**SECTION 07 53 23.02**

**ETHYLENE-PROPYLENE-DIENE TERPOLYMER ROOFING (EPDM) - ADHERED**

**BASED ON DFD MASTER SPECIFICATION DATED (11/8/2024)**

***(Notes to A/E: All notes and information screen viewable in bold red text within (Parentheses) are directions for the Architect/Engineer's use in document preparation only and should not be reprinted in the specifications. System options are identified within [brackets] in red type. This language SHALL be edited to meet the exact scope of the Project. Remove parentheses from selected option and change text to black. DO NOT USE RED TEXT.***

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development (DFD) expects changes and comments from you.)***

**PART 1 – GENERAL**

**SCOPE**

This Section consists of providing all labor, material, equipment, and supervision necessary to provide a weather and watertight roof system with an adhered EPDM roof covering complete, in place, as shown on the drawings and specified herein.

PART 1 - GENERAL

Scope

Related Sections

References

Definitions

Guarantee / Warranty

Contractor Guarantee

Elastic Sheet Membrane Manufacturer Warranty

Quality Assurance

Job Conditions

Delivery, Storage, and Handling

Submittals

Samples

Mockups

Installation Meetings

PART 2 - PRODUCTS

Performance Requirements

Manufacturers and Materials

Elastic Sheet Membrane

Thermal Barrier

Vapor / Air Retarder

Insulation

Miscellaneous

PART 3 - EXECUTION

Examination

Site Conditions

Substrate Preparation

Installation of Thermal Barrier

Installation of Vapor / Air Retarder

Installation of Insulation System

Installation of Roof Membrane

Installation of Roof Flashings

Installation of Roof Drain Flashing and Components

Flashing of Pipe Clusters and Unusually Shaped Penetrations

Miscellaneous

Workmanship

Cleaning

**RELATED SECTIONS**

Applicable provisions of Division 01shall govern work under this Section.

(Note to A/E: review all scope of work and determine other related Sections, which impacts this section, or work that is impacted by this section. A/E to add or remove sections below as needed.)

[07 05 00 – Common Work Results for Thermal and Moisture Protection]

[07 05 05 – Selective Demolition for Thermal and Moisture Protection]

[06 10 53.01 – Miscellaneous Rough Carpentry – Roofing]

[07 63 00 - ​Sheet Metal Roofing Specialties]

(Note to A/E: Include below section for Lightening Protection Systems that must be removed, altered, interrupted, or disabled to perform work.)

[26 41 13.14 – Lightning Protection for Buildings – Roof Level Upgrade]

**Reference STANDARDS**

ANSI/SPRI FX-1 2021; Standard Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners, or equivalent test procedure.

ANSI/SPRI IA-1 2021; Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesive, or equivalent test procedure.

ASTM C1177 - Standard Test Method for Materials finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C1289 – Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

ASTM-D6294 › Standard Test Method for Corrosion Resistance of Ferrous Metal Fastener Assemblies Used in Roofing and Waterproofing

ASTM D4637 - Vulcanized Rubber Sheet used in Single Ply Roof Membrane.

NRCA ‑ Roofing and Waterproofing Manual, 2023.

International Building Code (IBC) – Current addition adopted by the State of Wisconsin

International Energy Conservation Code (IECC) - Current addition adopted by the State of Wisconsin

SMACNA – Architectural Sheet Metal Manual, 7th edition

UL ‑ Fire Hazard Classifications.

**DEFINITIONS**

Manufacturer

Manufacturer and Suppliers are used interchangeably and are the company that assembles the various material products for installation of the Roof System.

Roof Assembly:

A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly can include an underlayment, a thermal barrier, insulation, or a vapor retarder.

Roof Covering:

The covering applied to for weather resistance, fire classification or appearance.

Roof Deck:

The flat or sloped surface constructed on top of the exterior walls of a building or other supports for the purpose of enclosing the story below, or sheltering an area, to protect it from the elements, not including its supporting members or vertical supports.

Roof System:

A system design to weatherproof and improve building thermal resistance. A roof system consists of a roof covering and other interacting roofing components and may include a vapor retarder, thermal barrier, insulation or other similar substrate. The system does not include the roof deck unless it is part of a single component serving as the roof covering and the roof deck.

SME:

Subject Matter Expert. DFD’s designated expert concerning this building envelope / roofing.

**Guarantee / Warranty**

The following information shall be included on all guarantee and warranty documents:

State of Wisconsin Agency, city or township, street address where work is performed, building name, DFD Project number, all roof areas involved (denoted by letter or number) as indicated on the drawings, and total square footage of all roof areas involved in the scope of Work.

The Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and Manufacturer as herein specified.

**Contractor Guarantee**

State of Wisconsin Roof System Guarantee: Provide **five (5) year** written guarantee that warranties all roofing and flashing furnished under the Contract, is watertight and free from defects in materials and workmanship for the duration, as stipulated in the contract-required guarantee form.

The Division 7 Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee. The first inspection shall be approximately two (2) years after the installation date; the second and final inspection shall be performed within the last 6-months of the five (5) year guarantee. The Division 7 Contractor shall contact the Agency contact to arrange for a site visit date. If available, the Agency contact shall accompany the Division 7 Contractor during the inspection. The Division 7 Contractor shall submit written inspection reports by e-mail to the DFD Project Manager and Agency contact within 5 working days after the inspection is performed, and prior to the expiration date of the guarantee.

***(Note to A/E: insert State of Wisconsin Guarantee at the end of this section.)***

A copy of the required State of Wisconsin Roof System 5-yr Guarantee form is located at the end of this Section and may also be acquired electronically at : <https://doa.wi.gov/Pages/DoingBusiness/MasterSpec_Div7.aspx>

The General Prime Contractor and all sub-contractors shallreview the guarantee and requirements of this section prior to submitting a Bid for all Work.

**Elastic Sheet Membrane Manufacturer Warranty**

***(Note to A/E: Select length or Manufacturer’s warranty wind speed coverage. Systems specified with a warranty wind speed coverage above 55 mph require additional attachment and detail considerations.)***

Provide the membrane suppliers NDL (“No-Dollar-Limit”) Total System” warranty covering defects in workmanship, membrane and all associated roof system components supplied by the membrane supplier for a period of twenty (20) years with a wind speed coverage of [55] [72] [90] miles per hour from the date of substantial completion of the roof.

All new roof system components, including, but not limited to insulation, Manufacturer fabricated metal flashing, pre-molded products, fasteners, adhesive, sealants, and accessories, shall be covered by the Manufacturer NDL (“No-Dollar-Limit”) / “Total System” warranty specified herein.

**Quality Assurance**

The Division 7 Contractor is required to be recognized by the Manufacturer, as an “approved” and “authorized” Contractor applicator of the roof membrane system and all associated products and components as specified herein.

Roof System shall be applied by Manufacturer’s authorized roofing applicator familiar with products and their current installation procedures.

Follow Manufacturers current written instructions regarding application and storage except where superseded by more stringent requirement specified herein.

If the Division 7 Contractor wishes to make improvements in materials and/or techniques or is required to make improvements by the membrane supplier to obtain guarantees/warranties, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no additional cost to contract.

Division 7 Contractor shall schedule an onsite installation meeting with the General Prime Contractor (GPC), a DFD’s Project Representative and the A/E. The meeting to occur within the first two days of the start of Division 7 construction. The purpose of the meeting is for the A/E to review and document scope of project and installation procedures.

The Division 7 Contractor is required to have been in business for a minimum of three years, and within the past three years, the Division 7 Contractor shall be able to document the successful completion of a minimum of three projects of similar size and / or scope as compared to the Work as specified in this Section. Backup documentation / verification shall be a submittal requirement.

A minimum of two site visits shall be performed by the Manufacturer during construction: at minimum 1st week, and at the final Warranty Inspection. Reports from these visits shall be submitted by the Division 7 Contractor within five working days in eBuilder.

All system components required by the Manufacturer, included in construction documents or otherwise, shall be provided and installed by the Contractor in order to achieve the Manufacturer’s warranty. Manufacturer required components not specified in construction documents shall need written approval and be required as part of the submittal package. System components listed in the construction documents but not otherwise warranted by the Manufacturer, shall be upgraded to achieve Manufacturer warranty at time of bid, if not listed herein. **Components installed that do not meet the above-listed criteria shall be cause for rejection of work**.

The Division 7 Contractor shall provide all equipment recommended by the Manufacturer for proper installation of the materials specified.

The Division 7 Contractor shall take multiple digital photos daily and throughout the duration of the Project. All photos shall be identified by the roof area where the photos are taken. These include but are not limited to:

* existing conditions,
* various stages of demolition,
* the entire installation starting at the roof deck and continuing throughout all roof system layers, various metal flashing details, transitions, penetrations, penetration height changes, over-all views of the field, drains and scuppers, all roof areas in difficult watertight locations, and mechanical fastening that is hidden from view, or otherwise concealed beneath the completed work,
* completed Work.

**Job Conditions**

The GPC and/or Division 7 Contractor shall maintain at the jobsite at least 1 copy of the latest version of the Manufacturers installation manual/ handbook, including details and technical information concerning application techniques, for all primary roofing system materials required by the work. The GPC and/or Division 7 Contractor shall also maintain at least one copy each of the construction set specification and drawings, “Request for Information” (RFI), “Construction Bulletin” (CB) and “Change Order” (CO) documents, and all other approved signed submittals throughout construction. Documents shall be stored and readily accessible to Division 7 installation crews.

The Division 7 Contractor shall maintain, at the jobsite, at least one physically accessible copy of the Safety Data Sheets (SDS) manual, for all Division 7 materials used on this Project or stored on the jobsite.

Work, once begun, leaves the building subject to leakage and therefore it must be considered in a state of emergency when weather threatens. The existing building shall be protected by the Contractor from moisture entering through any roof or parapet area (even in unforeseen weather conditions), for the life of the Project, and for maintaining a weathertight condition during the entirety of construction. **The Contractor shall be responsible for all damage to property due to moisture infiltration**.

An effective watertight seal between existing roofing and new roofing is required at the end of each day's work. Temporary seals shall be removed upon installation of new permanent work.

Load roofing debris directly into trucks by means of approved chutes or other controlled means. Throwing or dropping shall not be permitted. All such gravel, rubbish, debris, etc., shall be removed from the site and disposed of by the Contractor. All debris / material shall be controlled to prevent uncontrolled exiting from roof level. All debris shall be picked up continuously to prevent straying. Avoid damaging property as much as possible by limiting the number of locations where trucks may be loaded. **The Contractor shall be responsible for all damage to property.**

**Delivery, Storage, and Handling**

The Division 7 Contractor shall make no deliveries to the Project site, until a storage area has been identified for the Project, and the DFD’s Project Representative and the user Agency Representative has approved onsite deliveries. The State shall not accept delivery, nor shall the State be responsible for any materials or equipment stored on the premises.

Deliver materials in original unopened containers of packaging clearly labeled with Manufacturer’s name, brand name, instructions for use, all identifying numbers and U.L. labels. Labels shall be maintained throughout the duration of the Project.

Materials used on the job shall be stored in such a manner as not to create a nuisance or hazard.

Materials shall be stored on clean, raised platforms, with breathable, weather protective covering when stored outdoors. The Contractor shall provide continuous protection from all materials, against weathering and exposure to moisture.

Shrink wrap is not considered to be an acceptable weather protective covering. Shrink wrapping of materials is a known cause for exposure to moisture, either from manufacturing or condensation. Ventilation cuts shall be made to all shrink wrapped materials to allow for exhaust of moisture. All materials shall subsequently be covered with weather protective covering after the ventilation process. **Materials damaged** **in the ventilation process shall be considered unsuitable for installation and shall be rejected**.

Store and handle all materials in a manner which does not damage the material. Materials contaminated with any foreign substance shall constitute damage. All damaged materials shall not be considered suitable for installation and shall be rejected and removed from the jobsite.

Adhesives, primers, coatings, sealants, and similar materials shall be stored in compliance with the temperature set by the Manufacturer of that specific product.

Store flammable products away from any ignition source – sparks, open flame, etc.

Select and operate material handling equipment that allows for the safe storage of materials. The Contractor shall replace or make good any damage, loss, or injury caused by the improper use of material handling equipment. Do not use material handling equipment in a manner which overloads any portion of the building.

Storage of materials within the building is prohibited.

**Submittals**

All submittals shall be in electronic format. The Contractor shall upload accepted submittals in eBuilder.

***(Note to A/E: add or remove sections below as needed.***)

Prior to the start of Division 7 work, electronically submit to the A/E for review and acceptance. The following submittals as required herein:

Membrane Manufacturers “Assembly Letter” listing all major materials to be used, attachment method and spacing, UL Assembly Classification, and Manufacturer sample warranty indicating length and type of warranty.

List of all materials proposed for use on the project, starting at the roof deck and identified by manufacturer's name, size, thickness, type or grade. List shall be submitted on Roofing Contractor's letterhead stationery. The contractor shall state the following at the bottom of the material list submittal: “New products installed on this project do not contain asbestos”.

Manufacturers current product data sheets for supplied products with specific product size/thickness noted.

Tapered insulation shop drawings showing layout and rate of taper, location of roof drains and penetrations

Manufacturer’s shop drawing showing the required patterns for placement of mechanical fasteners.

Manufacturer's shop drawing showing the required patterns for adhesive bead layout including additional bead around board perimeter.

Mechanical fastener pull test results using test procedure ANSI/SPRI FX-1 2021; Standard Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners, or equivalent test procedure.

Adhesive pull test results using test procedure ANSI/SPRI IA-1 2021; Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesive, or equivalent test procedure.

Manufacturers letter stating pull test results achieved are sufficient for system requirements and warranty requirements

Shop drawings showing any proposed detail/specification changes as required to obtain the specified warranty.

The manufacturer’s most current version of installation and detail manual edited to include only the system being installed.

Division 7 Contractors Project Specific Quality Assurance Plan, at a minimum the plan shall include:

* Project name, address, number, manufacturer and subcontractor(s)
* Project scope and approach to project
* Emergency contact information
* Project Quality Assurance Manager name (Office) and role
* Project Quality Control Manager name (On-site) and role
* Project personnel and certifications
* Inspections and tests to be performed, by whom and when
* Control of nonconformance items to protect the quality of the installation
* Project completion inspections.

The Division 7 Contractor shall submit electronic copies of a written Site Specific Safety Report to be given to the Agency Representative at the preconstruction meeting, describing in detail the Division 7 Contractor’s implementation of specific OSHA regulations, worker safety program methods / means, roof perimeter safety and identification of the “watch person” required at all roof levels. Identify fire extinguisher and their locations, all equipment/operators on roof/ground in setup/storage area and travel routes used while performing the work.

***(Note to A/E: When removing an existing roof insert the following paragraph(s).)***

[The Division 7 Contractor is responsible for all Category I Non-Friable Asbestos Containing Material (ACM) disturbed during any and / all facets of this project. Contractor shall submit electronic copies of test results including a drawing indicating locations where test samples are taken. Contractor replacing the roof system is required to take a minimum of two samples of existing roof system(s) components encountered starting at the roof deck including existing vapor retarder, to be sent to an accredited testing lab. Take one sample at the base flashing and one sample from the field of the roof. Additional samples are required where roof areas are not of the same roof system or installation period. Each test result shall properly identify the Owner Project Number, project location, building name, building number & roof area / location where the test sample was taken. Laboratory fees and associated removal and disposal charges shall be the responsibility of the Contractor at no additional cost the project.

The Division 7 Roofing samples must be collected by an Asbestos Inspector or Exterior Asbestos Supervisor with current accreditation as required by DHS 159. Contractor shall have certified staff or hire an accredited third-party consultant at no additional cost to the project.

Any impact of asbestos materials or assumed asbestos materials, must be conducted by workers properly trained and currently certified in accordance with DHS 159.

NOTE – POSITIVE RESULTS

The Division 7 Contractor shall submit an electronic copy of the necessary regulatory notification for asbestos removal or an electronic copy of test results indicating the roofing materials intended for removal do not contain asbestos. (Refer to General Requirements Article “HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB’S)” for additional information.) Laboratory results must be submitted prior to start of work]

**Samples**

***(Note to A/E: add additional samples below as needed.)***

**MOCKUPS**

***(Note to A/E: Insert mockups below or “None” as required.)***

**Installation Meetings**

Prior to the start of construction, the GPC shall schedule an Installation meeting. It is required that the GPC’s Project Manager and Superintendent; and Division 7 Superintendent and/ or Foreman attend an Installation meeting. Coordinate attendance with these representatives: DFD Project Representative, SME, the user Agency contact, and the A/E. All required and accepted submittals for this Section and related work shall be uploaded to eBuilder prior to the meeting.

***(******Note to A/E: add or remove paragraphs below as needed.***)

[For new construction or remodel Projects with tapered deck structure or tapered insulation systems, the General Prime Contractor shall setup a meeting between the roofing contractor, plumbing contractor and other contractors as required to coordinate the final drain location.]

[For new construction or remodel Projects with Lightening Protection Systems, the General Prime Contractor shall setup a meeting between the Division 7 Contractors, Lightening Protection Contractor and other contractors as required to coordinate the attachment and final location of the Lightening Protection System.]

**PART 2 - PRODUCTS**

**Performance Requirements**

Roof Assembly shall have a U.L. Class A Fire Hazard Classification. All exceptions shall be approved in writing by the DFD SME.

**Manufacturers and Materials**

All products installed on this Project shall be compatible with one another and approved by the Manufacturer for use in the Manufacturers tested roof assembly / system and included in the Manufacturers NDL warranty. All associated products required by the Manufacturer for a complete warranty specified installation shall be approved and provided by the Manufacturer.

**Unapproved Manufacturer products installed on the Project shall be cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the Project**.

All products installed on this Project shall have been in production, and in field use (with field installed data upon request), for a minimum of ten years. Products that do not have a production and field history of at least ten years installed on this Project shall be rejected and shall be completely replaced at no cost to the Project.

Use of salvaged materials shallbe considered cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the Project, unless specified herein. Salvaged or used materials are unacceptable and shall be removed from the Project site.

**Elastic Sheet Membrane:** EPDM (Ethylene Propylene Diene Terpolymer) thermoset roof membrane meeting or exceeding ASTM D4637, Type I.

Reinforcement: None

Color: Black

Thickness: 60-mil +/- 10%

Fire retardant: As required to obtain a UL Class A rating

***(Note to A/E: Membranes with pre-tapped seams are acceptable. Self-adhering field membranes are not acceptable)***

**Uncured Flashing:** Uncured black 55-60-mil EPDM elastomer that cures in place after installation.

**Cured Flashing:** ASTM D4637, Type I; Non-reinforced black 60-mil EPDM elastomer.

**Self-Adhering Flashing**: Nominal 60-mil-thick uncured EPDM elastomer membrane, laminated to adhesive.

**Membrane Bonding Adhesive:** Solvent-based contact adhesive designed to bond EPDM membrane to a variety of substates. Water-based adhesives are not acceptable.

**Insulation / Cover Board Adhesive:** Two-part low rise expanding polyurethane adhesive designed for adhering insulation and cover board to various substrates.

**Insulation / Reinforcement Strip and Accessories Fasteners:** Designed for use with fastening plates to secure insulation and reinforced termination strips to various types of substrates. Fasteners have a drill point tip and buttress thread design to reduce back-out. Fasteners shall have a coating providing corrosion resistance exceeding the requirements of FM 4470. Thread diameter as required by the manufacturer to obtain warranty.

Insulation / Reinforced Strip Fastener Plates: Galvalume coated metal plates designed for use with fasteners listed above for attachment of insulation and reinforced termination strips. Plates shall exceed the corrosion resistance requirements of FM 4470. Plate diameter shall be 3-inch minimum for securing insulation and 2-inch minimum for securing reinforced strips.

**Cements, Tapes, Sealants and Accessories:** Foam and / or solvent based adhesives and related prepping and cleaning agents required for the installation of membrane, flashing, seaming, etc.

***(Note to A/E: Water-based adhesives are not acceptable. Obtain approval of the SME prior to accepting solvent free of low VOC adhesives)***

**Perimeter Securement Strip:** Reinforced EPDM elastomer with a pre-applied splice tape along one edge.

**Sealant:** ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A or O; FS TT-S-00230C, Type II, Class A; one-part polyurethane base, elastomeric joint sealing compound such as Sika Chemicals "Sikaflex 1a", Sonneborn-Contech "Sonolastic NP1" or Tremco "Vulkem 116" or “Dymonic".

**Thermal Barrier**

[None Required]

[Pre-primed fiberglass faced gypsum board, ASTM C 1177. Thickness as required by construction drawings.]

**Vapor / Air Retarder**

***(Note to A/E: If no vapor retarder is specified an effective air seal between the roof deck, walls and roof system shall be specified and detailed.)***

[None Required]

[Vapor Retarder: Membrane supplier’s self-adhering vapor retarder consisting of rubberized asphalt laminated to a woven polypropylene film.]

[Vapor Retarder Primer: Manufacturer supplier’s approved solvent-based primer used to prime and prepare concrete, metal, wood, plywood and gypsum surfaces to enhance the adhesion of self-adhered vapor retarder membrane.]

[Vapor Retarder: 6-mil polyethylene]

[Vapor Retarder Tape: Polyethylene tape designed to adhere to polyethylene and other surfaces. 3M™ Polyethylene Tape 483 or accepted equal.]

**Insulation**

Polyisocyanurate, Flat stock and Factory Tapered: ASTM C1289, Type II, Class 2; rigid board insulation with coated glass mat facing on both sides. Thickness and slope as required by construction drawings. Individual board thickness shall not exceed 3-inches.

***(Note to A/E: Specify and show insulation in a minimum of two (2) layers.)***

***(Note to A/E: Tapered systems should achieve a 1/4-inch per foot slope. 1/8-inch per foot tapered should only be used with DFD approval where flashing height issues are involved.)***

Tapered Edge: Wood Fiber, ASTM C208, Type II, Grade 1; high-density wood fiber rigid board insulation.

Spray foam insulation: Two-component, quick-cure polyurethane foam with a flame spread of less than 25 and a density of 1.75 lb./ft3. DOW FROTH-PAK™ Foam Insulation or accepted equal.

**COVER BOARD**

[High Density Polyisocyanurate: ASTM C1289 Type II, Class 4, Grade 1; rigid board insulation with coated glass mat facing on both sides. ½” thick, maximum board size 4’x4’.]

[Fiberglass Faced Gypsum Board: ASTM C1177; high density gypsum core with primed fiberglass facings on each side. **<insert board thickness>**, maximum board size 4’x4’.]

**Miscellaneous**

Plumbing Vent Flashing: Pre-molded boot with stainless steel draw-band clamp shall be approved and supplied by the membrane manufacturer.

Termination Bar: ASTM B209, Series 3000, Temper H-14; minimum 0.10" thick, 1.25" wide aluminum with reverse bend for sealant application. Shall be approved and supplied by the membrane manufacturer.

Metal Batten Strip: Galvalume® AZ 55, .040” minimum with pre-punched holes. Shall be approved and supplied by the membrane manufacturer.

For Fastening to Concrete or Masonry: Zinc alloy expansion shield with hardened steel pin or concrete screw.

Pourable Sealer: One or 2-part polyurethane or other sealer intended for use by the membrane provider to seal provider approved penetrations accessories components. The sealer and penetrations accessories components shall be included in the membrane supplier warranty.

***(Note to A/E: Specify Type of support required. Use roller type supports when pipe / conduit expansion and contracting accommodations are needed.)***

[Roller Pipe Supports: UV stable polycarbonate base or 100% recycled rubber and polyurethane prepolymer base. Support to have an adjustable height stainless steel or zinc plated support with self-lubricating roller to allow for longitudinal pipe movement. Provide membrane support / protection pad and top pipe guide to restrain vertical movement of pipe.]

[Pipe Support: UV stable polycarbonate base or 100% recycled rubber and polyurethane prepolymer base to support sections of pipe not requiring a roller to accommodate pipe expansion and contraction. Provide membrane support / protection pad and top pipe guide to restrain vertical movement of pipe.]

[Pavers: Concrete pavers intended for rooftop use. Standard, nominal 2’ x 2’ x 1-3/16”. Approximate weight 23lb./ft2, compressive strength 8000 psi., water absorption 5% max. Natural finish with a diamond pattern.]

[Walkway Pads: Manufacturer’s standard cured rubber walk pads with textured top surface. Approximate size 30”x30”.]

Other products, not specifically described, but required for a complete and proper warranted system installation as required by this section shall be selected by the Contractor to be included in the Work, identified on a materials list and subject to the approval of the Owner.

**PART 3 – EXECUTION**

**Examination**

Examine the areas and conditions under which work in this section shall be installed. Notify the DFD’s Project Representative of any conditions detrimental to the proper and timely completion of the Work (safety or otherwise). The Division 7 Contractor shall not proceed until the unsatisfactory conditions have been corrected.

Division 7 Contractor to inspect the underside of the structural deck for spray-applied insulation or fireproofing, as well as interior components attached to the deck. Notify DFD’s Project Representative and A/E of such items that could be dislodged from deck during normal construction activities. The Division 7 Contractor shall take every precaution to prevent damage to or, the release of components from the interior building envelope during construction. The Division 7 Contractor is responsible for all damage to the building interior or its contents that occur as a direct cause of the Work, and due to the Contractors methods and mean practice to accomplish the Work required herein.

**Site Conditions**

**NOTE:** Proceeding with the work shall signify the Contractor’s acceptance of the substrate that is to be covered by this Work.

Apply roofing materials in dry weather. All roofing materials installed during a rain/ snow/ precipitation event shall be removed and replaced with dry materials at the Contractor's expense.

Do not apply roofing unless the ambient temperature is above 32 degrees Fahrenheit. Installation of any roofing material in ambient temperature below 32 degrees Fahrenheit shall be rejected.

The Division 7 Contractor shall provide special protection or avoid any heavy traffic on work to remain.

Existing materials designated to remain, which are damaged or defaced prior to the installation of new Work, shall be replaced at the Contractor’s expense to like new condition. Do not store equipment or materials on completed work.

***(NOTE to A/E: provide drawing detail number and sheet number for extension of vent stacks. See DFD Standard Detail for approved method.)***

Extend plumbing vent stacks as necessary to provide a minimum height of 8" above the finished roof surface. No extensions used to achieve the minimum height shall be shorter than 4”.

Install all rooftop mounted equipment in a Manufacturer approved, watertight manner, and repair any damage to sheet metal or other components related to connection and protection of the roof system.

Prevent materials from entering and clogging roof drains and conductors. Remove roof drain plugs when no work is taking place or when rain is forecast.

**Substrate Preparation**

***(Note to A/E: Use appropriate Sections from Division 7 to specify removal and disposal of existing roofing system and related components.)***

Clean surfaces of all residual materials as necessary to ensure adequate bond of new material.

The Contractor shall verify that the substrate is clean, dry, free from sharp projections and depressions, and that all surfaces and site conditions are ready to receive new materials. All areas shall be void of moisture and all other debris prior to the start of Division 7 construction.

[Bottom flanges (ribs) of steel deck shall be void of moisture and all other debris.]

The Contractor shall take whatever action is necessary to prevent dirt, debris, and toxic fumes from entering the building during the Work required by this Section.

The Contractor shall verify that wood blocking, curbs, and nailing flanges are securely anchored, and that roof openings and penetrations are in place, set, and braced.

Existing drains indicated on the drawings to remain shall be cleaned and prepared to receive new flashing, and new clamps, bolts, nuts, etc., Drill and tap new holes and bolts as needed.

Provide replacement cast-iron or aluminum drain strainers matching existing retainer ring where existing strainers are missing, damaged or plastic.

The Contractor shall notify the DFD Construction Representative and the A/E if the existing deck has uncovered holes, is found to be deteriorated, decayed, or deformed, or in any way preventing proper installation or drainage of the new system.

**installation of thermal barrier**

[None required.]

[Clean deck surfaces prior to application. Surfaces shall be dry and free of dust and foreign material.]

***(Note to A/E: Specify attachment requirement below)***

[Loose lay thermal barrier across deck. Lay with long joints continuous parallel to deck ribs and short joints staggered. Joints parallel to deck ribs shall be formed over with edges bearing a minimum of 1-1/2 – inches on deck flange.]

[The thermal barrier shall be mechanically attached to the metal deck with fastener and plate (commonly attached with insulation, contractor to attach as necessary until insulation components are mechanically attached). Fasteners shall be of a length to engage the top rib of the metal deck and not extend beyond the bottom of the metal deck as follows:

Field shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.

Perimeter Zone **<insert perimeter width>** feet wide) shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.

Corner Zone **<insert corner dimension(s)>** shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.]

**Installation of Vapor / Air Retarder**

***(Note to A/E: If no vapor retarder is specified an appropriate air barrier must be designed and specified. It is the A/E’s responsibility to calculate uplift requirements and insert spacing of mechanical fastener attachment.)***

[None required.]

[Clean surfaces prior to application. Surfaces shall be dry and free of dust and foreign material. Loose lay one ply of polyethylene vapor retarder across substrate. Overlap joints a minimum of 6-inches.

Turn up at perimeters and all curbed and pipe penetrations to height equal to the insulation thickness.

Seal all joints and terminations with vapor retarder tape.]

[Remove all contaminates prior to application of primer. Prime substrate, using roller or brush, with manufacture supplier’s solvent-based primer in a manner and rate specified by the manufacturer. Allow primer to dry tacky to the touch. Provide self-adhering vapor retarder to tacky primed surface. Install with minimum 3-inch side laps and 6-inch end laps. Lap material in direction of flow of water. Turn vapor retarder up at all perimeters, curbed and pipe penetrations a height equal to the insulation thickness. Seal all terminations. Roll with a weighted roller to fully mate each roll to the substrate.]

**Installation of Insulation System**

***(Note to A/E: It is the A/E’s responsibility to calculate uplift requirements and insert spacing of mechanical fasteners and adhesive attachment.)***

***(Note to A/E: add or remove paragraphs below based on roof deck type and insulation attachment.***)

[Repair all damage to vapor retarder before installation of first layer of insulation.]

Clean surfaces prior to application. Surfaces shall be dry and free of dust and foreign material. Remove all contaminates prior to application of insulation.

Provide tapered insulation where required and as shown on drawings. Tapered system to provide a smooth uniform transition from high point to low point.

Stagger insulation joints in all layers of insulation, a minimum of 12" in both directions. Insulation shall be installed in a minimum of two (2) layers.

Install insulation boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeters of roof areas and around penetrations and projections.

Fill gaps between ¼ inch and ½ inch wide with spray foam insulation. Gaps over ½ inch shall be filled with specified insulation.

Fill area around drain bowl with spray foam insulation prior to setting insulation sump.

Provide sumps around all roof drains using tapered insulation as required or detailed. Unless otherwise indicated, sump shall be 48” x 48”. Insulation shall have a constant, gradual slope from the perimeter of the sump to the drain bowl. Severely sloped sumps will be rejected.

Provide tapered insulation saddles at twice the slope of field taper, on the backside of curbs and rails.

[ **<insert what layers of insulation (excluding cover board) are to be mechanically attached>** layers of insulation shall be mechanically attached with fastener and plate. Fasteners shall be of a length to engage the top rib of the metal deck and not extend beyond the bottom of the metal deck as follows:

Field shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.

Perimeter Zone **<insert perimeter width>** feet wide) shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.

Corner Zone **<insert corner dimension(s)>** shall be mechanically attached at the rate of **<insert number>** fasteners and plates/sf.]

Install fasteners perpendicular to roof deck using a standard clutch drive screw gun. Screw threads shall engage metal deck minimum of ¾”, maximum of 1-1/2”.

Do not under drive fasteners or over drive fasteners breaking insulation facer. Replace insulation boards with damaged facer.

[**<insert what layers of insulation are to be adhesively attached>** layers of insulation shall be adhesively attached with “full (splatter) spray” or with beads of adhesive. Provide beads of adhesive in a type of pattern and bead size as specified by the manufacturer at the following rate:

Field beads shall be spaced a maximum of **<insert spacing>** inches on center plus a bead of adhesive around the perimeter of each board.

Perimeter Zone **<insert perimeter width>** feet wide) shall be spaced a maximum of **<insert spacing>** inches on center plus a bead of adhesive around the perimeter of each board.

Corner Zone **<insert corner dimension(s)>** shall be spaced a maximum of **<insert spacing>** inches on center plus a bead of adhesive around the perimeter of each board.]

Weight adhesively adhered individual layers of insulation sufficiently to bond insulation to underlying substrate.

**INSTALLATION OF COVER BOARD**

Clean surfaces prior to application. Surfaces shall be dry and free of dust and foreign material. Remove all contaminates prior to application of cover board.

Install cover boards with edges in moderate contact without forcing. Cut cover board to fit neatly to perimeters of roof areas and around penetrations and projections.

Install with one joint continuous and end joint staggered a minimum of 12". Stagger cover board joints a minimum of 12” from underlying insulation joints.

Fill gaps between ¼ inch and ½ inch wide with spray foam insulation. Gaps over ½ inch shall be filled with specified cover board.

The cover board shall be adhesively attached with “full (splatter) spray” or with beads of adhesive. Provide beads of adhesive in a pattern and size as specified by the manufacturer at the following rate:

Field beads shall be spaced a maximum of <insert spacing> inches on center plus a bead of adhesive around the perimeter of each board.

Perimeter Zone <insert perimeter width> feet wide) shall be spaced a maximum of <insert spacing> inches on center plus a bead of adhesive around the perimeter of each board.

Corner Zone <insert corner dimension(s)> shall be spaced a maximum of <insert spacing> inches on center plus a bead of adhesive around the perimeter of each board.]

Weight adhesively adhered cover board sufficiently to bond cover board to underlying substrate.

**Installation of Roof Membrane**

Install membrane in accordance with the membrane supplier’s recommendations and the following:

Use largest membrane panels practical to minimize field seams; lap all seams perpendicular to or in the direction of flow.

Clean surfaces of all debris, contaminates, etc. prior to installing membrane.

Unroll membrane over the insulation and position without stretching. Allow membrane to relax approximately 30 minutes or more, per membrane supplier’s instructions, prior to adhering and seaming. Remove wrinkles that impede the flow of water.

Apply bonding adhesive to underlying substrate and backside of membrane in accordance with manufacturers specifications. Do not apply adhesive to lap / seaming areas.

Broom membrane to ensure full (90 to 100%) contact with underlying substrate and eliminate blisters, wrinkles, etc.

Clean all laps with manufacturer's approved solvents and/or primers. All bonding surfaces must be free of dirt, moisture, etc. Apply cleaner / primer a minimum of one inch beyond matting surface.

Seam membrane together, following manufacturers direction regarding splicing application**.**

Panels jointed utilizing seam / splice tape shall use minimum 3-inch-wide tape. Tape to extend 1/8” to ¼” beyond overlying top panel. Trim panel as necessary. Seam having less than 1/8” or more than ¼” exposed shall area overlaid with a minimum 5-inch flashing.

Adhesive seams shall be a minimum of four (4) inches wide. Lap sealant shall be applied to adhesive seams before the end of each day but not before seam has set for two (2) hours. Lap joints to be cleaned before installing sealant.

Seam through a roof drain or prefabrication boot and sheet wrinkles through a seam are not allowed.

Roll seam first perpendicular to seam the entire length of seam then parallel to seam for the entire length of seam.

Terminate membrane in accordance with approved shop drawings.

Fasten membrane to walls, curbs, slope changes over 1 in 12, and other protrusions using reinforced termination strips. Fasten strips using screw and plate twelve (12) inches o.c. maximum. Bond horizontal portion of reinforced termination strip to underlying substrate.

Edge of plate shall be 1/4" - 1/2" from deck to wall/curb juncture.

Where field seams cross forming a "T" joint, provide a minimum 6" x 6" patch of uncured flashing with rounded corners adhered over "T" joint.

At vertical field splices, provide a minimum 6" x 6" adhered patch of uncured flashing with rounded corner centered over joint.

**Installation of Roof Flashings**

All flashings and terminations shall be done in accordance with detail drawings or approved shop drawings.

Totally bond (95 to 100%) all flashing to its substrate and round all exposed corners.

1/4" bridging of flashing material, measured across the face, is maximum allowable.

All cured flashing vertical field splices shall be overlaid with a piece of uncured flashing centered over the field splice at the angle change.

Forming of all uncured flashings shall be done with the aid of a hot air gun during “cold” weather. Do not stretch flashings.

Flashing at curbs, expansion joints, etc. shall extend up to and terminate on top of horizontal surface.

***(Note to A/E: Provide detail of intermediate attachment when flashing height exceeds five feet)***

Provide intermediate attachment of flashing when height of flashing exceeds five (5) feet.

Flash penetrations, such as soil vent stacks in accordance with manufacturers' instructions using prefabricated units where possible. Flash other penetrations using field fabricated flashings.

Roofing membrane to be flashed at the end of each day with the top edge of the flashing sealed with caulk strip, sealant or mastic to prevent water entry.

Top and side edges of all wall flashings are to be sealed with a caulk strip/compression bar, provide a 1" x 1/8" continuous bead of water stop mastic behind the membrane before installing bar.

**Installation of Roof Drain Flashing and Components**

Wire brush clean, existing drain flange and clamping ring. Provide new clamping ring-to-bowl hardware (bolts, clamps, etc.). Tap out existing bolt holes prior to installation of new bolts.

Replace all plastic, broken or missing strainers with new cast iron strainers.

Taper insulation around roof drains to provide a smooth transition from roof surface to drain clamping flange. Do not slope insulation greater than 3/12".

Provide a watertight seal using a full bead of water cut-off mastic between roof membrane and drain flange. Use a minimum of 5 oz. of water cut-off mastic at each drain.

Roofing to extend into bowl 3/4" to one inch to form a drip.

Do not cut back membrane to install clamping ring bolts. Punch membrane at each bolt location. Secure clamp ring to bowl to achieve constant pressure of the water cut-off mastic between membrane and flange.

Complete installation of roof drain assembly daily. Temporary installation at drain bowl assemble shall not be allowed. Clamping rings and sealant shall be applied to assure a watertight installation at the end of each workday.

All drains shall be made to be fully operable and free flowing and maintained in such condition throughout construction and after final drain bowl strainer re-installation.

**flashing of Pipe Clusters and Unusually Shaped Penetrations**

Clean penetration of all rust, grease, paint, asphalt, sealant, etc.

Seal EPDM membrane to penetration.

Provide minimum 2-inch-deep sealant pan around penetration. Allow a minimum clearance of 1″ between the penetration(s) and all sides of the sealant pan.

Prime inside and outside of sealant pan and penetration.

Flash sealant pan with uncured flashing. Wrap flashing inside pan one-inch minimum.

Fill sealant pan with pourable sealer mounded to shed water.

Pourable Sealer must be a minimum of 2″ deep and 1″ clear around the penetrations.

**Miscellaneous**

Provide concrete pavers were shown on drawings and four (4) pavers at roof hatch exit, roof access doors, and at the top and bottom of all rooftop wall mounts ladders or stairways. Provide concrete pavers over a second layer of “protection” membrane, minimum 45-mil EPDM.

Provide adhered prefabricated rubber walkway pads where shown on drawings.

Concrete paver or prefabricated walkways over or within 6-inches of a membrane splice edge shall have a 6-inch-wide layer of flashing installed over the splice edge. Flashing to extend a minimum of 6-inches each side of walkway.

Attach hood(s), covers, etc. to curb(s) with a minimum of two (2) screws with weather tight washers on each side.

***(Note to A/E: For projects requiring piping and conduit support. Insert spacing requirements below to not exceed the compressive strength of the specified insulation.)***

[Provide specified pipe supports over protection pad **< insert spacing>**.]

**WORKMANSHIP**

In part the following items may be cause for rejection or repair in whole or part of the roof system. Corrective action necessary will be determined by the SME, Division Representative and A/E.

• Wrinkles in membrane or flashing in excess of 2" in any direction

• Bubbles in membrane or flashing of any size, caused by outgassing or otherwise

• Blistering of membrane or flashing of any size

• Tenting / bridging of membrane or flashing of 2" or more off of any planar surface (excluding flashing boots).

• Delamination or warping of installed material from any surface

• Delamination of flashing from any adhered surface

• Cuts, holes, tears, punctures, or damage to the membrane or flashing of any kind.

**CLEANING**

Inspect adjacent roof systems, their drain strainers, and the grounds below the work area and remove debris associated with this Project.

The Contractor **SHALL** repair or replace defaced or disfigured finishes caused by Work in this Section. In areas where finished surfaces are soiled by any source caused by Work of this Section, consult with Manufacturer for cleaning advice, product recommendations, and conform to their instructions.

**\*\*\* END OF SECTION \*\*\***