

MECHANICALLY ATTACHED SINGLE PLY SPECIFICATION

CIRE Equity – Produce Row – 3120 Produce Row, Houston, TX

Building: 6

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:

1. Work specified herein shall be provided only to the extent and as applicable to the work included in this specification. Refer to Roof Plan Drawing for specific scope of work locations.
2. Remove gravel surfacing by power broom or industrial vacuum.
3. Tear off designated wet/damaged lightweight concrete roof areas identified during the course of the work. Fill in removed areas to match the height of the existing adjacent roof area with new lightweight concrete. A unit price line item on the bid form will address wet or damaged lightweight concrete removal and infill. All removal areas are to be documented by the contractor through markup drawing and photos confirming the conditions. Property management and Roofingprojects.com to be notified and made aware of the conditions as they are encountered.
4. The existing roof system is as follows: Gravel surfaced BUR followed by lightweight concrete followed by a steel deck totaling approximately 3 inches.
5. Prepare the surface: Remove gravel surfacing as noted above. Sweep the roof surface of all debris and dirt. Cut, set down and/or remove any walkpads, blisters or ridges that would prevent a level and uniform application of the new recovery board insulation or new membrane. Cut existing membrane every 10 feet on center.
6. New Roof System: Install new roof system over existing membrane: a mechanically attached FM approved .060 mil reinforced TPO or PVC bare backed single ply membrane over 1 layer of 1" polyisocyanurate insulation mechanically attached to FM-1-90 Guidelines. All insulation and membrane fasteners shall be attached through the existing roof system into the steel roof deck. The building is not FM insured, however, the membrane fastening patterns are to meet the FM-1-90 installation guidelines including increased fastening in the perimeter and corner areas.
7. Install specified FM approved sheet metal flashings and accessories that meet the stated FM-1-90 wind uplift guidelines – include all clips, sealants, fasteners, and connections to make watertight.
8. Refer to roof plan drawing for wall flashing and edge condition details. Install new gutters in locations noted on the roof plan drawing.
9. The bid form will address an add alternate price to install a tapered cricket in location indicated on the roof plan drawing.
10. Coordinate all necessary disconnects and reconnection of roof top equipment required to install new roof system with Owner approved electrician and HVAC contractor.
11. Install tapered insulation crickets to the up slope side of all Roof Top Units as specified.
12. Install manufacturers walk pads at roof access points and at all serviceable sides of roof top units. A lineal foot price is available on the bid form for additional walk pads to be determined later.
13. Replace all pipe supports with pressure treated wood blocking on membrane wear pads screwed to wood supports at 10' o.c. maximum spacing and secured to pipe to maintain position. At

contractors option, pre-fabricated pipe supports may be used if secured to pipe to maintain position.

14. **Contractor to include in their lump sum pricing a \$15,000 Cash Contingency Allowance.** All contingency allowance expenditures are at the discretion of property management and must be authorized in writing by property management and roofingprojects.com prior to being performed. Payment will not be made on any unauthorized contingency expenditures. Any allowance value not approved during the course of the project will be credited back to the owner.
15. Provide a manufacturer's 20 Year Labor and Material, NO Dollar Limit (NDL) watertightness warranty and a contractor's 2 year warranty. Contractor to provide at Pre-Construction meeting the Warranty Reference Number assigned when the contractor registers the project with the Material Manufacturer providing the Long-term Warranty.
16. All required municipal permits, fees and taxes are to be included in the contractors base bid price.
17. All contractor payment applications are to be submitted to Roofingprojects.com for approval and certification to Owner for payment on standard AIA forms. Contractors are to include copies of itemized material supplier invoices and release of liens with all payment applications.

B. Section Includes:

1. Roofing Membrane and Insulation Removal.
2. TPO & PVC Membrane Roofing Systems.
3. Waterproofing Membrane.
4. Flashing Membrane.
5. Roof Insulation.

a. Polyisocyanurate Insulation (For Insulation Fill Recovery Board & Drain Crickets)

C. Acceptable Manufacturer's (Roof Recovery):

- Carlisle-Syntec
- Versico
- Holcim-Elevate
- Johns Manville
- GAF
- Sarnafil

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM C 208 - Cellulosic Fiber Insulating Board.
2. ASTM C 1289 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
3. ASTM C 1303 - Standard Test Method For Estimating The Long-Term Change In The Thermal Resistance Of Un-faced Rigid Closed-Cell Plastic Foams By Slicing And Scaling Under Controlled Laboratory Conditions

B. FM Global Research Corporation (FM):

1. FM Loss Prevention Data Sheet 1-28 – Wind Design
2. FM Loss Prevention Data Sheet 1-29 – Roof Deck Securement and Above Deck Roof Components
3. FM Standard 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.
4. FM Loss Prevention Data Sheet 1-49 – Perimeter Flashing
5. www.roofnav.fmglobal.com

- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL - Roofing Materials and Systems Directory.
 - 2. UL 790 - Standard Tests for Fire Resistance of Roof Covering Materials.
 - 3. UL 1256 - Standard Fire Test of Roof Deck Construction.

1.3 SYSTEM DESCRIPTION

- A. Single Ply Membrane Roofing System: Single ply 60 mil reinforced TPO or PVC for mechanically attached membrane roofing system consisting of the membrane material as applicable to the following.
- B. Insulation of the following type:
 - 1. FM Approved Polyisocyanurate Insulation Board Mechanically Attached to the Steel Deck (FM-1-90 Guidelines) for Roof Assemblies in Section 1.3 A. "SYSTEM DESCRIPTION".
- C. Flashing and Waterproofing Membranes: FM Approved 60 mil-reinforced TPO or PVC membrane, fully adhered, as defined herein and indicated on the drawings.

1.4 SUBMITTALS

- A. Submittals after Award of Contract: After award of project, submit the following submittals to Owner Construction Representative with an electronic copy transmitted to Roofingprojects.com. Submittals shall be available at all times to the Owner Representative.
 - 1. MSDS sheets for products to be used on site.
 - 2. Product Data sheets for accepted system showing compliance with the specified physical properties.
 - 3. Shop Drawing showing:
 - a. Fastener patterns to meet uplift requirements.
 - b. Details required for completion but not shown on attached drawings.
 - c. Techniques for end of workday tie offs.
 - 5. List of any sub-contractors being used under primary roofing contractor's contract.
 - 6. Required Building Permits
 - 7. Copies of required State Licenses
 - 8. Preconstruction Damage Report – Form to be provided after award of contract.
 - 9. Construction Schedule
 - 10. Certificates of Insurance
 - 11. Copy of Certified Applicator Statement from system manufacturer (If Requested).
 - a. Job names, size, scope, letters from owner contact, present owner contact name and phone number to verify logistical and system experience (If Requested).

1.5 QUALITY ASSURANCE

- A. General
 - 1. Standards: Comply with the latest additions of standards as listed below:
 - a. The NRCA Roofing and Waterproofing Manual, Fifth Edition, 2001 – National Roofing Contractors Association.
 - b. The Membrane Material Manufacturer's current published specifications, application

- instructions, and technical bulletins.
- c. Annual Book of ASTM Standards, Latest Revision – ASTM International.
- 2. Qualifications of Roofing Contractor: All bidders shall be licensed Roofing Contractors and shall be certified by the Material Membrane Manufacturer to install the roofing system outlined in the Scope of Work and meet the requirements further outlined in Section 1.5 B. 1. "System Experience".
- 3. Qualification of Workers: Use the necessary quantity of skilled laborers who are completely trained and versed in the necessary trades, and are thoroughly instructed in the various scopes of work required to complete this project as specified. Lack of skill or inadequate instruction of laborers to the scope of work required for this project will not be an excuse for accepting or rejecting the work performed.
- 4. Sub-Contracting of Roof System Installation: The Roofing Contractor (under contract) will not sub-contract the installation of major roofing system components to an individual or firm that is not a full time employee of the contracted Roofing Contractor. Major roofing system components are considered as the following:
 - a. Insulation
 - b. Roof Membrane
 - c. Flashings
 - d. Roof Walk Pads
- 5. Code Compliance: Bids must be in compliance with all applicable local and state codes. Contractor will be required to secure any and all permits required by local and state jurisdictions in order to conduct this project as specified. All costs for required permits must be included in contractor's base bid price.
- 6. Employee Conduct: All employees and sub contracted employees must conduct themselves professionally at all times while on Mall property. Owner will have a ZERO tolerance policy for employee interaction with Mall customers. There will be no drinking of alcoholic beverages on Mall Property. In addition there will be no smoking allowed on the roof during the course of the project. Violation of the above mentioned items will be grounds for that employee to be banned from future work at the Mall.

B. Qualifications of Applicator:

- 1. System Experience:
 - a. Contractor shall have been trained by and shall be an authorized installer or licensed contractor for the roofing system manufacturer, as defined by the roof system manufacturer, for five (5) years prior to the bid date.
 - b. Contractor shall be rated by the roofing system manufacturer as "elite" among their certified applicators and be able to present documentation from the material manufacturer to substantiate this claim prior to the award of contract.
 - c. Contractor shall have installed a minimum of fifteen (15) projects using the specified roofing system.

- d. Contractor shall have been in business a minimum of ten (10) years performing work under the current registered name.
- C. Regulatory Requirements for Roof Assembly: Comply with FM Global System Approval Guide, Underwriters Laboratories, Inc. Roofing Materials, Building Code, Energy Code and Systems Directories as specified:
1. FM Global: Provide roofing assembly meeting FM Class 1– 90-A requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheet 1-28, 1-29, & 1-49.
 2. Underwriters Laboratory: UL Class A External Fire Rating
 3. International Building Code
- D. Pre-installation Conference:
1. RoofingProjects.com shall convene a pre-installation conference at the site, prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section, including, but not limited to, the Owner's representative, Roofing Applicator and job foreman, and Roofing Manufacturer's Representative.
 2. RoofingProjects.com shall record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to roofing work, including the following:
 - a. Tour, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
 - b. Review required submittals.
 - c. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Review required inspections, testing, certifying, and material usage accounting procedures.
 - e. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
- E. Manufacturer's Site Inspections:
1. Provide site inspection and reports by the manufacturer's representative at the following periods:
 - a. Prior to 50% of roof installation.
 - b. Final Inspection: Two weeks prior to Final Payment.
 2. Prepare certificate of acceptance of completed roof installation by the Manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall make arrangements for delivery of materials in manufacturer's original unopened containers, dry, undamaged, seals and labels intact.
- B. Contractor shall store materials in weather-protected environment, clear of ground and moisture. Storage requirements for insulation are as follows:
1. Cut or remove plastic shipping wrap from insulation.
 2. Cover with tarpaulin, shield from moistures and ultraviolet rays.
 3. Elevate minimum of 4 inches above substrate.
 4. Secure to resist high winds.

5. Distribute insulation stored on roof deck to prevent concentrated loads. Place over main structural components.
 6. Do not install wet insulation. Insulation shall be thoroughly dry prior to installation.
- C. Store cements, primers, and caulks in heated area above 40 degrees F during cold weather and in area below 80 degrees F in warm weather.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on completed roofing.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Follow industry standards for environment requirements including, but not limited to, the following:
1. Do not apply roofing membrane during inclement weather. When air temperature is expected to fall below 40 degrees F, follow specified Cold Weather Application Procedures as specified herein.
 2. Do not apply finished roofing system to wet, damp or frozen surfaces or when precipitation is occurring.
 3. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.8 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate the Work with installation of associated metal counterflashings specified under other sections as the Work of this Section proceeds.

1.9 WARRANTY

- A. Material Manufacturer: Provide a warranty to the Building Owner naming Owner and the Project Address and roof size - commencing at date of roof final acceptance by the RoofingProjects.com, Owner and Material Manufacturer, that includes the cost of labor and materials for loss of weather tightness without financial limit for a period of 20 years.
- B. Contractor Warranty: All work performed by the Roofing Contractor shall be guaranteed, in writing, for a period of Two (2) Years from the date of roof final acceptance by the RoofingProjects.com, Owner and Material Manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with specification requirements herein, manufacturers listed below are considered acceptable to Owner that provide the 20 year warranty (as specified in Section 1.9 Warranty) and roofing systems or products that meet the performance criteria listed in Section 2.2 MEMBRANE PERFORMANCE CRITERIA.
- B. Acceptable Manufacturer's:

- Carlisle-Syntec
- Versico
- Holcim-Elevate
- Johns Manville
- GAF
- Sarnafil

2.2 MEMBRANE PERFORMANCE CRITERIA

- A. TPO: Membranes composed of a top and bottom film formulated with an ultra-violet resistant thermoplastic polyolefin with a polyester reinforcement, 60 mil thickness, white. Membrane sheets not to exceed 10 feet unless approved by roof RoofingProjects.com – final width to be determined by Manufacturer based on deck type, building elevation and FM Requirements may be narrower than 10 feet.
- B. PVC: Membranes composed of a top and bottom film formulated with an ultra-violet resistant poly vinyl chloride with a polyester reinforcement, 60 mil thickness, white. Membrane sheets not to exceed 10 feet unless approved by roof RoofingProjects.com – final width to be determined by Manufacturer based on deck type, building elevation and Manufacturer Guidelines may be narrower than 10 feet.

2.3 FLASHING MEMBRANE

- A. Flashing Membrane: Reinforced and non-reinforced membrane and pressure-sensitive or heat welded flashings by Roofing System manufacturer, minimum 60 mils, specifically designed for use in flashing at perimeters and wall, and around projections through roofing system.

2.4 WATERPROOFING MEMBRANE

- A. Waterproofing Membrane: Membrane waterproofing formed into uniform, flexible sheets by Roofing System manufacturer. Reinforced, 60 mils nominal thickness.
- B. Waterproofing Flashing: Reinforced and non-reinforced membrane and pressure-sensitive or heat welded flashings by Roofing System manufacturer, minimum 60 mils, specifically designed for use in flashing at perimeters and wall, and around projections through roofing system.

2.5 ROOF INSULATION & FASTENERS

- A. Polyisocyanurate (Recovery Board, New Insulation Fill, Tapered Insulation, New Roof Crickets & for Roof Top Unit Curbs)
 - 1. Insulation will be closed cell, isocyanurate foam core with factory installed facers meeting ASTM C 1289, Type II, on both major surfaces. Foam core will have a rated spread of flame of 25 or less as defined by ASTM E 84.

B. Tapered Edge Strip

1. Factory cut wood fiber board – ASTM C 208-95

C. FM Approved Fasteners for Steel Deck

1. Steel Decks: Insulation mechanical fasteners for metal decks shall be factory coated for corrosion resistance. The fastener shall conform meet or exceed Factory Mutual Standard 4470 and when subjected to 30 Kesternich cycles, show less than 15% red rust.

2.6 ROOF PENETRATION FLASHING AND SEALS

- A. Molded Pipe Flashing: Pre-molded flexible pipe flashing as recommended and supplied by the roofing manufacturer.
- B. Pitch Boxes: Manufacturer's coated metal products. *Note: Use of Pitch Boxes must first be approved by RoofingProjects.com and will only be allowed when the alternative does not provide the likelihood of a longer term watertight seal.*
- C. Pitch Box Pourable Sealer: Manufacturer's two-part pourable urethane sealer.

2.7 SHEET METAL FLASHING

- A. All sheet metal flashings will be contractors choice of .040 Aluminum or 24 Ga. Galv'd. steel – metal shall be Kynar Coated for all Metal with Manufacturer's 20 Year Warranty on the finish. Shop Fabricated Metal Components will adhere to SMACNA Standards and be ES-1 rated .

2.8 ACCESSORIES

- A. Provide new manufacturer's system accessories as required for a complete and warranted Roofing System. Use of each accessory item indicates its acceptance by the material manufacture providing the long-term warranty. Roofing contractor is responsible for using accessory items that are approved by FM Global and acceptable by the manufacturer of the primary roofing material.

2.09 PLYWOOD & PLYWOOD FASTENERS (If Required)

- A. All Plywood: Exterior Rated APA, Structural 1 – Thickness: minimum ½ inch
- B. Plywood Fasteners:
 1. All Fasteners: Shall be FM approved, corrosion resistant coated carbon steel.
 2. Self tapping, self drilling screw with low profile head.

2.10 PIPE & CONDUIT SUPPORTS

- A. Replace all wood, missing or damaged pipe supports with new pressure treated wood blocking at 10' on-center maximum spacing. Pressure treated 4" x _ (height as required by conditions) wood blocking on membrane wear pad screwed to wood and strap-anchored to pipe to maintain alignment. At contractors option, pre-fabricated pipe supports may be used if strap-anchored to pipe to maintain alignment.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Due to multiple roof system options the installation guidelines listed may include more than one alternative. Finished installation must be acceptable to the Material Manufacturer of the proposed primary roof membrane material for issuance of the specified long-term warranty.
- B. SAFETY
 - 1. Contractor shall follow all current OSHA and roofing industry requirements and standards for procedures followed during the roof replacement project.
 - 2. Daily clean-up of work, staging and personnel areas is required.
 - 3. Barricades: Barricades must be put in place prior to the start of the work that requires them. Proper barricades must be in place to encompass the entire swing radius of the crane to ensure and prevent the possibility of the public or employees being harmed by the crane or its operations.
 - 4. Fire extinguishers must be present on the job site at all times – number of fire extinguishers should be sufficient so that any point is within 100 feet of a fire extinguisher.
 - 5. Cranes and Hoists: Contractor must know and work within the load capacity, limitations and specifications provided by the equipment manufacturer.
 - 6. Public Access: Unauthorized persons are not allowed to enter the roof at any time.
 - 7. Fumes: Notify Mall Management when there is the possibility that fumes and/or dust can be drawn into the building through air intake ducts so that steps can be taken to cover or shut down the unit.

3.2 EXAMINATION

- A. Verify substrate surfaces are dry and free of water, snow, and ice.
- B. Beginning installation means acceptance of substrate and pre-installation conference has been held with agreements reached.
- C. **NOTE: Roofing Contractor is to verify that all drain lines are free from debris and are free flowing prior to beginning this project. Any drains that are discovered to be blocked or suspect as free flowing shall be brought to the attention of the Owner construction representative prior to beginning work. Any drains discovered to be blocked or non-free flowing after the start of the project will be the contractors' responsibility to correct at their cost.**

3.3 PREPARATION

- A. Provide covers and other means of protection as necessary to protect building surfaces against damage during roofing work.
- B. Where Work shall continue over newly finished roof membrane, protect surfaces from damage.

- C. Prior to start of work, verify that all pipe vents, vent stacks, steel supports are attached to the building structure. Be sure these items are removed or secured to the building structure prior to the start of work.
- D. Block all drains within any tear off and removal areas of the roof prior to beginning tear off – remove plug at the end of work for that day or in the onset of inclement weather.

3.4 RECOVER OF EXISTING ROOF

- A. Refer to the scope of work for specific preparation information for each section.
- B. Existing Membrane Preparation: Remove gravel surfacing by power broom or industrial vacuum. Cut and remove any anomalies (blister, ridges, buckles etc.) that might inhibit the uniform positioning of the separator board and new membrane system.
- C. Damaged insulation identified or discovered during the course of the project shall be removed and replaced with specified polyisocyanurate insulation. Thickness: To match the height of the surrounding roof system.
- D. Existing roof system to remain. Cut exiting roof membrane every 10 ft. or as required by selected roof system manufacturer. Overlay existing roof system with polyisocyanurate insulation or tapered polyisocyanurate insulation where specified directly over existing roof system and then install new 60 mil reinforced membrane roofing system as specified

3.5 REMOVAL OF EXISTING WALL/CURB FLASHING & OBSOLETE EQUIPMENT

- A. Removal of the vertical wall and curb flashings is required. Surfaces shall be cleaned and prepared for application of new materials as satisfactory with the manufacturer.
- B. Remove and dispose of all identified roof top equipment and penetrations identified by roof plan and or Owner Construction Representative. Openings in the roof deck created during the removal of this equipment and penetrations to receive new 22 gauge metal decking (to match existing Type) screw or spot weld into place.

Note: The cost to fill in of openings in the roof deck must be included in the contractor's base bid price.

- C. Remove and dispose of existing roof related sheet metal flashings unless identified on the roof drawing to re-use the existing.

3.6 ROOF INSULATION INSTALLATION

- A. Install polyisocyanurate separator board with 12 inch staggered board joints in one direction. Mechanically fasten insulation Through existing roof membrane and insulation to the steel deck with FM approved fasteners and plates in accordance with requirements of FM. Fastener density may increase at the perimeter and corners to meet FM 1-90 Guidelines – refer to FM Loss Prevention Data Sheets 1-28, 1-29, & 1-49.
 - 1. Install fasteners using drill with torque clutch. Other types of drills will not be permitted.

2. Install fasteners in the pattern and spacing as recommended by the manufacturer to meet the FM 1-90 Requirement but not closer than 6" from either edge of the insulation board. Engage the top portion of the flutes of the steel deck. Use shortest possible screws to engage the roof deck $\frac{3}{4}$ ".
- B. Lay separator boards to moderate contact without forcing joints. Do not kick separator boards into place. Cut separator board to fit neatly around protrusions through roof. At parapet walls, cut insulation around protrusions and embed plates. Butt insulation tight against wall to provide sealing. Fill gaps over $\frac{1}{4}$ inch wide with filler as recommended by the manufacturer.
- C. Place roof crickets and tapered insulation to required slope pattern or as required to prevent ponding when required for complete roof removal and replacement.
- D. Apply no more insulation than can be sealed with membrane in same day.
- E. Do not install wet, damaged or warped insulation boards.
- F. Install tapered insulation to the upslope side of roof top curbs. Cricket shall extend out from the curb half the curbs width and be at $\frac{1}{2}$ inch per foot slope.

3.7 ROOFING MEMBRANE APPLICATION

- A. When approved by the Owner, the manufacturer's recommended methods of installation (unless superseded by this specification) will become the basis for inspecting and the accepting or rejection of the actual installation procedures used on this work.
- B. Surface Conditions
 1. Surfaces scheduled to receive roofing are to be free of any standing water, frost, snow or loose debris.
 2. Substrate is to be smooth, free of sharp projections and free of obvious depressions.
 3. All necessary metal fittings are to be in place before roofing.
 4. **All required nailers shall be securely installed prior to roofing & any additional nailers needed to achieve the proper height for roofing shall be included in the contractor's base bid price – this excludes any rotted or damaged nailers that are unsuitable for the new roof system installation. Unit prices are requested on the bid form to identify lineal foot prices for wood nailer replacement.**
- C. Installation - General
 1. Perform all related work specified elsewhere necessary for the installation of the specified membrane system.
 2. Ensure that fasteners do not penetrate conduit or other miscellaneous items on bottom side of the deck.

3. Increased fasteners in the field of the roof will not reflect the FM 1-90 requirements at perimeters and corners. Manufacturer to use their standard formula on half sheets and increased fasteners to meet the FM-1-90 guidelines per building elevation.
- D. Cold Weather Application Procedures: When air temperature is expected to fall below 40 degrees F, follow Cold Weather Application Procedures as follows:
 1. Store materials in heated storage units prior to installation. Rotate adhesive, cement, and sealant containers to maintain their temperature above 40 degrees F.
 2. Allow membrane to relax until no wrinkles are visible and restrict work to sunny days
 3. Allow adequate time for solvents in cements to flash off. Check dryness of applied cements before sealing joints.
 4. Verify that frost, dew, and other forms of moisture have evaporated prior to covering insulation with membrane to prevent entrapment of moisture within finished roof system.

3.8 INSTALLATION OF MECHANICALLY ATTACHED ROOFING MEMBRANE

- A. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
- B. Membrane seams must run perpendicular to the ribs of the steel decking below.
- C. Overlap roofing membrane a minimum of 5 inches for side laps and 3 inches for end laps.
- D. Install membrane so that side laps run across the roof slope lapped towards drainage points.
- E. All exposed sheet corners shall be rounded by a minimum of 1 inch.
- F. Use full width rolls in the field of the roof and half width rolls in the perimeter and corner region of the roof and mechanically fastened in the side lap area to the roof deck.
- G. Membrane laps shall be heat welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns or scorch marks.
- H. Weld shall be a minimum of 1 ½ inch in width for automatic machine welding and a minimum of 2 inches for hand welding.
- I. All cut edges of the reinforced roof membrane must be sealed with manufacturers edge sealant.
- J. The membrane shall be mechanically fastened in the side lap area to the roof deck with screws and plates to meet FM-1-90 guidelines.
- K. Metal plates must be placed within ¼ inch – ½ inch from the membrane edge. Plates shall not be placed less than ¼ inch from the membrane edge.
- L. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8 inch wide manufacturer's reinforced membrane flashing strip welded over the additional fasteners.

M. Additional membrane attachment is required at the base of all walls and curbs – use of screws and plates or termination bar is acceptable. Refer to individual manufacturers guidelines for preferred attachment method.

N. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface – no movement or wrinkling of the sheet is allowed. Install fasteners with no lean or tilt.

3.9 SEAM APPLICATION

A. General

1. **Seaming area is to be absolutely clean and free of moisture traces, dust, dirt, or debris.**
2. All field seams must be installed in strict accordance with the manufacturer's requirements.
3. Any areas where the reinforced membrane edge has been cut shall be sealed with manufacturer's seam sealant.

B. Quality Control of Membrane Seams

1. All seams shall be checked for integrity with a blunt ended probe. Any openings or "fishmouths" shall be repaired with a hand held hot air tool fitted with a narrow nozzle tip with a roller.
2. Several times each day the seam welding machine shall be tested for proper calibration. Typically this will occur at the start of work and at a minimum after the mid-day break. A test seam will be welded for inspection by the onsite roof inspector. These test samples will be numbered and marked with dates and times of the test weld.

3.10 FLASHINGS

A. General

1. All flashing must be in accordance with manufacturer's details and be 100% prelaminated tape backed, including prelaminated corners. Flashings are to extend a minimum of 6 inches onto the roof membrane and 8 inches up the vertical surface.
2. All surfaces to receive base flashing must be dry and smooth. In areas where a minimum of 75% adhesion of the base flashing to the substrate cannot be achieved, a suitable covering must be installed over the base substrate. Follow manufacturer's guidelines for membrane and adhesive product selection when complete removal of all asphalt residue from previous roof system cannot be achieved.
3. All parapet wall flashing membrane (including sloped portions) shall be fully adhered to the wall substrate following manufacturer's specification.
4. Intermittent fastening of the flashing membrane at parapet wall heights exceeding 3 feet must be figured if required by Global Risk Consultants and/or manufacturer.

- B. ***Premolded flashing corners, pipe boots, and accessories must be used wherever practical.***
- C. This Contractor shall be responsible for providing and installing all sheet metal counterflashing, coping metals, gutters, etc.
- D. Apply flexible flashings to seal membrane to vertical elements using manufacturer's standard peel and stick or heat welded flashings.
- E. Reinforced Flashing Membrane: Where conditions permit, flash penetrations and walls with reinforced flashing membrane.
- F. Uncured Flashing: Limit use of uncured flashing to overlay vertical seams as required at angle changes, to flash inside and outside corners, scuppers, and other penetrations or unusually shaped walls as approved by the manufacturer.
- G. Seal flashings and flanges of items penetrating membrane.
- H. Gas Pipe, Conduit Supports and Isolation Pads: Replace pipe supports as specified. Install new isolation pads at each pipe support and provide new strap anchor to pipe to maintain support alignment.
- I. Walkway Pads: Layout pattern shall provide membrane protection at all service doors of the roof top equipment. Secure pads to roofing membrane by weld or adhesive to prevent displacement in maximum anticipated design wind velocity. A lineal foot price for walk pads is available on the bid form for any additional walk pads to be determined at a later date.

3.11 PERIMETER MEMBRANE SECUREMENT

- A. The membrane is to be secured at the roof perimeter, curbs, walls, all projections, and at changes in plane greater than 15 degrees.
- B. Membrane securement shall consist of one of the following as approved by the manufacturer:
 - 1. Manufacturer's termination bar – anchor every 12 inches to maintain constant compression.
 - 2. Manufacturer's approved metal details
- C. Membrane securement shall be in accordance with FM 1-29.
- D. Base Tie-Ins: All base tie-ins that are required by the manufacturer's specifications shall be performed with the manufacturer's reinforced securement, strip method of perimeter securement with seam tape factory laminated.

3.12 FLASHING DETAILS

A. GENERAL

- 1. Flashing Details by Number as shown on the Plan Drawing.

B. FLASHING DETAIL DRAWINGS

1. See Detail Drawings included in the project bid package.

3.13 WATER CUTOFFS AND WEATHER PROTECTION

- A. Install water cut-offs at end of day's operation to seal insulation and edge of roof membrane from moisture entry. If inclement weather appears imminent during roofing application, cease operations and protect deck, insulation, flashings, penetrations, and membrane from moisture infiltration with water cutoffs. Insulation and roofing materials not so protected prior to inclement weather will be considered damaged and will be cause for rejection.
- B. Remove water cut-offs and other temporary weather protections prior to continuing roofing work. Remove materials that have been subject to moisture damage and return deck to a clean, dry condition before proceeding with roofing operations. Remove damaged materials from job site.
- C. The water cut-offs and weather protection shall not be considered a part of the final roof system

3.14 Metal Gutter and Leader Roof Drainage Systems:

- A. Gutter system: shall be shop fabricated 24 G Kynar coated steel or .040 Kynar coated Aluminum (Contractor's choice). Expansion Joints shall be spaced a maximum of 50 feet on center and shall be comprised of two end caps with a slip splice over the joint. The gutter sections are to be 20 feet long, minimizing the number of joints between ends and expansion joints. Hidden top hanger straps are to be installed at 24 inches on center. All new gutters and leaders are to match the existing size, profile and routing as the existing system.
- B. Provide 5-year Contractor's Watertightness and Workmanship Warranty on the gutter and leader system

3.15 PROJECT CLOSE OUT

A. Project Completion

1. When the project is considered completed by the Roofing Contractor, the contractor will do the following:
 - a. Notify Owners Property Representative and Roofing Projects.com in writing that the Project is considered completed and that it has been inspected by the Material Manufacturer for warranty purposes. Letter shall list any punch list items generated by the Manufacturer's Inspection and that these items have been corrected to the Manufacturer's satisfaction.
 - b. Provide RoofingProjects.com with all inspection reports to include the Material Manufacturer's final inspection report.
 - c. Assure surfaces of new work and surrounding ground areas are clean and free of excess construction material and all debris.

B. Final Completion Inspection

1. When the Roofing Contractor, and Material Manufacturer have indicated that the project is complete then a final inspection with RoofingProjects.com, Owners Property Representative and the Roofing

Contractor will take place.

2. All defects noted and non-compliances with the Specifications or the unfulfilled recommendations of the Material Manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owners Property Representative and RoofingProjects.com. and the Material Manufacturer prior to demobilization.

C. Final Payment

1. All Warranties referenced in this Specification shall be submitted to Owner with an electronic copy transmitted to Roofingprojects and be accepted by both Owner and Roofingprojects before final payment is made.

END OF SPECIFICATION