.
			2. Basis of Design: DEXcell Glass Mat Roof Board.
			3. Basis of Design: Dens Deck Roof Board.

\*\* NOTE TO SPECIFIER \*\* Delete thickness options not required.

* + - * 1. Thickness: 1/4 inch (6 mm) thick.
				2. Thickness: 1/2 inch (13 mm) thick.
				3. Thickness: 5/8 inch (16 mm) thick.
		1. Glass Mat Roof Board Gypsum Board: ASTM C1177, Heavy duty coated glass-mat facer, water-resistant gypsum substrate for adhered roof applications.
			1. Basis of Design: DEXcell FA Glass Mat Roof Board.
			2. Basis of Design: Dens Deck Prime Roof Board.

\*\* NOTE TO SPECIFIER \*\* Delete thickness options not required. Delete Eonic prime face if not required.

* + - * 1. Thickness: 1/4 inch (6 mm) thick.
				2. Thickness: 1/2 inch (13 mm) thick.
				3. Thickness: 5/8 inch (16 mm) thick.
				4. Eonic primed face.
		1. Gypsum Fiber Board: ASTM C1278, non-faced, gypsum and cellulose fiber substrate.
			1. Basis of Design: Securock Gypsum-Fiber Roof Board.

\*\* NOTE TO SPECIFIER \*\* Delete thickness options not required.

* + - * 1. Thickness: 1/4 inch (6 mm) thick.
				2. Thickness: 3/8 inch (9.5 mm) thick.
				3. Thickness: 1/2 inch (13 mm) thick.
				4. Thickness: 5/8 inch (16 mm) thick.
		1. High-Density Polyisocyanurate: Bonded to glass reinforced facers. For mechanically fastened membrane attachment only.
			1. Basis of Design: ENRGY 3 HD.
				1. Size: 48 x 96 inches (1220 x 2440 mm).
				2. Thickness: 1/2 inch (12.7 mm).
				3. Dimensional Stabilityper ASTM D2126: 1.0 percent linear change.
				4. R-Value per ASTM C518: 2.5.
				5. Water Absorption per ASTM C209: 3.0 percent, maximum.
				6. Compressive Strength per ASTM D1621: 80 psi (551 kPa) minimum.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. ROOF INSULATION - FLUTE FILLER
		1. General: Preformed roof insulation boards complying with requirements and referenced standards, selected from manufacturer's standard sizes and thickness indicated.
		2. Product: ENRGY 3: Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2.
			1. Include metal roof flute filler insulation package with thickness to fill flutes the height of standing seam.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. ROOF INSULATION
		1. General: Preformed roof insulation boards complying with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
		2. Polyisocyanurate Board Insulation: ASTM C1289, Type II.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design roof insulation options not required.

* + - 1. Basis of Design: ENRGY 3.
				1. Class 1.
				2. Grade 2 (20 psi).
			2. Basis of Design: ENRGY 3 25 PSI.
				1. Class 1.
				2. Grade 3 (25 psi).
			3. Basis of Design: ENRGY 3 CGF.
				1. Class 2.
				2. Grade 2 (20 psi).
			4. Basis of Design: ENRGY 3 25 PSI CGF.
				1. Class 2.
				2. Grade 3 (25 psi).
		1. Insulation package minimum R Value:

\*\* NOTE TO SPECIFIER \*\* Revise and delete the following insulation paragraphs as required per project requirements.

* + - 1. R Value: \_\_\_\_\_\_\_\_.
			2. R Value: Minimum R-value required by applicable code.
			3. Insulation Package: \_\_\_\_\_\_\_\_ minimum thickness.
			4. Insulation Package: Multiple layers.
			5. Long-Term Thermal Resistance (LTTR): 5.7 per inch minimum.
				1. Determined according to CAN/ULC S770 at 75 degrees F (24 degrees C).

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. TAPERED INSULATION
		1. Tapered Insulation: ASTM C1289, Type II. Factory-tapered insulation boards fabricated to slope of 1/4 inch (6.35 mm) per 12 inches (304.8 mm) (1:48 slope), unless otherwise indicated.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required.

* + - 1. Basis of Design: Tapered ENRGY 3.
				1. Class 1.
				2. Grade 2 (20 psi).
			2. Basis of Design: Tapered ENRGY 3 25 PSI.
				1. Class 1.
				2. Grade 3 (25 psi).
			3. Basis of Design: Tapered ENRGY 3 CGF.
				1. Class 2.
				2. Grade 2 (20 psi).
			4. Basis of Design: Tapered ENRGY 3 25 PSI CGF.
				1. Class 2.
				2. Grade 3 (25 psi).

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. INSULATION ACCESSORIES
		1. General: Roof insulation accessories recommended by insulation manufacturer for intended use, compatible with membrane roofing.

\*\* NOTE TO SPECIFIER \*\* Delete insulation accessory options not required.

* + 1. Tapered Fesco Edge Strips: Saddles, crickets, tapered edge strips, and other insulations shapes indicated for sloping to drain. Fabricate to slopes indicated.
		2. UltraFast Fasteners and UltraFast Plates: Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting FMG 4470 corrosion-resistance requirements designed for fastening roof insulation to substrate, furnished by roofing system manufacturer.
		3. All Purpose Fasteners and High Load Plates: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
		4. All Purpose Fasteners and UltraFast Plates: Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting FMG 4470 corrosion-resistance requirements, designed for fastening roof insulation to substrate, furnished by roofing system manufacturer.
		5. Lite-Deck Fasteners and Plates: Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting FMG 4470 corrosion-resistance requirements, designed for fastening roof insulation to substrate, furnished by roofing system manufacturer.
		6. JM Two-Part Urethane Insulation Adhesive (UIA): Urethane Adhesive: Manufacturer's two component polyurethane adhesive to adhere insulation to substrate.
		7. JM One-Step Foamable Adhesive: Urethane Adhesive: Manufacturer's two component polyurethane adhesive to adhere insulation to substrate.
		8. Roofing Systems Urethane Adhesive (RSUA): Urethane Adhesive: Manufacturer's two component polyurethane adhesive to adhere insulation to substrate.
		9. JM Two-Part Urethane Insulation Adhesive Canister: Urethane Adhesive: Manufacturer's two component polyurethane adhesive to adhere insulation to substrate.
		10. Wood Nailer Strips: Comply with requirements in Division 06 Section - Miscellaneous Rough Carpentry.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. VAPOR RETARDER

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required; glass-fiber felts, SBS-modified asphalt sheet, vapor barrier and primer options.

* + 1. Basis of Design: GlasPly IV: Glass-Fiber Felts: ASTM D2178, Type IV, asphalt-impregnated, glass-fiber felt.
		2. Basis of Design: DynaWeld Base: Torch Applied SBS Vapor Retarder: ASTM D6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
		3. Basis of Design: DynaBase HW: Torch Applied SBS Vapor Retarder: ASTM D6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt base sheet; smooth surfaced, heat weldable; suitable for application method specified.
		4. Basis of Design: DynaLastic 180 S: SBS Vapor Retarder: ASTM D6164, Grade S, Type I, glass scrim, polyester-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
		5. Basis of Design: DynaBase: SBS Vapor Retarder: ASTM D6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
		6. Polyethylene Air Barrier: ASTM D4397.
			1. 6 mils (0.15 mm) thick, minimum, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq m).
			2. 10 mils (.025 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq m).
		7. Basis of Design: JM Vapor Barrier SAR: Self-Adhered SBS Vapor Retarder: Tri-laminate woven polyethylene, nonslip UV protected top surface; suitable for application method specified.
		8. Basis of Design: JM Vapor Barrier SA. Self-Adhered SBS Vapor Retarder. Tri-laminate woven polyethylene, nonslip UV protected top surface; suitable for application method specified.
		9. Basis of Design: JM Asphalt Primer: Asphalt Primer: ASTM D41.
		10. Basis of Design: SA Primer: Self-Adhered Primer: One-part, sprayable, penetrating primer for self-adhering membranes.
		11. Basis of Design: SA Primer Low VOC: Self-Adhered Primer: One-part, low VOC, sprayable, penetrating primer for self-adhering membranes.
		12. Basis of Design: JM All Season Sprayable Bonding Adhesive: Self-Adhered Primer: Low VOC, aerosol, penetrating primer for self-adhering membranes.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. BASE-SHEET MATERIALS

\*\* NOTE TO SPECIFIER \*\* Delete basis of design base sheet and fastener options not required.

* + 1. Base Sheet: ASTM D4601, Type II, non-perforated, asphalt-impregnated and coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.
			1. Basis of Design: PermaPly 28.
			2. Basis of Design: GlasBase Plus.
		2. Basis of Design: Ventsulation Felt: Base Sheet: ASTM D4897, Type II, venting, non-perforated, heavyweight, asphalt-impregnated and coated, glass-fiber base sheet.
			1. Coarse granular surfacing on bottom surface.
			2. Embossed venting channels on bottom surface.
		3. Lightweight Concrete (LWC) Base Sheet Fasteners: Twin legged factory-coated steel fasteners and Galvalume metal plates meeting FMG 4470 corrosion-resistance requirements, designed for fastening base-sheet to substrate. Tested by manufacturer for required pullout strength and provided by roofing system manufacturer.
		4. UltraLok Locking Impact Fastener: Base-Sheet Fasteners: Tube, disk and locking staple design, factory-coated steel fasteners and Galvalume metal battens meeting FMG 4470 corrosion-resistance requirements, designed for fastening base-sheet to substrate. Tested by manufacturer for required pullout strength and provided by roofing system manufacturer.
		5. Base Sheet Fasteners: 32 gauge, 1-5/8 inch (41 mm) diameter tin clips with 11 gauge annular ring shake nails.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required or delete paragraphs not required.

* 1. SUBSTRATE BOARD
		1. Gypsum Board: ASTM C1177, coated glass-mat facer, water-resistant gypsum substrate for mechanically attached roof applications.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options and thickness options not required.

* + - 1. Basis of Design: Securock Ultralight Glass-Mat Roof Board.
			2. Basis of Design: DEXcell Glass Mat Roof Board.
			3. Basis of Design: Dens Deck Roof Board.
			4. Thickness: 1/4 inch (6 mm).
			5. Thickness: 1/2 inch (13 mm).
			6. Thickness: 5/8 inch (16 mm).
		1. Gypsum Board: ASTM C1177, Heavy duty coated glass-mat facer, water-resistant gypsum substrate for adhered roof applications.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design option not required.

* + - 1. Basis of Design: DEXcell FA Glass Mat Roof Board.
			2. Basis of Design: Dens Deck Prime Roof Board.
			3. Thickness: 1/4 inch (6 mm).
			4. Thickness: 1/2 inch (13 mm).
			5. Thickness: 5/8 inch (16 mm).
		1. Basis of Design: Securock Gypsum-Fiber Roof Board: Gypsum Fiber Board: ASTM C1278, non-faced, gypsum and cellulose fiber substrate.

\*\* NOTE TO SPECIFIER \*\* Delete thickness options not required.

* + - 1. Thickness: 1/4 inch (6 mm).
			2. Thickness: 3/8 inch (9.5 mm).
			3. Thickness: 1/2 inch (13 mm).
			4. Thickness: 5/8 inch (16 mm).
		1. Basis of Design: ProtectoR HD: High-Density Polyisocyanurate: ASTM C1289, Type II, Class 4, Grade 1, High-density Polyisocyanurate bonded in-line to inorganic coated glass facers with greater than 80 lbs of compressive strength.
			1. Thickness: 1/2 inch (13 mm).
			2. R-value: 2.5.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required or delete paragraph and basis of design options not required.

* 1. EDGE MATERIAL COMPONENTS
		1. Basis of Design: Expand-O-Flash: Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Product must be from single-source roofing system supplier included in the No Dollar Limit guarantee.
		2. Basis of Design: Expand-O-Gard: Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Product must be from single-source roofing system supplier included in the No Dollar Limit guarantee.
		3. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap. Product must be from single-source roofing system supplier included in the No Dollar Limit guarantee.
			1. Basis of Design: Presto-Lock Coping.
			2. Basis of Design: Presto-Lock Gold Coping.
		4. Fascia System: Manufacturer's factory fabricated fascia consisting of a base piece and a snap-on cover. Product must be from single-source roofing system supplier included in the No Dollar Limit guarantee.
			1. Basis of Design: Presto-Tite Fascia Single Ply Systems.
			2. Basis of Design: Presto-Tite Edge One Fascia.
			3. Basis of Design: Presto-Tite Fascia System Ballasted Single Ply Systems.
		5. Basis of Design: JM EPDM Metal/Membrane Flashing. Manufacturers flashing for sealing and waterproofing.
		6. Shop-Fabricated Edge Metal: Custom-fabricated edge metal meeting the criterion of ANSI/SPRI ES-1. Must be approved by manufacturer technical representative. Minimum requirements:
			1. Steel: 24 gauge minimum, fastened 6 inches (152 mm) on center.
			2. Aluminum: 0.05 inch (1.3 mm) thick, fastened 6 inches (152 mm) on center.
		7. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."
		8. Roof Edge D Drainage Systems: Gutter Systems: Manufactured in section lengths not exceeding 12 feet (3.658 m) with 0.100 inch (2.5 mm) mill aluminum internal Gutter Hangers, 24 inches (610 mm) on center, and 2 inch (51 mm) wide formed external wind straps 6 ft 0 inches (1.829 m) on center.
			1. Basis of Design: JM Industrial gutter.
1. EXECUTION
	1. EXAMINATION
		1. General:
			1. Examine substrates, areas, and conditions for compliance with requirements affecting performance of roofing system.
			2. Verify roof openings and penetrations are in place and set and braced, and roof drains are securely clamped in place.
			3. Verify wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations, and nailers match thicknesses of insulation.

\*\* NOTE TO SPECIFIER \*\* Delete steel, concrete, wood, cementitious wood fiber, lightweight insulating concrete or gypsum decks options not required

* + 1. Steel Decks:
			1. Verify surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section - Steel Decking.
			2. Verify decking is visibly dry and free of moisture.
			3. Verify decking is smooth and free of large cracks, holes, or sharp changes in elevation of the surface.
			4. When applicable perform pull test with specific fastener being used on project to confirm fastener resistance meets requirements for that particular system.
		2. Existing Standing Seam and Light Guage Decks:
			1. Verify decking is visibly dry and free of moisture.
			2. Verify decking is smooth and free of large cracks, holes, or sharp changes in elevation of the surface.
			3. When applicable perform pull test with specific fastener being used on project to confirm fastener resistance meets requirements for that particular system.
				1. Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.
		3. Concrete Decks:
			1. Verify concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
			2. Verify concrete substrate is visibly dry and free of moisture.
		4. Wood Decks:
			1. Verify wood decking is visibly dry and free of moisture.
			2. Verify wood has ability to provide minimum fastener pull-out resistance.
				1. Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.
		5. Cementitious Wood Fiber Decks /Tectum:
			1. Verify cementitious wood fiber substrate is visibly dry and free of moisture.
			2. Verify cementitious wood fiber has minimum base sheet fastener pull-out resistance.
			3. Provide documentation of minimum pull-out (ANSI/SPRI FX-1 2016) or adhesion resistance (ANSI/SPRI 1A-1 2015) values using manufacturers approved procedures, whichever is applicable.
		6. Lightweight Insulating Concrete:
			1. Verify lightweight insulating concrete substrate is visibly dry and free of moisture.
			2. Verify lightweight insulating concrete has minimum base sheet fastener pull-out resistance.
			3. Include documentation of adhesion resistance values in accordance with ANSI/SPRI 1A-1.
		7. Gypsum Deck:
			1. Verify gypsum is visibly dry and free of moisture with no signs of staining.
			2. Inspect deck for cracking and deflection of bulb tees.
			3. Verify gypsum has minimum fastener pull-out resistance.
			4. Provide documentation of minimum pull-out (ANSI/SPRI FX-1 2016) or adhesion resistance (ANSI/SPRI 1A-1 2015) values using manufacturers approved procedures, whichever is applicable.
		8. Ensure general rigidity and proper slope for drainage.
		9. Verify deck is securely fastened with no projecting fasteners and no adjacent units more than 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
		10. Bring unacceptable panels to the attention of the General Contractor and Project Owner's Representative. Correct prior to installation of roofing system.
		11. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
		12. Do not begin installation until the substrates have been properly constructed and prepared.
	1. PREPARATION
		1. Clean surfaces thoroughly prior to installation. Remove sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation from substrate in accordance with roofing system manufacturer's written instructions.
		2. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions.
		3. Prevent materials from entering and clogging roof drains and conductors and spilling or migrating onto surfaces of other construction.
		4. If applicable, prime surface of deck at rate recommended by roofing manufacturer. Allow primer to dry.
		5. Proceed with each step of installation only after unsatisfactory conditions have been corrected.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. RE-ROOF PREPARATION
		1. Remove all roofing membrane, surfacing, coverboards, insulation, fasteners, asphalt, pitch, adhesives, etc.
			1. Remove area no larger than can be re-roofed in one day.
		2. Tear out all base flashings, counter flashings, pitch pans, pipe flashings, vents, sumps and like components necessary for application of new membrane.
		3. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations.
			1. Install decking to match existing as directed by Owner's Representative.
		4. Raise, or disconnect by licensed craftsmen, if necessary, all HVAC units and other equipment supported by curbs to conform with the following:
			1. Modify curbs as required to a minimum 8 inch (203 mm) base flashing height measured from the surface of new membrane to top of flashing membrane.
			2. Secure flashing and install new metal counterflashing prior to re-installation of unit.
			3. Perimeter nailers must be elevated to match elevation of new roof insulation.
		5. Immediately remove all debris from roof surface. Demolished roof system may not be stored on roof surface.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. RE-COVER PREPARATION
		1. Prepare existing roof according to roofing system manufacturer's written instructions, applicable recommendations of roofing manufacturer, and requirements in this Section.
		2. Tear out all base flashings, counter flashings, pitch pans, pipe flashings, vents, sumps and like components necessary for application of new membrane.
		3. Disable existing roof membrane per manufacturer's written instruction.
		4. Remove existing membrane per manufacturer's written instructions.
		5. Remove and replace wet, deteriorated, or damaged roof insulation and decking as identified in moisture survey.
		6. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations. Install decking to match existing as directed by Owner's Representative.
		7. Raise, or disconnect by licensed craftsmen, if necessary, all HVAC units and other equipment supported by curbs to conform with the following:
			1. Modify curbs as required to provide a minimum 8 inch (203 mm) base flashing height measured from surface of new membrane to top of flashing membrane.
			2. Secure top of flashing and install new metal counterflashing prior to re-installation of unit.
			3. Perimeter nailers must be elevated to match elevation of new roof insulation.
		8. Immediately remove all debris from roof surface. Demolished roof system may not be stored on roof surface.
		9. Install polyester slip sheet as a loosely laid single layer beneath new single ply membrane, side and end lapping each sheet a minimum of 3 inches (76 mm) and 6 inches (150 mm). Sheet may be tacked into place as deemed necessary.
	2. SUBSTRATE BOARD INSTALLATION
		1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
		2. Mechanically Fasten Substrate Board: Install substrate board and secure to deck using mechanical fasteners designed and sized for fastening specified substrate board to deck type.

\*\* NOTE TO SPECIFIER \*\* Delete steel or wood deck option not required.

* + - 1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof per roofing system manufacturer's written instructions.
			2. Fasten substrate board to top flanges of wood deck to resist uplift pressure at corners, perimeter, and field of roof per roofing system manufacturer's written instructions.
		1. Loose Laid Substrate Board: Loose lay substrate board, staggering joints with insulation board substrate.
		2. Adhered Substrate Board: Adhere substrate board to substrate as follows:
			1. Install in a two-part urethane adhesive according to roofing system manufacturer's instructions.
			2. Install to resist uplift pressure at corners, perimeter, and field of roof.
	1. BASE SHEET INSTALLATION
		1. Install one lapped base sheet course and mechanically fasten to substrate per roofing system manufacturer's written instructions.
			1. Enhance fastening rate in perimeter and corner zones per code requirements, wind uplift system approvals, or manufacturer's guarantee requirements, whichever is more stringent.
		2. Comply with roofing system manufacturer's written instructions for installing roof insulation.
	2. VAPOR-RETARDER INSTALLATION

\*\* NOTE TO SPECIFIER \*\* Delete polyethylene-sheet, glass-fiber felt piles, or modified bituminous vapor-retarder options not required.

* + 1. Install polyethylene-sheet vapor retarder as a loosely laid single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches (50 mm) and 6 inches (150 mm).
			1. Seal side and end laps.
		2. Install two glass-fiber felt plies lapping each sheet 19 inches (483 mm) over preceding sheet. Embed each sheet in a solid mopping of hot roofing asphalt per manufacturer's written instructions.
		3. Install modified bituminous vapor retarder sheet per roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
			1. Unroll roofing membrane sheets and allow to relax for minimum time required by manufacturer.

\*\* NOTE TO SPECIFIER \*\* Delete torch-applied, adhered, or self-adhering vapor retarder options not required.

* + - 1. Torch-apply vapor retarder to substrate per roofing system manufacturer's written instructions.
			2. Adhere vapor retarder in a full mopping of hot asphalt to substrate per roofing system manufacturer's written instructions.
			3. Self-adhere vapor retarder to substrate per roofing system manufacturer's instructions.
		1. Laps: Accurately align roofing membrane sheets without stretching and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps leaving no voids.
			1. Repair tears and voids in laps and lapped seams not completely sealed.
		2. Completely seal vapor retarder at terminations, obstructions, and penetrations.
	1. FLUTE FILLER INSULATION INSTALLATION
		1. Comply with roofing system manufacturer's written instructions for installing roof insulation.
		2. Loose lay polyisocyanurate flute filler insulation between metal roof standing seams.
	2. INSULATION INSTALLATION
		1. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
		2. Install tapered insulation under area of roofing to conform to slopes indicated.
		3. Install insulation boards with long joints in a continuous straight line. Joints must be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with like material.
		4. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
		5. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
		6. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

\*\* NOTE TO SPECIFIER \*\* Delete preliminary fastened, preliminary fastened for mechanically fastened membrane systems, adhered, loose laid with top layers mechanically fastened, loose laid, or mechanically fastened with subsequent layers adhered insulation options not required.

* + 1. Preliminarily Fastened Insulation: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.
			1. Fasten top layer to resist uplift pressure at corners, perimeter, and roof field.
		2. Preliminarily Fastened Insulation for Mechanically Fastened Membrane Systems: Install insulation with fasteners at rate required by roofing system manufacturer and applicable authorities, whichever is more stringent.
			1. Fasten top layer to resist uplift pressure at corners, perimeter, and roof field.
		3. Adhered Insulation: Adhere insulation to substrate as follows:
			1. Install each layer in two-part urethane adhesive according to roofing system manufacturer's instruction.
			2. Install each layer to resist uplift pressure at corners, perimeter, and roof field.
		4. Loose Laid Insulation with Top Insulation Layer Mechanically Fastened: Loose lay insulation with staggered joints and secure top layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.
			1. Fasten top layer to resist uplift pressure at corners, perimeter, and roof field.
		5. Loose Laid Insulation: Loose lay all layers of insulation with staggered joints.
		6. Mechanically Fastened with Subsequent Layers Adhered Insulation: Secure first layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.
			1. Fasten first layer to resist uplift pressure at corners, perimeter, and roof field.

\*\* NOTE TO SPECIFIER \*\* Delete urethane adhesive or hot asphalt installation option not required.

* + - 1. Install subsequent layers in two-part urethane adhesive according to roofing system manufacturer's instruction.
			2. Install subsequent layers in solid mopping of hot roofing asphalt according to roofing system manufacturer's instruction.
			3. Install each layer to resist uplift pressure at corners, perimeter, and roof field.
	1. COVER BOARD INSTALLATION
		1. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
		2. Install cover board with long joints in a continuous straight line. Joints must be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
			1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.
		3. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
			1. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

\*\* NOTE TO SPECIFIER \*\* Delete preliminary fastened for mechanically fastened systems, adhered, mechanically fastened, or loose laid cover board options not required.

* + 1. Preliminarily Fastened Cover Board for Mechanically Fastened Systems: Install cover board with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.
		2. Adhered Cover Board: Adhere cover board to substrate as follows:
			1. Install in two-part urethane adhesive according to roofing system manufacturer's instruction.
			2. Install to resist uplift pressure at corners, perimeter, and roof field.
		3. Mechanically Fastened Cover Board: Install cover board and secure to deck using mechanical fasteners designed and sized for fastening specified cover board to deck type.
			1. Fasten to resist uplift pressure at corners, perimeter, and roof field.
		4. Loose Laid Cover Board: Loose lay cover board, staggering joints with insulation board substrate.
	1. ROOFING MEMBRANE INSTALLATION, GENERAL
		1. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of roofing manufacturer and requirements in this Section.
		2. Where roof slope exceeds 1/2 inch (13 mm) per 12 inches (305 mm) (1:24), contact membrane manufacturer for installation instructions regarding installation direction and backnailing.
		3. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
		4. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
			1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
			2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
			3. Remove and discard temporary seals before beginning work on adjoining roofing.
	2. ADHERED ROOFING MEMBRANE INSTALLATION
		1. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions.
			1. Unroll roofing membrane and allow to relax before installing.
		2. Accurately align roofing membrane, maintain uniform side, and end laps of minimum dimensions required by manufacturer. Stagger end laps.
		3. Bonding Adhesive: Apply solvent or water-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
		4. Mechanically fasten roofing membrane securely at terminations, penetrations, and roofing perimeter.
		5. Apply roofing membrane with side laps shingled with roof slope, where applicable.
		6. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions. Apply lap sealant and seal exposed edges of roofing membrane terminations.
		7. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		8. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		9. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
	3. MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION
		1. Install roofing membrane over area to receive roofing in accordance with roofing system manufacturer's written instructions.
			1. Unroll roofing membrane and allow to relax before installing.
			2. Install sheet in accordance with roofing system manufacturer's written instructions.
		2. Accurately align roofing membranes, maintain uniform side, and end laps of minimum dimensions required by manufacturer. Stagger end laps.
		3. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
		4. Install membrane laps perpendicular to the steel deck flutes. Picture Frame installation method is not permitted.
		5. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
		6. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions. Apply lap sealant and seal exposed edges of roofing membrane terminations.
		7. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		8. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		9. Tape to Tape Reinforced FIT Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
			1. Align primary sheet with perforated seam tape up.
			2. Remove center strip of release liner to expose adhesive tape.
			3. Install batten bar over exposed adhesive and fasten to deck through predrilled holes at rate required by manufacturer.
			4. Align top sheet over fastened lower sheet as required to expose 1/4 inch (6
			5. mm) of lower tape.
			6. Remove three release liners in tandem, then roll seam with hard rubber roller.
			7. Roll across the seam at a 45 degree angle with a hard rubber roller using maximum hand pressure.
		10. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
		11. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.
	4. LOOSELY LAID AND BALLASTED ROOFING MEMBRANE INSTALLATION
		1. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
		2. Accurately align roofing membranes without stretching and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

\*\* NOTE TO SPECIFIER \*\* Delete mechanically fastened or adhered option not required.

* + 1. Mechanically fasten or adhere perimeter of roofing membrane according to requirements in ANSI/SPRI RP-4 and according to roofing system manufacturer's instructions.
		2. Adhere roofing membrane at corners, perimeters, and transitions according to requirements in ANSI/SPRI RP-4 and according to roofing system manufacturer's instructions.
		3. Apply roofing membrane with side laps shingled with slope of deck where possible.
		4. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions. Apply lap sealant and seal exposed edges of roofing membrane terminations.
		5. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		6. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions.
		7. Leave seams uncovered until inspected by membrane roofing system manufacturer.
		8. Sealing Strip Installation: Clean and prime both faces of splice areas, apply self-adhering sealing strip, and firmly roll over all seams according to manufacturer's written instructions. Apply lap sealant and seal exposed edges of membrane roofing terminations.
		9. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
		10. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
		11. Install protection mat over roofing membrane, overlapping a minimum of 6 inches (150 mm). Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of 12 inches (300 mm).
		12. Aggregate Ballast: Apply aggregate ballast uniformly over roofing membrane at the rate required by membrane roofing system manufacturer, but not less than the following, minimizing the possibility of damage to membrane roofing system. Lay ballast as roofing membrane is installed, leaving roofing membrane ballasted at the end of the workday.

\*\* NOTE TO SPECIFIER \*\* Delete ballast size option not required.

* + - 1. Ballast Weight: Size 4 aggregate, 10 lbs per sq ft (50 kg per sq m).
			2. Ballast Weight: Size 2 aggregate, 13 lbs per sq ft (65 kg per sq m), at corners and perimeter; Size 4 aggregate, 10 lbs per sq ft (50 kg per sq m), elsewhere.
		1. Roof-Paver Ballast: Install lightweight roof-paver ballast according to manufacturer's written instructions.
		2. Roof-Paver Ballast: Install rubber roof-paver ballast according to manufacturer's written instructions, in locations indicated.
			1. Install perimeter paver edge securement.
		3. Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter. Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of 13 lbs per sq ft (65 kg per sq m).
	1. SELF- ADHERED ROOFING MEMBRANE INSTALLATION
		1. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions.
			1. Unroll roofing membrane and allow to relax before installing (minimum 15-30 minutes, colder temperatures might require longer relaxation times).
			2. Install sheet in accordance with roofing system manufacturer's written instructions.
		2. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer.
		3. Self-Adhere membrane to approved substrate per manufacturer's written instructions.
			1. Keep all flammable materials away while peeling the release liner.
			2. Adjust speed and tension on membrane to avoid winkles in the material.
			3. Broom membrane in once both sides are down to promote adhesion and assist in removing air pockets.
			4. Roll-in adhered membrane with 100 lbs split roller completely.
		4. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
		5. Apply roofing membrane with side laps shingled with roof slope, where possible.
		6. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
		7. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.
		8. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
		9. Install roofing membrane and auxiliary materials to tie into existing roofing.
	2. BASE FLASHING INSTALLATION
		1. Install sheet flashings and preformed flashing accessories and adhere to substrates per membrane roofing system manufacturer's written instructions.

\*\* NOTE TO SPECIFIER \*\* Delete solvent-based, water-based, or self-adhering base flashing and primer options not required.

* + 1. Apply solvent-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
		2. Apply two-sided water-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
		3. Apply single ply liquid applied flashing system per manufacturer's written instructions.
		4. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
		5. Clean seam areas and overlap and firmly roll sheet flashings into adhesive.
		6. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
	1. EDGE METAL INSTALLATION
		1. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
		2. Provide edge details as indicated on the Drawings. Install in accordance with the membrane manufacturer's requirements and SMACNA's - Architectural Sheet Metal Manual.
		3. Join individual sections in accordance with the membrane manufacturer's requirements and SMACNA's - Architectural Sheet Metal Manual.
	2. COATING INSTALLATION
		1. Ensure that all surfaces are clean, dry, and free of any dirt, grease, oil, or other debris that may interfere with proper adhesion.
		2. Apply coating to roofing membrane and base flashings as recommended by the manufacturer. Apply in two coats. Allow the first coat to completely dry before applying the second coat.
	3. WALKWAY INSTALLATION

\*\* NOTE TO SPECIFIER \*\* Delete walkway option not required.

* + 1. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
		2. Roof-Paver Walkways: Install walkway roof pavers with applicable slip sheet according to manufacturer's written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.
	1. FIELD QUALITY CONTROL
		1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
		2. Owner or designated representative will provide on-site observation and inspection during installation.
		3. Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and prepare test reports.
		4. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion and submit report to Architect.
			1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
		5. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
		6. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

\*\* NOTE TO SPECIFIER \*\* Include if manufacturer provides field quality control with onsite personnel for instruction or supervision of product installation, application, erection, or construction. Delete if not required.

* + 1. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.
	1. CLEANING AND PROTECTION
		1. 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 according to guarantee requirements.
		2. Clean products in accordance with the manufacturer's recommendations. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
		3. Protect roofing system from damage and wear during remainder of construction period.

END OF SECTION