

**SECTION 07 54 20**  
**SINGLE PLY KEE MEMBRANE ROOFING**

**1.GENERAL**

**1.1. SECTION INCLUDES**

- A. Includes all labor, materials, and equipment to install an adhered KEE Membrane roof system over the properly prepared substrate.
- B. Includes removal and disposal of existing roofing system(s), insulation boards, gutters, flashings, sheet metal items, copings, etc. for a complete prepared roof surface to receive the new roofing system.

**1.2. RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Section 06: Rough Carpentry
  - 2. Section 07: Insulation
  - 3. Section 07: Sheet Metal Flashing and Trim
  - 4. Section 07: Sealants

**1.3. SUBMITTALS**

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- B. Samples: Submit two (2) samples of the following:
  - 1. Membrane, 3 each 12"x12".
  - 2. Fasteners / Plates, 3 each
  - 3. Insulation Board, 3 each 12" x 12"
- C. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.
- D. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7, In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article of this specification.
- E. Certificates: Cool Roofing certified by Cool Roof Rating Council.
- F. Shop Drawings: For roofing system. Include plans, elevations, sections, details and attachments to other Work.
- G. Samples: If specifically requested for specified products; required for alternate products.
- H. Installer Qualifications: Provide evidence that installers meet the requirements of Article 1.4.

- I. Closeout Submittals:
  - 1. O & M Manuals: Maintenance instructions.
  - 2. Guarantee: Provide completed form per Article 1.5.
  - 3. Manufacturer's weekly inspection reports noting issues, corrections, and final inspection photos.

#### 1.4. QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Minimum of 5 years of experience on similar work; knowledge and understanding of standards referenced herein; skill necessary to perform in compliance with this specification. Installers failing to demonstrate the required experience, knowledge, or skill shall be removed from the project.
  - 2. Factory trained and approved applicator, certificate must be current.
  - 3. 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. Maintain proper supervision of workmen.
  - 4. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
- B. Testing Characteristics: UL Class A roof; I-90 wind uplift.
- C. Applicator-Manufacturer Review: Provide Drawings and Specifications reviewed by Applicator with agent of roofing manufacturer; obtain manufacturer's agreement that specified system is proper for application shown.
- D. Manufacturers Participation:
  - 1. Pre-Application Job-Site Conference: Arranged by Applicator, with a minimum of 1 week advance notice; for review of storage, handling, protection, surface preparation, materials and application specifications; attended by applicator, his foreman, Architect, inspector, and manufacturer's agent.
  - 2. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.
  - 3. When the project is in progress, the roofing system manufacturer will provide the following:
    - a. Report progress and quality of the work as observed.
    - b. Provide weekly job site inspections throughout the course of construction.
    - c. Provide electronic inspection reports submitted weekly to the Owner and/or Architect.
    - d. Report to the Architect and/or Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
    - e. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

## 1.5. WARRANTY

- A. Manufacturer: Provide a fifteen (15) year warranty on manufacturers form. Warranty period shall begin on date of acceptance of roofing by Owner.
- B. Manufacturer will provide the following services at years 2, 5, 10 & 15 at no cost to the owner.
  - 1. Inspection by a technical service representative and delivery of a written inspection report documenting roof conditions.
  - 2. General rooftop housekeeping, subject to limits but generally including removal of incidental debris.
- C. Provide one warranty by a single approved manufacturer for membrane roof areas, coping metal systems and transitions between the material types.
- D. Installer: Provide in required form for a period of three (3) years from date of acceptance by Owner.

## 2.PRODUCTS

### 2.1. KEE SINGLE-PLY ROOFING

- A. Products:
  - 1. 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.
  - 2. The design is based upon roofing systems by The Garland Company Inc./VPG, Local representative Richard Jones (559) 647-1196. Equal or better than.
    - a. Solar Bright 60 Membrane (ASTM D 751)
    - b. Membrane Thickness: (ASTM D 751) 60 mil nominal
    - c. Breaking Strength (ASTM D 751): 298X278 lbf/in
    - d. Tearing Strength (ASTM D 751): 89X109 lbf/in
    - e. Factory Seam Strength (ASTM D 751) 286 lbf
    - f. Solar Reflectivity (ASTM C 1549) 82% (White)
    - g. Emissivity (ASTM C 1371) 91% (White)
    - h. SRI (ASTM E1980) 109 (White)
- B. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
  - 1. Bidder will not be allowed to change materials after the bid opening date.
  - 2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval seven (7) days prior to the bid date for review. A pre-bid addendum shall be submitted for all bidders to review if the substitution is permitted.
  - 3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:
    - a. Personally 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. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
  - f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.
- 4. Architect/ Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
  - 5. Failure to submit substitution package, or any portion thereof requested, will result in immediate disqualification and consideration for that particular contractors request for manufacturer substitution.

## 2.2. VAPOR RETARDER

- A. Red Rosin or equal or better than: One ply of mechanically attached to the prepared substrate, install at all wood deck roof areas.

## 2.3. NAILERS

- A. Douglas Fir; No. 2 or better than or equal to, pressure treated; no creosote or asphalt preservatives allowed.

## 2.4. ROOF BOARD INSULATION

- A. Roof Insulation Base Layer 4' x 8' max dimension:
  - 1. Thickness: 1"
  - 2. R-Factor Average: 5.7
  - 3. Attachment Method: Mechanically attached with (16) screws and plates per 4'x8' sheet.
- B. Roof Insulation top layer: Georgia Pacific Dens Dek Prime Roof Board. Equal or better than.
  - 1. Max Dimension: 4' x 8'
  - 2. Thickness: 1/2" at all horizontal surfaces and 1/4" inch at all vertical surfaces.
  - 3. Attachment Method: Insuloc or equal or better than Insulation Adhesive, 12" ribbon pattern.
- C. Tapered Insulation: Tapered roof board insulation to be used as required for tapered insulation system or tapered crickets. Hunter or equal or better than, ASTM C 1289, Type II, Class 1, Grade 2, (20psi) polyisocyanurate insulation board.
  - 1. Field Slope: \_\_ 1/2" \_\_ inch per foot.
  - 2. Sump Slope: \_\_ 1/2" \_\_ inch per foot.
  - 3. Cricket Slope: \_\_ 1/2" \_\_ inch per foot as needed for crickets and proper slope.
  - 4. Attachment Method: Mechanically Attached

## 2.5. FASTENERS

- A. Heavy duty #15 threaded fastener with a #3 Phillips drive used with barbed fastening plate to secure the insulation board to the structural decking. It is used on minimum 22 gauge steel decks

or minimum 15/32" CDX plywood decks. It is also designed to offer an optimum combination of driving performance, back-out and corrosion resistance with excellent pullout performance.

1. TruFast or better than/equal to, #15 EHD Roofing Fasteners or equal or better than.
- B. Fastening Plate: A 2-3/8" diameter metal barbed fastening plate used with HP-X, CD-10 or HD 14-10 Fasteners for membrane or insulation securement. This plate can be used for membrane or insulation securement.
  1. TruFast or better than or equal to Metal Seam Plates, 2.4" barbed.
- C. Insulation Fastening Plate: A nominal 3-inch metal plate used for insulation attachment in conjunction with the appropriate fastener.
  1. TruFast or equal or better than Metal Insulation Plates, 3" round.

## **2.6. ACCESSORIES**

- A. KEE or better than or equal to 60 mil membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system.
- B. KEE or better than or equal to Inside Corners: Pre-molded corner flashing for inside corners. 80 mil thickness. Color - White.
- C. KEE or better than or equal to Outside Corners: Pre-molded corner flashing for outside corners. 80 mil thickness. Color - White.
- D. KEE T-Joint Covers or better than or equal to: 40 mil thick non-reinforced PVC flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections.
- E. KEE Pipe Flashings or better than or equal to: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.
- F. KEE Split Pipe Seals or better than or equal to: Pre-fabricated flashing consisting of 60 mil reinforced Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. A split (cut) and overlap tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.
- G. KEE Non-Reinforced Flashing or better than or equal to: 60 mil thick rolls 12 inches and 24 inches wide. Used for inside/outside corners and field fabricated pipe flashings when use of pre-molded accessories is not feasible.
- H. KEE Heat Weldable Walkway Rolls or better than or equal to: offering superior tear, puncture and weather resistance and designed to protect membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 36 inches (914mm) wide by 60 feet (18.3 M) long and are nominal 80 mils thick.
- I. Single ply Coated Sheet Metal: Provide where flashing, gravel stops and sheet metal are in contact with single ply roofing membrane. Install 22 gauge cleat all all edge metal conditions.

## **2.7. SOLVENT, SEALANT, AND ADHESIVES**

- A. As recommended by manufacturer.
- B. SolarBright or better than/equal to Low VOC two sided Bonding Adhesive: Low VOC solvent-based contact adhesive that allows bonding of membrane to various porous and non-porous substrates.

1. Weight: 7.4lbs
2. VOC: 199
3. Color: Amber
4. Solids: 20%

### **3.EXECUTION**

#### **3.1. EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Do not commence Work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2. PREPARATION**

- A. Do not apply wet roofing, on wet application surface, or when temperature of deck less than 50 degrees F.
- B. Provide entire roof system including treated wood nailers, Single-ply coated sheet metal, and coordination of items such as roof drains, sumps, jacks, etc.
- C. Protect adjoining materials from stains particularly around perimeter of building; prevent debris from clogging roof drains.
- D. Deck surface swept clean and dry; keep free of loose and foreign materials.

#### **3.3. INSTALLATION**

- A. Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
  1. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
  2. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines and as specified in section 07 54 20, 2.4, A, B, & C above.
  3. Securely attach insulation to the roof deck. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by Factory Mutual (FM I-90) & the International Building Code (ASCE-7) or ANSI/SPRI WD-1.
- B. Application; Adhered system over roof deck

1. Position SolarBright or better than or equal to, membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.
2. Apply SolarBright Bonding Adhesive or better than or equal to, in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
3. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
4. Fold back the un-bonded half of the sheet lengthwise and repeat the bonding procedures.
5. Position adjoining sheets to allow a minimum overlap of 2 inches (51mm).
6. Hot-air weld the SolarBright or better than or equal to, membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.
7. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches (51mm) and complete the bonding procedures as stated previously.
8. Parapet Wall Covering: Install as shown, extend to full height of parapet; lap under parapet cap flashing and over wall substrate 2 inches minimum on the back side of the wall. Secure in adhesive and attach at 9" on center on the outside face to assure a completely watertight installation.
9. Walkway: Per manufacturer's instructions and as shown on drawings. If drawings do not show walkways a minimum required will be;
  - a. A path from the main roof access point to and around all HVAC units, to and around all serviceable roof top equipment, to and around all roof hatches, to and around all access points as designated by the owner, and as needed for protection of the roofing system will have walkway installed.
  - b. All support blocking will have walkway pad installed as a protection mat.

C. Fasteners:

1. General: Per manufacturer's recommendation; fastening length and pattern based on performance values supplied by the fastener/disc manufacturer and conforming to Factory Mutual I-90 fastening pattern.
2. Walkway Fastening: Provide 2 inch continuous heat weld strip around perimeter of membrane. A 3" opening is to be left non-welded at the lower side of the walkway pad to allow drainage and venting.

D. Hot Air Welding

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.
3. 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.**

4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
5. Contaminated areas within a seam will inhibit proper welding and will require a membrane patch or replacement of the membrane.

E. Hand Welding

1. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.
2. 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.
3. 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.
4. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

F. Automatic Machine Welding

1. Follow all manufacturers' instructions for the safe operation of the automatic welder.
2. Follow local code requirements for electric supply, grounding and surge protection.
3. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
4. 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.

G. Inspection

1. The job foreman and/or supervisor shall 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 most current Solar Bright Roofing Systems Specifications and Details.
3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of final inspection for warranty acceptance.

H. Metal Flashings:

1. General: Fabricate and install per Section 07601 - FLASHING AND SHEET METAL, as shown and per manufacturer's recommendations. Install PVC coated metal flashing at intersections of roofs with sloped or vertical surfaces, roof interruptions and penetrations.
2. Base Flashing: Extend up vertical surfaces 6 inches, minimum, and onto the horizontal roof surfaces not less than 3 inches, unless otherwise noted. Provide PVC coated metal flashing with 2 inches minimum overlap of roofing membrane; heat weld in the horizontal plane, with subsequent sealing of seams with sealant.



3. All perimeter edge details are to be fabricated from Garland/VPG SolarBright Clad Metal or equal to or better than, and required to have 22 gauge cleat.
4. Ensure all fascia extend a minimum of 2 inch lower than the bottom of the wood nailers.
5. Fasten all metal flashing to wood nailers or approved substrate with approved fasteners eight (8") inches on center.
6. Manufacture and install Solar Bright Clad or equal to or better than, 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.
7. Solidly weld Solar Bright Clad or equal to or better than expansion joints with a 6 inch strip of Solar Bright or equal to or better than membrane welded to the Solar Bright Clad or equal to or better than, covering the bond breaker tape (cover plates are optional).

I. Roof Drains

1. Flash all roof drains in accordance with Solar Bright or equal to or better than roof drain details.
2. Replace all worn or broken parts that may cut the Solar Bright or equal to or better than membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
3. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
4. Solar Bright or equal to or better than, non-reinforced 60 mil membrane shall be used for flashing the drain assembly. Drain assemblies and basins or "sumps" must be free of any asphalt or coal tar pitch residue prior to installation.
5. The drain target sheet should be sized and installed to provide for a minimum of 12 inch of exposed 60 mil on all sides of the drain.

**3.4. FIELD QUALITY CONTROL**

- A. Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements & manufacturers recommendations.
- B. Heat weld test cuts will be required. One (1) test cut per 5,000 square feet will be required.
- C. Correct defects or irregularities discovered during field inspection.
- D. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system a minimum of two (2) days per week. A copy of the specification should also be on site at all times.

**3.5. CLEANING**

- A. Keep premises free from accumulation of waste and debris. At completion of installation remove surplus materials and debris.
- B. At completion clean exposed surfaces in a manner that will not damage finish.

**3.6. FINAL INSPECTION**

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor.
- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements
- F. Notify the Contractor, Architect, & Owner upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END SECTION 07 54 20