SECTION 07530

SINGLE PLY MEMBRANE ROOFING

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section includes mechanically-fastened single ply membrane roofing.

1.02 REFERENCE STANDARDS

A. Leadership in Energy and Environmental Design (LEED), www.usgbc.org/LEED (United States Green Building Council (USGBC).

1. LEED – NC v2.2 Reference Guide, first edition, dated December 2006.

1.03 SUBMITTALS

A. Refer to Section 01352 – LEED Requirements for LEED related submittal requirements.

B. Product Data:

1. Furnish membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.

2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.

C. Samples: Submit samples of each product to be used.

D. Specimen Warranty: Submit prior to starting work.

E. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications.

F. Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice (PIN) has been accepted and approved by the manufacturer.

G. Certification that materials comply with local VOC limitations.

H. Heat Island – Roof: Furnish product specified tested values for initial and aged reflectance and emissivity.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Roofing installer shall have the following:

1. Current approval, license, or authorization as applicator by the manufacturer.

B. Pre-Installation Conference: Before start of roofing work, shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.

1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.

2. Notify the Architect well in advance of meeting.

C. LEED Performance Requirements: Energy Star compliant roof system with an initial reflectance of at least 0.65 for roofs having a slope less than 2:12; or an initial reflectance of at least 0.25 for roofs having a slope greater than 2:12 and a 3-year aged reflectance of at least 0.5 for roofs having a slope les than 2:12 or a 3-year aged reflectance of at least 0.15 for roofs having a slope greater than 2:12 when tested in accordance with ASTM E903 and an emissivity of at least 0.9 when tested in accordance with ASTM 408.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in manufacturer's original, unopened containers, with legible labels and in sufficient quantity to allow for continuity of work.

B. Select and operate material handling equipment in a safe manner, guarding against damage to existing construction or newly applied roofing and conforming to manufacturer's recommendations of handling and storage.

C. All rolls of membrane shall be stored, lying down, elevated above the roof deck and completely protected from moisture with tarpaulins.

D. Insulation and cover board materials shall be elevated on pallets and fully protected from moisture with tarpaulins.

E. Adhesives and sealants shall be safely stored between 50° F and 80°F prior to use.

F. Flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow all precautions as outlined in manufacturer's Material Safety Data Sheets.

1.06 JOB CONDITIONS

A. Safety:

1. Take all necessary precautions regarding worker health and safety when using solvents, adhesives and hot asphalt.

2. Store flammable liquid and materials away from open sparks, flames and extreme heat.

3. Take necessary precautions when using solvents and adhesives near fresh air intakes.

4. Comply with all OSHA requirements for construction.

5. Daily site cleanup shall be performed to minimize debris and hazardous congestion.

B. Protection:

1. Schedule installation sequence to limit access and utilization of the newly installed membrane for material storage, construction staging, mechanical and/or excessive foot traffic.

2. Provide proper protection on all newly completed roofing to avoid damage to the new roofing system.

3. Traffic should be minimized on a freshly laid roof.

4. Protect building walls, rooftop units, windows and other components during installation.

C. Additional Precautions:

1. Adverse weather conditions e.g. extreme temperature, high winds, high humidity and moisture, could have a detrimental effect on adhesives, general production efforts and/or the quality of the finished installation.

2. Daily production schedules of new roofing shall be limited to only that which can be made 100% watertight at the end of the day, including all flashing and night seals.

3. All surfaces to receive new roof system, including insulation and flashing, shall be free from all dirt, debris and be thoroughly dry.

4. Comply with local EPA requirements as published by Local, State and Federal authorities.

5. All construction debris shall be removed from the construction site and legally dispose of off site.

1.07 COORDINATION

A. Prior to installation of materials, a pre-roofing conference should be held with the roofing installer, Architect, and Owner to discuss the specified roofing system, coordinate its proper application and the expectations of all parties involved. The authorized roofing contractor and the owner/owner's representative shall notify all parties a minimum of fourteen days prior to the meeting.

B. Plan and coordinate the installation of the roofing system with other trades in such a manner to avoid membrane damage, keeping the complete installation weather tight and in accordance with all approved details and warranty requirements.

1.08 WARRANTY

A. Warrant single ply membrane roofing to be free from defects in materials and workmanship for a period of 20-years from the Date of Substantial Completion. This warrant is in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 – PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Seaman Corporation "FiberTite Roofing System".

2.02 MEMBRANE

A. FiberTite-SM Membrane: FiberTite-SM is a nominal 45-mil ketone ethylene ester (KEE) membrane, reinforced with a 5-oz yd² knitted polyester fabric. Membrane shall exceed the physical property requirements and the surface compound meets polymer content definitions as outlined in ASTM D 6754 Standard Specification for Ketone Ethylene Ester (KEE) Sheet Roofing.

B. Flashing Membrane: Nominal 36-mil FiberTite, 45-mil FiberTite-SM or 50-mil FiberTite-XT membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system. Note: FiberTite membranes incorporating the 6-oz polyester backing are not considered 'flashing" membranes.

2.03 RELATED MATERIALS

A. FTR Adhesives: Adhesives shall be specially formulated for the specified roofing systems.

1. FTR-190e Bonding Adhesive: A VOC compliant solvent borne, contact (two sided) bonding adhesive, designed for bonding non-fleece back membranes to properly prepared and pre-authorized horizontal and vertical substrates.

B. FTR-101 Sealant: A one-component gun-grade polyurethane sealant to seal flashing termination.

C. FTR-SL1 Sealant: A one-component pourable, self leveling, polyurethane sealant to fill "pitch pans".

D. Fiber Clad Metal: To fabricate metal flashing, 4' x 10' sheets of 24 gauge hot dipped G-90 steel, or 0.040 thick 3003H14 aluminum, laminated with a 0.020 mil polymeric coating.

E. FTR-Pre-Molded Flashing(s): Injection molded vent stack and inside/outside corner flashing using FiberTite KEE compound.

F. FTR Non-Reinforced Membrane: Field fabrication membrane, 0.060 mil non-reinforced KEE membrane.

G. FTR-Tuff Track Walkway & Protection Pads: High grade walk way/protection material with "slip resistant" design.

H. FTR-Fasteners:

1. FiberTite MAGNUM Series: To secure FiberTite to steel, wood and structural concrete decks. A #15-13, buttress threaded, #3 Phillips head fastener constructed of case hardened carbon steel with a reduced diameter drill point and corrosion resistant coating.

2. FiberTite HD: To secure insulation to steel, wood and structural concrete decks. A #14-13, heavy duty threaded steel #3 Phillips truss, self tapping corrosion resistant fastener.

3. FiberTite TapGrip: To secure insulation and membrane(s) to structural concrete decks, masonry block and brick. Hard carbon steel, threaded fastener for attachment using a 3/16 inch pilot hole.

4. FiberTite NTB-1H: To secure insulation, base sheet and /or membrane to gypsum and cementitious fiber decks. Threaded, glass-filled nylon fastener, with locking wire barbs.

5. FiberTite Peel Rivets: To secure insulation, base sheet and /or membrane to steel, wood, cement fiber, tectum, fiberglass and lightweight plank decks. Thread less, high magnesium aluminum alloy fastener.

6. FiberTite BS Fasteners: Coated fastener and stress plate to secure base sheet to gypsum and cellular lightweight insulating concrete decks.

7. FiberTite Purlin Fasteners: To secure FiberTite membrane to the existing metal roofing systems structural members.

L. FTR-MAGNUM Series Barbed Stress Plates: Used to anchor membrane, are 2.5 inch x 1.5 inch rectangular in dimension with 3/4 inch radial corners, manufactured from 18 gauge AZ-50 galvalume steel with a 0.250 inch diameter hole in its center. The plate has a raised reinforcement area and eight "barbs" or used to anchor membrane, are 2.375 inch round steel plate manufactured from 20 gauge galvalume steel with a 0.250 inch diameter hole in its center. The plate has a raised reinforcement area and "barbs".

M. FTR-Sand Dollar Insulation Stress Plates: Used to secure insulation and/or cover-board to steel, wood and structural concrete decking. Manufactured from high density polyethylene, 3 inch in diameter, designed with a self locking mechanism to secure the head of the FTR fasteners into the plate.

N. FTR-Termination Bar: Membrane flashing(s) restraint/termination seals, nominal 1/8 inch x 1 inch x 10' 6060-T5 extruded aluminum bar with pre-punched slots, 8 inches on center.

O. FiberTite Metal Fascia System: Two piece "snap-on" pre-formed, architectural metal edge system.

P. FTR-Value Insulation: Polyisocyanurate and extruded polystyrene flat or tapered insulation.

Q. FTR-601: Dual component, single bead (ribbon applied) urethane insulation adhesive. Adhesive is a non-solvent, elastomeric, urethane adhesive, specifically designed for bonding single or multiple layers of roof insulation and insulation composites and/or cover boards to structural roof decks, base sheets, and smooth surfaced BUR.

R. FTR-Cover Board:

1. Gypsum or gypsum/cellulose core board manufactured for use with either mechanically attached roofing systems.

2. Surface treated Gypsum (Dens-Prime) or Gypsum/Celluose core (Securock) board manufactured for use with adhered roofing system / applications.

2.04 RELATED MATERIALS

A. Wood Nailers:

1. Wood shall be No. 2 or better construction grade lumber. Creosote or asphaltic type preservatives are not acceptable.

2. Minimum top nailer thickness shall be 1-1/2-inches nominal.

B. Insulation

1. Insulation shall be installed, where specified and/or required to provide a suitable surface for the FiberTite Roofing System and/or meet desired thermal values.

2. Acceptable products shall be pre-approved in writing by roofing membrane manufacturer and comply with the following minimal characteristics and classification(s).

3. Pre-Approved Products

a. FTR-Value Polyisocyanurate:

1) FM approved rigid insulation meeting Class A 1-90, for fire and wind.

2) UL Classification: Class A.

3) Density: 2.0 pcf. Minimum

4) Meet requirements of ASTM C1289

b. FTR-Value EXPS:

1) FM approved rigid insulation meeting Class A 1-90, for fire and wind.

2) UL Classification: Class A Assembly.

3) Density: 1.5 pcf. Minimum

4) Meet requirements of ASTM D1621

c. Gypsum Core Cover Board:

1) FM approved meeting Class A 1-90, for fire and wind.

2) UL Classification: Class A Assembly.

3) Meet requirements of ASTM C 473

a) GP Gypsum "Dens-Deck" mechanically fastened systems only and/or use as a thermal barrier

b) GP Gypsum "Dens-Prime" adhered roofing systems

c) USG "Securock" mechanically fastened or adhered roofing systems and/or thermal barrier

C. Adhesive(s) for Insulation Attachment:

1. General

a. Adhesive not specifically supplied by roof membrane manufacturer shall be listed and approved by Factory Mutual Research in conjunction with the specified insulation and specific substrate.

b. Adhesive shall meet minimum roofing system design requirements as evidenced by testing in conjunction with the proposed substrate and or composite; under FM-Global requirements or acceptable third party laboratory.

c. Adhesive manufacturer shall provide written specifications regarding the safe handling, storage, and surface preparation for a quality application of the product.

d. All adhesives shall be pre-authorized by roof membrane manufacturer.

2. Hot Asphalt

a. Asphalt shall be Type III or Type IV steep asphalt, according to ASTM D312.

b. Asphalt shall be applied within 25°F of the asphalt manufacturer's recommended Equiviscous Temperature (EVT). If the manufacturer does not supply the EVT Seaman Corporation recommends a temperature range of 425 ^{O}F for mopping and 450 ^{O}F for mechanical spreaders. Asphalt applied within 25 ^{O}F of the EVT, under normal environmental conditions; will provide a nominal 23-25 pounds of asphalt per 100 square feet.

1) Projects utilizing hot asphalt for insulation securement require written authorization from the roof membrane manufacturer.

3. Polyurethane:

a. Adhesive shall be either a dual or single component polyurethane adhesive, dispensed from a portable pressurized container or traditional foam equipment.

b. Pre-Approved Products

1) FTR-601

2) Insta-Stik; Dow Chemical Company

3) OlyBond; Olympic Manufacturing Group

4) Tite-Set, PolyFoam Products, Inc.

PART 3 - EXECUTION

3.01 GENERAL

A. Coordinate the installation to ensure that the system remains watertight at the end of each working day

3.02 SUBSTRATE PREPARATION

A. Verify that the deck condition and/or existing roof construction is suitable for the specified installation of the specified roofing system.

B. Examine surfaces for inadequate anchorage, low areas that will not drain properly, foreign material, wet insulation, unevenness or any other defect which would prevent the proper execution and quality application of the roofing system as specified.

C. Prepared substrate shall be smooth, dry, and free of debris and/or any other irregularities which would interfere with the proper installation of the roofing system.

D. Do not proceed with any part of the application until all defects and preparation work have been corrected and complete.

E. The application of adhesives or hot asphalt directly to structural concrete; or gypsum materials may require sealing or priming with an accepted asphalt primer prior to application.

3.03 SUBSTRATE PREPARATION

A. Steel Deck

1. Steel decking should conform to Factory Mutual (FM) guidelines for Class-1 insulated steel deck construction.

2. Steel decking should be constructed of a minimum 22 gauge cold rolled steel sheets with factory G-90 galvanized coating.

3. Panel profiles, (ribs) shall be formed to minimize deflection and provide suitable strength and integrity to support anticipated structural live and dead loads.

4. Steel decking shall be installed in compliance with specified design criteria and California Building Code requirements.

5. Steel decking that is less than 22 gauge will be considered for application by the roof membrane manufacturer. Fastener withdrawal tests shall be performed on all "Non-FM Approved" steel decking, (decking less than 22 gauge) to determine suitability and appropriate fastener patterns and densities for mechanical attachment of the new components of the roofing system.

B. Wood

1. Wood decking shall conform to Factory Mutual (FM) guidelines for Class-1 impregnated wood decking. FM Class-1 decking consists of a minimum 2 inches thick wood plank or minimum 3/4 inch plywood.

2. Wood decking that is less than 3/4 inch will be considered for application by the roof membrane manufacturer. Fastener withdrawal tests shall be performed on all "Non-FM Approved" wood decking (wood plank less than 2 inches thick or plywood less than 3/4 inch thick) to determine suitability and appropriate fastener patterns for the components of the roofing system.

3. Wood decking shall be sound, well seasoned or kiln dried and of proper thickness to accommodate design loads (including wind up-lift) according to specified design criteria and/or California Building Code requirements.

4. Wood decking shall be installed to provide positive slope and subsequent positive drainage of the roofing system.

C. Cementitious Fiber:

1. Molded panels shall be installed in strict accordance with the manufacturer's installation requirements.

2. Decking shall be installed to provide positive slope and subsequent positive drainage of the roofing system.

3. Vertical alignment between adjacent panels shall provide a uniform substrate. Alignment differences shall be no greater than 1/8 inch and shall be leveled with cementitious grout.

4. Fastener withdrawal tests shall be performed on all cement fiber decking to determine suitability for and appropriate fastener patterns for the components of the new FiberTite Roofing System.

3.04 WOOD NAILERS

A. Install treated lumber at the same heights as insulation layer or adjacent construction ± 1/4 inch continuous treated wood nailers are to be installed at all perimeters, around roof projections and penetrations as shown in approved details. In re-cover applications, the surface under the wood nailers shall be free of all gravel and shall be as even as possible.

B. Where wood nailers are installed directly on the substrate, the substrate shall be carefully examined to confirm that the entire area provides a suitable fastening surface. All defects shall be repaired by the appropriate trade prior to installation.

C. Nailers shall be at least 3-1/2-inches wide and 1-1/2-inches high and installed and anchored in such a manner to resist a force of 250 lbs. per linear foot of wood blocking in any direction.

D. Nailers along parapets, curbs and expansion joints are recommended for insulated decking.

3.05 ROOF INSULATION

A. General

1. Roof insulation shall be installed where by the long dimension of the board(s) run in parallel alignment and the short dimensions are staggered.

2. Insulation shall be installed with minimum joint dimensions and shall be tightly butted where possible. Maximum joint widths shall be 3/8 inch. Damaged corners shall be cut out and replaced with an insulation piece a minimum of 12 inch x 12 inch Pieces which are cut from larger panels and are smaller than one square foot are not acceptable.

3. Install no more than can be covered during the same working day.

4. Taper roof insulation to drain sumps using tapered edge strips. If an insulation layer is 1-1/2 inches or less, taper 12 inches from the drain bowl. If insulation thickness exceeds 1-1/2 inches, taper 18 inches from the drain bowl. All taper boards or pieces must be adhered or mechanically fastened with a minimum of two fasteners per board.

5. When a cover board and/or multiple layers are installed each layer should be offset from the previous layer a minimum of 12 inches on center.

6. At the end of each working day, provide a watertight cover on all unused insulation as to avoid moisture penetration.

B. Preliminary Attachment of Insulation for Mechanically Attached Roofing Systems

1. Insulation shall be applied to or installed over properly prepared and pre-approved substrates, free of any debris, dirt, grease, oil or moisture.

2. Fasteners and stress plates for the mechanical attachment of insulation and/or cover board materials shall be FTR Fasteners as provided by Seaman Corporation.

3. Fasteners and stress plates shall be Factory Mutual Research approved for mechanical attachment of insulation and comply with FM Standard 4470 for corrosion resistance.

4. General 1-90 attachment criteria require preliminary attachment for insulation and cover boards for mechanically attached membrane roofing systems. Insulation/cover board within the field of the roof requires 6 fasteners and stress plates per 4' x 8' insulation board.

   a. Perimeter areas do not require an increase in the fastener density when the membrane is mechanically attached.

   b. Corner areas do not require an increase in the fastener density when the membrane is mechanically attached.

5. Fasteners shall be installed straight, tight and perpendicular to the decking complying with minimum penetration requirements of specific deck types. Do not over torque fasteners.

6. Fasteners shall be installed using depth sensing tool attachments to ensure proper installation.

7. Attach the top layer of Insulation/cover board using 6 fasteners and "locking" stress plates per 4' x 8' insulation board.

8. It may be possible to utilize adhesives for the preliminary attachment of the insulation layer(s) on non-steel deck projects. The insulation/cover board manufacturer must recommend and approve the specific board and adhesive combination in writing prior to roofing membrane manufacturer granting approval for this method of preliminary securement.

3.06 INSTALLATION OF MEMBRANE

A. Quality Control:

1. Initiate and maintain a QC program to govern all aspects of the installation of the roofing system.

2. If inconsistencies in the quality of the application of the composite, membrane and/or welds are found, all work shall cease until corrective actions are taken to ensure the continuity the installation.

B. General:

1. Work shall be coordinated to ensure that sequencing of the installation promotes a 100% watertight installation at the end of each day.

2. All roofing systems or sections shall be designed utilizing and determined to be in compliance with the procedures outlined within the current publication of ASCE Standard 7. Alternative designs may be determined using the criteria within Factory Mutual Research Loss Prevention Data.

3. The roofing system may utilize either conventional "roll goods" or pre-fabricated custom rolls or a combination of both. Custom Rolls must be utilized for ballast and metal recover applications.

4. Restrictions regarding outside ambient air temperature are relative only to the exposure limits of the workers and/or adhesives.

5. When using adhesives outside ambient air temperature shall be above 40°. Curing or drying time of the adhesive will be affected by ambient temperatures and must be taken into consideration when determining flashing lengths.

6. No moisture may be present on the adhesive(s) prior to mating or application of membranes.

7. Install roofing systems over properly prepared and sound substrates, free from excessive surface roughness, dirt, debris and moisture.

C. Mechanically Fastened FiberTite Roofing Systems:

1. ***Rolls of roofing shall are to be positioned and installed straight and snug but not taut. Stretching of the membrane places undue stress on the mechanical fasteners.***

2. If using custom fabricated rolls, align the paneled rolls to stager the factory seams to prevent adjacent welds from falling on top of one another. Adjoining rolls shall overlap five inches and be properly shingled with the flow of water where possible. It is not uncommon and is acceptable for the factory laps to “buck” water.

3. The properly positioned membrane shall be attached using FTR Magnum Fasteners and Magnum Stress Plates installed through the membrane and insulation assembly and engage the structural decking.

4. The Magnum stress plates shall be installed straight and parallel to existing structural purlin members. All stress plates must set completely on the membrane allowing a minimum of 1/2-inch from the edge and allow sufficient room to facilitate welding.

5. Fastener row spacing and intervals shall be established to resist design pressures, determined in compliance with procedures outlined within the current publication of ASCE Standard 7. Alternative designs may be determined using the criteria within Factory Mutual Research Loss Prevention Data.

6. The Table below lists "general" default attachment requirements for the field of the roof, as applied to structural roof decks generally referred to as Class 1; minimum 3/4-inch plywood, minimum 22 gauge steel or minimum 3,000 psi concrete.

7. Perimeter zone and corner zone enhancement is required on all mechanically fastened roofing systems. Perimeters and corners are defined as follows:

   a. Perimeter: 10-percent of the width of the roof areas or 40-percent of the height of the roof area, which ever is less to a minimum of 4-feet. Perimeter zones run parallel to all external roof edges including those with parapet walls.

   b. Corner zones are the square intersection of perimeters.

   c. Projects having variable roof levels shall treat the outer boundary of each level as a perimeter. Internal expansion joints, firewalls or adjoining building walls greater than 3-feet are not considered perimeter areas.

   d. Perimeters and corners may be enhanced by:

      1) Installing "half" rolls of membrane fastened as specified.

      2) Adding additional rows of fasteners through the top of the membrane system within the perimeter at prescribed intervals area and sealing with a 6-inch strip.

FASTENER TABLE

Design Pressure 22 gauge steel or greater	Row Intervals / Lap Structure	Lap Fastening
≤ -30 psf /FM1-60		
80 ksi steel	51" on center - open	24" on center
33 ksi steel	51" on center - open	18" on center
80 ksi steel	69" on center - open	12" on center
33ksi or 80 ksi steel	95" on center - open	6" on center
≤ –45 psf/FM1-90		
80 ksi steel	51" on center - open	18" on center
33 ksi steel	51" on center - open	12" on center
80 ksi steel	69" on center - open	12" on center
33 ksi steel	69" on center - open	6" on center

33ksi or 80ksi steel	95" on center - open	6" on center
≤ –60 psf/FM1-120		
80 ksi steel	51" on center - open	12" on center
33 ksi steel	51" on center - open	6" on center
80 ksi steel	69" on center - open	6" on center
33 ksi steel	104.5" on center - closed	6" on center
≤ –67.5 psf/FM1-135		
80 ksi steel	51" on center	6" on center
≤ –82.5 psf/FM1-165		
80 ksi steel	94" on center - closed	6" on center
≤ –112.5 psf/FM1-225		
80 ksi steel	47" on center - closed	6" on center

D. Hot Air Welding:

1. General

a. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.

b. All field seams must be clean and dry prior to initiating any field welding.

c. Remove foreign materials from the seams (dirt, oils, etc.) with Acetone or authorized alternative. Use clean white cotton cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.

d. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.

e. Contaminated areas within a seam will inhibit proper welding and will require a membrane patch.

2. Hand Welding:

a. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.

b. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.

c. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be use to apply pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

d. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

3. Automatic Machine Welding:

a. Follow all manufacturers' instructions for the safe operation of the automatic welder.

b. Follow local code requirements for electric supply, grounding and surge protection.

c. The use of a dedicated, portable generator is recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.

d. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

E. Inspection:

1. Initiate daily inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.

2. Ensure that all aspects of the installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the roof membrane manufacturer's requirements.

3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted.

4. Perform a final "self" inspection on all seams prior to requesting the inspection for warranty issuance by the membrane manufacturer.

3.07 FLASHING

A. Clean vents, pipes, conduits, tubes, walls, and stacks to bare metal. Protrusions shall be properly secured to the roof deck with approved fasteners. Remove and discard lead, pipes and drain flashing. Flash penetrations according to approved details.

B. Remove loose and/or deteriorated cant strips and flashing.

C. Flash curbs, parapets and interior walls in accordance with manufacturer-approved details.

D. Flashing shall be adhered to properly prepared, approved substrate(s) with manufacturer-recommended adhesive or mastic applied in sufficient quantity to ensure total adhesion.

E. The base flange of all membrane flashing shall extend out on to the plane of the deck, beyond the wood nailers to a maximum width of 8 inches.

F. Vertical flashing shall be terminated no less than 8 inches above the plane of the deck with approved termination bar and counter-flashing or metal cap flashing.

G. Vertical wall flashing termination shall not exceed 40 inches without supplemental mechanical attachment of the flashing between the deck and the termination point of the flashing.

H. Complete inside and outside corner flashing details with pre-formed corners or an approved field fabrication detail.

I. Probe seams with a dull, pointed probe to ensure the weld has created a homogeneous bond.

J. Install penetration accessories in strict accordance with approved details. Ensure penetration accessories have not impeded in any way the working specification.

3.08 METAL FLASHING

A. Perimeter edge details shall be fabricated from clad metal or utilize a prefabricated fascia system.

B. Ensure fascia extend a minimum of 2 inches lower than the bottom of the wood nailers.

C. Fasten metal flashing to wood nailers or approved substrate with approved fasteners 8 inches on center.

D. Break and install clad metal in accordance with approved details, ensuring proper attachment, maintaining 1/2 inch expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.

E. Solidly weld clad expansion joints with a 6 inch strip of membrane welded to the clad metal, covering the bond breaker tape (cover plates are optional).

F. Roof Drains:

1. Flash roof drains in accordance with manufacturer's roof drain details.

2. Provide non-reinforced 60 mil membrane for flashing the drain assembly. Drain assemblies and basins or "sumps" shall be free of any asphalt or coal tar pitch residue prior to installation.

3. The drain target sheet should be sized and installed to provide for a minimum of 12 inches of exposed 60 mil on all sides of the drain.

G. Pitch Pans:

1. Fabricate pitch pans from clad metal, installed in accordance with manufacturer's details, ensuring proper attachment, maintaining a minimum of 2 inch clearance around the penetration.

2. Pitch Pans shall be filled with non-shrinking grout to within 1 inch of the top of the pan. Allow the grout to dry and fill remainder of the pan with pourable sealant.

3.09 EXPANSION JOINTS

A. Flash expansion joints in accordance with manufacturer-approved details. Fasten expansion joint material according to manufacturer's specifications. Ensure the expansion material has sufficient material to expand to the widest point in expansion without causing undue stress on the expansion joint material.

3.10 SEALANTS

A. Apply sealants to surface mounted reglets and per project requirements. Sealants shall shed water. Follow manufacturer's instructions and installation guides.

B. Use primer when recommended by the manufacturer.

3.11 TEMPORARY SEALS

A. At the end of each working day or at the sign of rain, install temporary, 100% watertight seal(s) where the completed new roofing adjoins the uncovered deck or existing roof surface.

B. Create and maintain the temporary seal in such a manner to prevent water from traveling beneath the new and/or existing roof system.

C. If water is allowed to enter beneath the newly completed roofing, the affected area(s) shall be removed and replaced at no additional expense to the Owner.

D. Prior to the commencement of work, cut out and remove all contaminated membrane, insulation, roof cement or sealant and properly dispose off site.

3.12 WALKWAYS

A. Install walkways and protection pads at staging areas for roof top equipment maintenance or areas subject to regular foot traffic.

B. Walkway Installation:

1. Roofing membrane to receive walkway material shall be clean and dry.

2. Cut and position the walkway material in accordance with manufacturer instructions.

3. Hot air weld the entire perimeter of the walk way to the previously cleaned roofing membrane. Avoid excessive heating of the walk way material to prevent scorching the underlying roofing membrane.

C. Protection Pad Installation:

1. Roofing membrane to receive protection pad material shall be clean and dry.

2. Prior to installing the protection pads (1/4 inch x 2' x 4'), weld a 6 inch x 6 inch strip of membrane to each of the four corners of the back side of the pad. Position the strips in such a way that they overhang the edge of the pad a minimum of two inches around the 90° corner.

3. Position the protection pads and weld the visible portion of the previously applied stripping to the roofing membrane.

3.13 COMPLETION

A. Remove debris, excess materials and scrap of any kind from the roof and surrounding premises prior to demobilization.

B. Inspect field welds, detailing and terminations to ensure a 100% the watertight installation.

END OF SECTION