SECTION 07 54 200
KEE MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold Applied 2-Ply Thermoplastic Hybrid Roof System

B. Accessories

C. Edge Treatment and Roof Penetration Flashings

1.2 RELATED SECTIONS

A. Section 06 10 00 Rough Carpentry

B. Section 07 01 50 - Membrane Reroofing Preparation

C. Section 07 22 16 - Roof Board Insulation

D. Section 07 62 00 - Sheet Metal Flashing and Trim

1.3 REFERENCES

A. Factory Mutual Research (FM): Roof Assembly Classifications.

B. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

D. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

E. ASCE 7, Minimum Design Loads for Buildings and Other Structures

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Design Requirements:

1. Uniform Wind Uplift Load Capacity

a. Installed roof system shall withstand negative (uplift) design wind loading pressures in compliance with local building code and calculated per ASCE 7.

2. Live Load: See Code/Design Criteria Table, Sheet G1 of drawings.

3. Dead Load:

a. Installation of new roofing materials shall not exceed the dead load capacity of the existing roof structure.

b. See Code/Design Criteria Table, Sheet G1 of drawings.

C. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation, and vapor retarder, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins.

D. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio-based materials.

E. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

F. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience, certified as an approved installer by the manufacturer, and licensed as a contractor in the State of Washington.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Manufacturer's Field Supervision: A representative of the roof system manufacturer must be present at least once weekly during the roof system installation.

F. Product Certification: Provide manufacturer's certification that materials conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

G. Source Limitations: All components of the roof system shall be compatible with the system as designed by the manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Engineer or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.7 PRE-INSTALLATION MEETING

A. Convene minimum two weeks prior to commencing Work of this section, including representatives from Owner, manufacturer, installer, and any major trades. Refer to Section 013113, COORDINATION.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:

1. Record minutes of the conference and provide copies to all parties present.

2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.

3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Engineer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. No wet or damaged materials will be used in the application.

D. Store membranes at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50-degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Owner.

F. Adhesive storage shall be between the range of 50˚F (10˚ C) to 80˚F (27˚ C). Area of storage shall be suitable for flammable materials storage.

1.9 PROJECT CONDITIONS

A. Only store and install products within environmental condition limits (temperature, humidity, and ventilation) as recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.10 WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed no dollar limit (NDL) warranty guaranteeing that if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.

1. Warranty Period:

a. 20 years from date of acceptance.

B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.

1. Warranty Period:

a. 5 years from date of acceptance.

PART 2 PRODUCTS

2.1 Products:

A. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this section.

1. The design is based upon KEE-Stone FB 60 Membrane roofing system, by The Garland Company Inc. Local representative Brian Warbis (253) 328-1942.

B. Proposed alternatives: Proposed alternative roofing systems shall comply with ASTM D 6754 and shall be equal to or exceed the following performance characteristics:

1. Membrane Thickness: (ASTM D 751) 60 mil nominal
2. Breaking Strength (ASTM D 751, proc. B- strip): 375 lbf (1668 N)
3. Tearing Strength (ASTM D 751): 120 lbf (534 N)
4. Factory Seam Strength (ASTM D 751, Grab Method) 620 lbf (2758 N)

5. Puncture Resistance (ASTM D 751) 161 lb
6. Thickness over scrim: => 30 mils

2.2 SUBSTITUTIONS

A. Requests for substitutions will be considered in accordance with provisions of Section 01 33 24 SUBMITTALS AND SUBSTITUTIONS.

B. The products specified are intended and the Standard of Quality for the products required for this project. The bidder shall acquire preapproval from the Owner before the bid closing date for alternate manufacturers and/or roofing systems that they propose to use. Only manufacturers and roofing systems listed in the specifications or by addendum will be allowed.

1. Proposed manufacturer and roofing systems must be listed on the bid form. Bidder will not be allowed to change materials after the bid closing date.
2. If alternate products are proposed, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Owner for approval prior to acceptance.
3. In making a request for substitution, the bidder represents that it has:
    a. Investigated the proposed product or method and determined that it is equal or superior in all respects to that specified.
    b. Will provide the same guarantee for substitution as for the product and method specified.
    c. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
    d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
    e. Will reimburse the Owner for all redesign costs incurred by the Owner for accommodation of the substitution.
4. Engineer/ Owner reserves the right to act as the final authority on the acceptance or rejection of proposed alternate roofing systems or materials.
5. Listing a manufacturer of roofing system that is not listed in the specifications, or addendum will result in a rejection of the bid as non-responsive.

2.3 COLD APPLIED 2-PLY THERMOPLASTIC HYBRID ROOF SYSTEM

A. See Detail 1, Sheet D1 of drawings for roofing system typical cross section

B. Bituminous Vapor Barrier Base Membrane

1. SBS-modified, fiberglass-scrim-reinforced self-adhering roofing membrane

2. Meets or exceeds ASTM D 4601 Type II
3. Thickness: => 40 mils
4. Application
    a. Over existing intact vapor barrier
        1) VersiPly 40 by Garland, or equal
        2) One ply heat welded to prepared roof deck
    b. Over new or bare deck
        1) VaporSmart SA by Garland, or equal
        2) One ply adhered to prepared roof deck
        3) When installing directly to wood deck, substrate must be primed with SA Primer.

C. Deck Primer
    1. SA Primer by Garland or equal
    2. Polymer Emulsion-Base Primer
    3. Applied to substrate before installation of self-adhering vapor barrier
D. Insulation: See Section 07 22 00 - Roof Insulation and Coverboard
    1. Bonded to vapor barrier and subsequent layers of insulation with manufacturer approved insulation adhesive
E. Coverboard: See Section 07 22 00 - Roof Insulation and Coverboard
    1. Bonded to insulation with manufacturer approved insulation adhesive
F. Modified Bituminous Base Ply and Flashing Base Ply
    1. StressBase 80 Plus by Garland, or equal.
    2. Fiberglass reinforced styrene-butadiene-styrene (SBS) rubber-modified bitumen membrane
    3. Meets or exceeds ASTM D 6163, Type I
    4. Thickness: 80 mil
    5. One ply bonded to the coverboard with interply adhesive (1) or flashing adhesive respectively
G. Thermoplastic Cap (Ply) Sheet:
    1. KEE-Stone FB 60 by Garland, or equal
    2. Thermoplastic fleece backed cap sheet modified with ketone ethylene ester (KEE).
    3. Meets or exceeds ASTM D 6754

4. Thickness: 60 mils
5. One ply bonded to the modified bituminous base ply with interply adhesive (2)

H. Thermoplastic Flashing Cap (Ply) Sheet:

1. KEE-Stone NF 60 Flashing by Garland, or equal.
1. Thermoplastic non-fleece backed reinforced flashing cap sheet modified with ketone ethylene ester (KEE).
2. Meets or exceeds ASTM D 6754
3. Thickness: 60 mils
2. One ply bonded to the modified bituminous flashing base ply with Flashing Ply Adhesive (2).

I. Adhesives

1. Insulation Adhesive: See Section 07 22 00 - Roof Insulation and Coverboard
2. Interply Adhesive (1) for modified bituminous base play
   a. Green-Lock Plus Membrane Adhesive by Garland, or equal.
   b. High-performance, asphalt free, moisture-cured polymer adhesive
   c. Meets or exceeds the following performance standards:
      1) ASTM D 93: Flash Point (375˚F /190˚C)
      2) ASTM D 4586: Non-volatile content (>95% to 100% solids).
      3) VOC: <50 g/l
      4) ASTM D 2196, Brookfield viscosity vis T-E spindle (15,000-30,000 cPs)
3. Flashing Ply Adhesive (1):
   a. Green-Lock Plus Flashing Adhesive by Garland, or equal.
   b. Cold-applied, zero VOC, 100% polyether moisture-cured flashing adhesive. Trowel-grade, fast-curing roof mastic designed for flashing installations and field repairs.
   c. Meets or exceeds the following performance standards:
      1) ASTM D 93: Flash point (375°F / 190°C)
      2) ASTM D 4586: Non-volatile content (>95% to 100% solids).
      3) VOC: <50 g/l
      4) ASTM D 2196: Brookfield viscosity via T-E Spindle (ranging from 200,000 to 305,000 cPs or higher).

5) ASTM C 679: Surface cure time (approx. 100 minutes at 70°F / 50% humidity)

4. Interply Adhesive (2) for thermoplastic cap sheet
   a. KEE-Lock Foam Spatter by Garland, or equal.
   b. Two-component, low rise, solvent free, polyurethane, foamable adhesive that contains no high Global Warming Potential (GWP) propellants
   c. Meets or exceeds the following performance standards:
      1) ASTM D 412 (Tensile Strength: 250 psi)
      2) ASTM D 1875 (Density: 8.5 lbs./gal.)
      3) ASTM D 2556 (Viscosity: 22,000 - 60,000 cP)
      4) ASTM D 903 (Peel Strength: 17 lb./in.)
      5) ASTM D 816 (Flexibility: Pass at -70°F /-56.7°C)
5. Flashing Ply Adhesive (2) for thermoplastic flashing cap:
   a. KEE-Lock WB Flashing Adhesive by Garland, or equal
   b. Roller grade, water-based, solvent-free acrylic, pressure-sensitive adhesive
   c. Meets or exceeds the following performance standards:
      1) ASTM D 4586 (Non-volatile content: 99.2%).
      2) VOC: <50 g/l
      3) ASTM D 2196, Brookfield viscosity vis T-E spindle (900,000 +/- 100,000 cPs)

2.4 ACCESSORIES:

A. Sealants
   1. KEE-Lock Water Cut-Off Sealant by Garland, or equal.
      a. Adhesive applied at the perimeter of KEE membrane to help prevent any water intrusion where scrim reinforcement is exposed
   2. Tuff-Stuff MS by Garland or equal.
      a. Moisture-curing, single-component, non-sag, urethane sealant containing no solvents. Designed to maintain an effective bond and seal between materials of similar and dissimilar surfaces, porosities, and expansion coefficients including reglets, precast panels, tilt-up walls, metal curtain walls, copings, window and door perimeters, panel bedding, and glazing details.

b. Meets or exceeds the following performance standards:

1) Tensile Strength, ASTM D 412: 225 psi

2) Elongation, ASTM D 412: 450-550%

3) Hardness, Shore A ASTM C 920: 25-35

4) Adhesion-in-Peel, ASTM C 92: 30 pli

3. Seal-Tite Pitch Pocket Sealer by Garland, or equal.

a. Two-part, 100% solids, self-leveling, polyurethane sealant for filling pitch pans as recommended and furnished by the membrane manufacturer.

b. Meets or exceeds the following performance standards:

1) ASTM D 2240 (Durometer: 40-50 Shore)

2) ASTM D 412 (Elongation: 250%)

3) ASTM D 412 (Tensile Strength: 200 psi@ 100 mil)

B. Nails and Fasteners

1. Non-ferrous metal or galvanized steel, except for the following:

a. hard copper nails shall be used with copper

b. aluminum or stainless-steel nails shall be used with aluminum

c. stainless-steel nails shall be used with stainless steel

2. Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer.

3. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.

C. Walkway Pads

1. Cool-Sil Yellow Walkway Coating by Garland, or equal.

2. Granular coated, one-component, moisture curing silicone rubber coating system designed to enhance the impact resistance of the roof surface and provide a non-skid walking surface

3. Meets or exceeds the following performance standards:

a. Installed Thickness: 25 mil

b. ASTM D2369 (Solids content: 95% +/-2%)

c. ASTM E96 (Permeability:10.7 perms)

d. ASTM D412 (Elongation: 174%)

e. ASTM D412 (Tensile Strength: 350 psi)

f. ASTM D2240 (Hardness: 37)

g. ASTM D 93: Flash point (141°F /60.6°C)

h. VOC: < 50g/L

4. Shall be installed 4’ in width fully surrounding all maintained equipment

D. Fiberglass Cant Strip: Continuous triangular cross-section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, roof hatches, nailers, surfaces and all other elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. Notify Owner of unsatisfactory conditions of existing roofing elements discovered during examination. Coordinate with owner for replacement or repair of unsatisfactory elements before proceeding to roof installation.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.

1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for tile substrate under the project conditions.

2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.

3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.

4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.

5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.

6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.

7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

B. Wood Deck:

1. Dimensional wood deck shall be minimum 1 inch (25 mm) thick, knotholes and cracks larger than 1/4 inch shall be covered with sheet metal. All boards shall be appropriately nailed and have adequate end bearing to the centers of beams/rafters. Lumber shall be kiln dried.
2. Plywood shall be a minimum 15/32 inch (11.9 mm) thick and conform to the standards and installation requirements of the American Plywood Association (APA).
3. If no roof insulation is specified, provide a suitable dry sheathing paper, followed by an approved base sheet nailed appropriately for the specified roof system, with 1 inch (25 mm) diameter caps and annular nails unless otherwise required by the applicable Code or Approval agency.
4. Insulation is to be mechanically attached in accordance with the insulation manufacturer's recommendations unless otherwise required by the applicable Code.
5. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per tile deck manufacturer's recommendations and standards of the APA/Engineered Wood Association prior to new roof application.
6. Light metal wall ties or other structural metal exposed on top of the wood deck shall be covered with one ply of a heavy roofing sheet extending 2 inches to 6 inches (51 mm to 152 mm) beyond the metal in all directions. Nail in place before applying the base ply.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. Contractor shall adjust parapet and curb heights as necessary to accommodate new roof system thickness.

C. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures is unavoidable, use the following precautions:

1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
2. Unrolling of cold materials, under low ambient conditions must be avoided

to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

D. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

E. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION COLD APPLIED ROOF SYSTEM

A. Base Ply: Cut base ply sheets into 18-foot lengths and allow plies to relax before installing. Install base sheet in interply adhesive applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.

1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
2. Solidly bond to tile substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
4. Install subsequent rolls of modified across tile roof as above with a minimum of 4-inch side laps and 8-inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
6. Install base flashing ply to all perimeter and projection details.
7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Thermoplastic Cap Ply: Allow plies to relax before installing. Install in interply adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of specified plies. Shingle in proper direction to shed water on each large area of roofing.

1. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
2. All field seams must be clean and dry prior to initiating any field welding. 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.
3. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.
4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.
5. The back interior edge of tile 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.
6. Follow local code requirements for electric supply, grounding and surge protection. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
7. Properly welded seams shall utilize a 1.5-inch-wide nozzle, to create a homogeneous weld, a minimum of 1.5 inches in width.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cants may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking and Nailers: Provide wood blocking and nailers as specified in Section 0610 00.
1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
3. Nailer lengths should be spaced with a minimum 1/8-inch gap for expansion and contraction between each length or change of direction.
4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07 62 00. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o.c. to achieve constant compression. Provide suitable sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base

1. Seal curb, wall, and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) o.c. and sealed at top.
5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.
6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed or nailed 4 inches o.c. and covered with an acceptable counter flashing.

H. Flashing Cap Ply:

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer lo dry lack free.
3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.

6. All stripping shall be installed prior to flashing cap sheet installation.
7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed or nailed 4 inches o.c. and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Scupper Through Wall:
1. Inspect the nailer to ensure proper attachment and configuration.
2. Run base ply over nailer, into scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
3. Install a scupper box in a 1/4-inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4-inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper and allow to dry.
4. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.
5. Strip in flange of scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
6. Then install thermoplastic cap field ply run over the base flashing ply in bitumen or foam adhesive.
7. Install a second ply of thermoplastic flashing cap ply heat welded over the thermoplastic cap ply, 9 inches (228 mm) on to the field of the roof.
8. Heat weld a cover strip over all seams.

B. Scupper Through Wall (Overflow):
1. Inspect the nailer to ensure proper attachment and configuration.
2. Run base ply over nailer up the overflow, into the scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
3. Install scupper box in a 1/4-inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4-inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper and allow to dry.
4. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.
5. Strip in flange scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
6. Then install thermoplastic cap field ply run over the base flashing ply in bitumen or foam adhesive.
7. Install a second ply of thermoplastic flashing cap ply heat welded over the thermoplastic cap ply, extending 9 inches (228 mm) over the field of the

roof.

8. Heat weld a cover strip over all seams.

C. Coping Cap:

1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall and allow to dry.
2. Set cant in bitumen. Run all base field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to the base field ply and set in bitumen. Nail base flashing ply at 8 inches (203 mm) o.c. on the back side of the parapet wall.
4. Install thermoplastic cap field ply over the base flashing ply using manufacturer recommended adhesive.
5. Install a second ply of thermoplastic flashing cap ply. Heat weld over the thermoplastic cap field ply, extending 9 inches (228 mm) over the field of the roof.
6. Heat weld a cover strip over all seams.
7. Install continuous cleat and fasten at 6 inches (152 mm) o.c. to outside wall.
8. Install new metal coping cap hooked to continuous cleat.
9. Fasten inside cap 24 inches (609 mm) o.c. with approved fasteners and neoprene washers through slotted holes, which allow for expansion and contraction.

D. Expansion Joint:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Contractor shall adjust curb height as necessary to accommodate roof system thickness. Chamfer top of curb. Prime vertical curb and allow to dry.
2. Mechanically attach wood cant to expansion joint nailers. Run all base field plies over cant a minimum of 2 inches (50 mm).
3. Install compressible insulation in neoprene cradle.
4. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
5. Install thermoplastic cap field ply over the base flashing ply using manufacturer recommended adhesive.
6. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.

7. Install pre-manufactured expansion joint cover. Fasten sides at 12 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.

E. Area Divider:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Contractor shall adjust curb height as necessary to accommodate roof system thickness. Prime vertical curb at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all base field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to the base field ply and set in bitumen.
4. Then install thermoplastic cap field ply run over the base flashing ply using manufacturer recommended adhesive.
5. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.
6. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers through slotted holes. Furnish all joint cover laps with butyl tape between metal covers.

F. Equipment Support:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Contractor shall adjust curb height as necessary to accommodate roof system thickness. Prime vertical and allow to dry.
2. Set cant in bitumen. Run all base field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering the curb set in bitumen with 6 inches (152 mm) on to the base field ply and set in bitumen.
4. Then install thermoplastic cap field ply run over the base flashing ply using manufacturer recommended adhesive.
5. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.
6. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

G. Pre-manufactured Curb for Equipment Support:

1. Minimum curb height is 8 inches (203 mm) above finished roof height.

Contractor shall adjust curb height as necessary to accommodate roof system thickness. Prime vertical and allow to dry.

2. Run all base field plies over the pre-manufactured cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering the pre-manufactured curb set in bitumen with 6 inches (152 mm) on to the base field ply and set in bitumen.
4. Then install thermoplastic cap field ply run over the base flashing ply using manufacturer recommended adhesive.
5. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.
6. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

H. Exhaust Fan:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Contractor shall adjust curb height as necessary to accommodate roof system thickness. Prime vertical and allow to dry.
2. Set cant in bitumen. Run all base field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to the base field ply and set in bitumen.
4. Then install thermoplastic cap field ply run over the base flashing ply using manufacturer recommended adhesive.
5. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.
6. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

I. Roof Drain:

1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
3. Run roof system base plies over drain. Cut out plies inside drain bowl.
4. Set lead/copper flashing {30-inch square minimum) in 1/4-inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime

lead/copper and allow to dry.

5. Install base flashing ply (40-inch square minimum) in bitumen.
6. Install thermoplastic cap ply (48-inch square minimum) using manufacturer recommended adhesive.
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

J. Plumbing Stack:

1. Minimum stack height is 12 inches (609 mm). Contractor shall adjust stack height as necessary to accommodate roof system thickness.
2. Run roof base ply over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4-inch (6 mm) bed of roof cement.
4. Install base flashing ply in bitumen.
5. Install thermoplastic cap ply using manufacturer recommended adhesive.
6. Caulk the intersection of the membrane with elastomeric sealant.
7. Turn sleeve a minimum of 1 inch (25 mm) down inside of stack.

K. Pitch Pocket:

1. Run all base plies up to the penetration.
2. Place the pitch pocket over the penetration and prime all flanges.
3. Strip in flange of pitch pocket with one ply of base flashing ply. Extend 6 inches (152 mm) onto field of roof.
4. Then install thermoplastic cap field ply run over the base flashing ply using manufacturer recommended adhesive.
5. Install the thermoplastic flashing ply using manufacturer recommended adhesive over the base flashing ply, extending 9 inches (228 mm) over the field of the roof.
6. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with pourable sealant.
7. Caulk joint between roof system and pitch pocket with elastomeric sealant.

3.6 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.7 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes, and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.8 FIELD QUALITY CONTROL

A. Inspection: In addition to the requirements defined in 1.6.E, provide manufacturer's field observations at start-up and at intervals of approximately 30 percent, 60 percent, and 90 percent completion. Provide a final inspection upon completion of the Work.

1. Warranty shall be issued upon manufacturer's acceptance of the installation.

2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.

3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.

4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

PART 4 MEASUREMENT AND PAYMENT

4.1 KEE Membrane Roofing System

A. Measurement and Payment for KEE MEMBRANE ROOFING SYSTEM shall be on a lump sum (LS) basis at the price as indicated on the bid form. This shall include all work, labor, materials, equipment, and other resources needed for the complete removal and replacement of the roof, including associated flashing, sleepers, equipment supports, and other roofing accessories to result in a complete product.

END OF SECTION