

SECTION 07550
MODIFIED BITUMINOUS ROOFING WITH KEE-STONE FB 60 MIL MEMBRANE – COLD APPLIED

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provide all labor, equipment, and materials to install modified bituminous roof system with KEE-Stone FB 60 mil Membrane over the properly prepared substrate.

****ALL products in bold italics will be furnished by Dehesa School District. All products not in bold italics to be furnished by the Contractor. All products in bold italics will be manufactured by The Garland Company and purchased by District using its authority under the CMAS schedule.****

Contract #: 4-20-56-0006B

- B. Building E – Scope of Work:
1. Remove existing roof system to the structural deck.
 2. Perform any deck repair as needed. Contractor to include 10% deck replacement in base bid. If the replacement amount exceeds 10%, the Contractor will be issued a change order based on the sq ft amount over 10% by the unit price amount. If the replacement amount is less than 10%, the Contractor is to issue a credit to the District based on the sq. ft amount under 10% by the unit price amount. Contractor to include unit price amount in base bid.
 3. Mechanically fasten ½” DensDeck Prime coverboard across entire roof system. Fasten per I-90 wind uplift requirements.
 4. Install SBS modified base sheet – ***StressBase 80*** - in no-odor adhesive – ***Green-Lock Plus Membrane Adhesive*** – at 2.5 gal per sq. across entire roof system. Extend ply over edge blocking.
 5. Sweep or blow away any dust, dirt, or debris off the base sheet. Install KEE-Stone Fleece Back membrane – ***KEE-Stone FB 60*** - in urethane foam adhesive – ***KEE-Lock Foam*** – in a ribbon pattern with 1/4”-1/2” wide beads 12” o.c. across entire roof system.
 6. Once the ***KEE-Stone FB 60*** membrane is adhered, heat-weld all side lap seams to seal the membranes together.
 7. Ensure all end laps are properly adjoined. Heat-weld ***KEE-Stone 6” Utility Roll*** at all end laps.
 8. Edge Metal: Install new 22 ga drip-edge with 3” face over wood blockers fastened 3” o.c. Contractor responsible to field-verify dimensions. Metal to be fabricated from ***R-Mer SS Flat Stock (Emerald Green.)***
 9. Perimeter flashing areas: Glue the ***KEE-Stone 6” Utility Roll*** on metal flange using Viking KEE VOC Bonding Adhesive, then heat weld to the ***KEE-Stone FB 60*** membrane - extending 3” onto the field.
 10. Ductwork: Seal all seams with polyester-reinforced adhesive tape – ***UniBond ST 6”*** – and coat over all taped seams with urethane coating – ***White-Knight Plus WC***. Install Dura-Blok rubber blocks on all legs of units.

11. Penetrations: All penetrations to be flashed with Viking KEE Pipe Flashing Boots.
12. Conduit: Lift any conduit currently fastened into the roof. All conduit to be set on Dura-Blok rubber blocks once roof system is installed.
12. Gutters: Install new 22 ga. gutters and downspouts on the front of the building. Downspouts to be installed on each corner. Contractor responsible to field-verify dimensions. Gutters and downspouts to be fabricated from **R-Mer SS Flat Stock (Emerald Green)** to match the section installed on the back of the building.
13. Contractor to provide a 5-year warranty for labor.

C. Building F – Scope of Work

1. Remove existing roof system to the structural deck.
2. Perform any deck repair as needed. Contractor to include 10% deck replacement in base bid. If the replacement amount exceeds 10%, the Contractor will be issued a change order based on the sq ft amount over 10% by the unit price amount. If the replacement amount is less than 10%, the Contractor is to issue a credit to the District based on the sq. ft amount under 10% by the unit price amount. Contractor to include unit price amount in base bid.
3. Apply primer – **SA Primer** – at 0.5 gal per sq. to the entire wood deck.
4. Apply one layer of self-adhering underlayment – **R-Mer Seal** – to the entire roof system.
5. Apply second layer of self-adhering underlayment – **R-Mer Seal** – to the entire roof system. Must be back-nailed at side and end laps. Contractor to use a roller to help promote the adhesion while installing.
6. Apply Owens Corning three-tab shingles, or approved equal, and match existing light gray color.
7. Edge metal: Install new 22 ga drip-edge with 3" face over wood blockers fastened 3" o.c. Contractor responsible to field-verify dimensions. Metal to be fabricated from **R-Mer SS Flat Stock (Emerald Green.)**
8. Gutters: Remove any existing and install new 22 ga. gutters and downspouts on all perimeter sections. Downspouts to be installed every 20'. Contractor responsible to field-verify dimensions. Gutters to be fabricated from **R-Mer SS Flat Stock (Emerald Green)** and downspouts to be fabricated from **R-Mer SS Flat Stock (Regal White.)**
9. Counter-flashing: Install new 22 ga metal where existing below windows. Contractor responsible to field-verify dimensions. Metal to be fabricated from **R-Mer SS Flat Stock (Sandstone.)**
10. Penetrations: All penetrations to be flashed in with lead set in **KEE-Lock Mastic**.
11. Coping metal: Install new 22 ga steel where existing. Contractor responsible to field-verify dimensions. Metal to be fabricated from **R-Mer SS Flat Stock (Emerald Green.)**
12. Contractor to provide a 5-year warranty for labor.

D. Building A (Add-Alternate) – Scope of Work

1. Remove existing roof system to the structural deck.

2. Perform any deck repair as needed. Contractor to include 10% deck replacement in base bid. If the replacement amount exceeds 10%, the Contractor will be issued a change order based on the sq. ft amount over 10% by the unit price amount. If the replacement amount is less than 10%, the Contractor is to issue a credit to the District based on the sq. ft amount under 10% by the unit price amount. Contractor to include unit price amount in base bid.
3. Apply primer – **SA Primer** – at 0.5 gal per sq to the entire wood deck.
4. Apply one layer of self-adhering underlayment – **R-Mer Seal** – to the entire roof system.
5. Apply Owens Corning three-tab shingles, or approved equal, and match existing light gray color.
6. Edge metal: Install new 22 ga. drip-edge with 3” face over wood blockers fastened 3” o.c. Contractor responsible to field-verify dimensions. Metal to be fabricated from **R-Mer SS Flat Stock (Emerald Green.)**
7. Penetrations: All penetrations to be flashed in with lead. Set lead in mastic – **KEE-Lock Mastic.**
8. Curbs: Install two layers of self-adhering underlayment – **R-Mer Seal** – under existing metal. Re-use metal and coat white with **White-Knight Plus WC.**
9. Skylight: Existing metal flashing to be re-used. Seal around domes with caulking – **Tuff-Stuff MS True White.** Install nailable base sheet – **HPR Glasbase** – and torch new base sheet - **HPR Torchbase** – and cap sheet – **StressPly IV Plus Mineral** on the cricket behind the skylight.
10. Gutters: Install new 22 ga. gutters and downspouts where existing. Gutters to be installed where existing, downspouts installed every 20’. Contractor responsible to field-verify dimensions. Gutters be fabricated from **R-Mer SS Flat Stock (Emerald Green)** and downspouts from **R-Mer SS Flat Stock (Regal White.)**
11. Contractor to provide a 5-year warranty for labor.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry
- B. Section 07220 - Insulation Board
- C. Section 07620 - Sheet Metal Flashing and Trim

1.3 REFERENCES

- A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- B. ASTM D 312 - Standard Specification for Asphalt used in Roofing.
- C. ASTM D 451 - Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
- D. ASTM D 1970 - Specification for Sheet Materials, Self-Adhering Polymer Modified Bituminous, Used as Steep Roofing Underlayment for Ice Dam Protection.
- E. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous

Materials.

- F. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
- G. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
- H. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- I. ASTM D 2822 Standard Specification for Asphalt Roof Cement.
- J. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
- K. ASTM D 4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
- L. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
- M. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
- N. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- O. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- P. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings
- Q. Factory Mutual Research (FM): Roof Assembly Classifications.
- R. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- S. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.
- T. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
- U. Warnock Hersey (WH): Fire Hazard Classifications.
- V. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.
- W. ASCE 7, Minimum Design Loads for Buildings and Other Structures
- X. UL - Fire Resistance Directory.
- Y. FM Approvals - Roof Coverings and/or RoofNav assembly database.
- Z. California Title 24 Energy Efficient Standards.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

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

- B. Exterior Fire Test Exposure: Class A fire-rated roof.
- C. Energy Star: Roof System shall comply with the initial and aged reflectivity required by the U.S. Federal Government's Energy Star program.

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 barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.
- C. Provide written certification from the roofing system manufacturer dated within 30 days of the bid date certifying the applicator is currently authorized to install the specified roof system and ability to provide the specified warranty.
- D. Sample Warranty: Provide an unexecuted copy of the warranty specified for this project clearly stating the terms required of the owner, contractor, and manufacturer.
- E. 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 and a certified Pre-Approved Garland Contractor.
- 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. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and 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.
- F. 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. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- G. District reserves the right to award low bidder on Add-Alternate at their discretion.

1.7 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to commencing Work of this section.
- 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 Owner and Architect.

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. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.
- D. Store 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 Architect/Engineer.
- F. District reserves the right to have the Contractor store all OFCI materials on non-school property at no additional charge to the District.

1.9 COORDINATION

- A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.10 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11 WARRANTY

- A. Upon completion of the work, provide the Manufacturer's written and signed NDL Warranty, warranting 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. 30 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 MANUFACTURERS

Basis of Design: The Garland Company, Inc.; 3800 E. 91st St., Cleveland, OH 44105.

Local representative: Luke Foster, 619-630-9057

- A. District has no responsibility to provide any equipment for handling and / or loading the materials to the Contractor's trucks. Upon signature of receiving the materials, Contractor assumes full responsibility for all received materials. Any materials lost or stolen are the responsibility of the Contractor to replace.
- B. Contractor must provide all labor to install District-supplied materials as part of their bid. All materials not specifically included in this section will be the responsibility of the Contractor to provide and install. Contractor to be responsible for all Garland materials in excess of District purchased and furnished amount. District to provide material quantities matching the specified amount below. Any additional Garland material required to complete this project is the responsibility of the Contractor, including all freight and tax charges.
- C. Maximum quantity of the OFCI materials for the base bid (Building E, F) which will be provided to the Contractor are as follows:

Material	Amount	Unit
StressBase 80	26	Rolls
KEE-Stone FB 60 (8' x 100')	3	Rolls
KEE-Stone FB 60 (8' x 50')	3	Rolls
KEE-Stone Utility Roll	16	Rolls
Green-Lock Plus Membrane Adhesive	19	5 Gal
KEE-Lock Foam (Kit)	7	Kit
UniBond ST - 6"	4	Rolls
White-Knight Plus WC	2	5 gal
KEE-Lock Mastic	6	3 gal
Garla-Prime VOC	2	5 Gal
R-Mer Seal	38	Rolls
SA Primer	4	5 gal
R-Mer SS Flat Stock (Emerald Green)	55	Sheet
R-Mer SS Flat Stock (Regal White)	15	Sheet
R-Mer SS Flat Stock (Sandstone)	8	Sheet

- D. Maximum quantity of the OFCI materials for the add-alternate (Building A) which will be provided to the Contractor are as follows:

Material	Amount	Unit
UniBond ST - 6"	4	Rolls
White-Knight Plus WC	2	5 gal
KEE-Lock Mastic	4	3 gal
Garla-Prime VOC	2	5 gal
R-Mer Seal	32	Rolls
SA Primer	6	5 gal
HPR Torchbase	2	Rolls
StressPly IV Plus Mineral	2	Rolls
Tuff-Stuff MS True White	12	Tube
R-Mer SS Flat Stock (Emerald Green)	35	Sheet
R-Mer SS Flat Stock (Regal White)	15	Sheet

2.2 COLD APPLIED 2-PLY ROOF SYSTEM

- A. Type II Base Sheet: One ply of each mechanically attached to the prepared substrate.
 - 1. HPR Glasbase
- B. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
 - 1. StressBase 80
- C. KEE Membrane: One ply bonded to the prepared substrate with Interply Adhesive:
 - 1. KEE-Stone FB 60
- D. Interply Adhesive:
 - 1. Green-Lock Plus Membrane adhesive, ASTM D1475.
 - 2. KEE-Lock Foam
- E. Flashing Base (Ply): One ply bonded to the prepared substrate with Interply Adhesive:
 - 1. StressBase 80
- F. Flashing Cap Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
 - 1. KEE-Stone FB 60 Flashing
- G. Flashing Ply Adhesive:
 - 1. KEE-Lock Foam
- H. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. 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.

- I. Urethane Sealant Hybrid - Tuff-Stuff MS: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
 - 1. Tensile Strength, ASTM D 412: 250 psi
 - 2. Elongation, ASTM D 412: 450%
 - 3. Hardness, Shore A ASTM C 920: 35
 - 4. Adhesion-in-Peel, ASTM C 92: 30 pli
- J. KEE Membrane Mastic: KEE-Lock Mastic, ASTM D412.
- K. Primer: Garla-Prime VOC.
- L. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.
- M. Glass Fiber Cant - Glass Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

2.3 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

- A. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.
- B. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.
- C. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled. All plumbing stacks are to have the factory lead caps installed. Caulking and banding will not be acceptable on open top pipe penetrations. On field fabricated flashings where a lead cap can't be applied a lead umbrella flashing is to be installed. Caulking and banding will be required with the specified sealant.
- D. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07620.
 - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.
- E. Manufactured Roof Specialties: Shop fabricated copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07710.
 - 1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

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, nailers and surfaces and elements.
- C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.
- D. If substrate preparation and other conditions are the responsibility of another installer, notify

Architect of unsatisfactory preparation before proceeding.

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 the 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. Red rosin paper & type II base sheet to be staggered and nailed to ensure protection for building interior.
 - 4. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per the deck manufacturer's recommendations and standards of the APA/Engineered Wood Association prior to new roof application.
 - 5. 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, such as HPR Glasbase Base 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 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer required to perform services in connection with installing the roof system.

- B. 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.

- C. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures 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 BUILDING E - INSTALLATION OF 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 the 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 the 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 interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. 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 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.

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. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.
- D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
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 07620 or Section 07710. 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 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 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 on center 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 to dry tack 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 on center and covered with an acceptable counter flashing.

3.5 BUILDING F, A – INSTALLATION OF THREE-TAB SHINGLE ROOF SYSTEM

- A. Self-Adhering Primer:
1. Wood deck must be smooth, dry, and free of projections, bulges, and old roofing materials. Dust and moisture on the roof surface or the membrane itself will prevent proper adhesion.
 2. Prime substrate with SA Primer at a rate of 0.5 per 100 sq ft to the entire roof system.
- B. High-Temp Underlayment
1. Starting at the low point of the deck, peel back about 12 in. of the release liner, align the roll, and carefully press R-Mer Seal into place. Unroll the material along the deck removing release liner as it is installed. Apply the membrane in lengths up to 18 feet.
 2. The adhesive on R-Mer Seal is pressure-activated, so press the material firmly into place using linoleum roller or equivalent to ensure a strong seal. Pay particular attention to the seams and overlaps, firmly rolling them with a hand roller so they are well-sealed.
 3. Overlap head laps a minimum of 6 in. Overlap side laps a minimum of 3 in. as indicated by the lap lines on the product.
 4. Second layer to be back-nailed to the first layer. Use a roller to ensure proper adhesion of the second layer to the first layer when applying.
 5. NOTE: R-Mer Seal membrane should not be folded over roof edge unless covered by a gutter, mechanically fastened every 6" or protected with other flashing materials.
 6. Details:
 - a. Ridges, valleys, penetrations, dormers and other area that require flashing need special attention. R-Mer Seal is not designed to withstand structural movement or to bridge openings greater than 1/8". When flashing, the overlapping layers of R-Mer Seal will seal to one another. Take special care that the overlap is a minimum of 6 in. and that seams are shingled so the water will flow over rather than against them.
 7. Vertical Surfaces:
 - a. When R-Mer Seal terminates on a vertical surface, it should be nailed securely and sealed with an exterior-grade polyurethane or latex sealant. Do not install over active solvents or sealants, flexible vinyl gasketing, EPDM rubber, or caulking containing silicone as this may cause the asphalt adhesive to liquefy.

- C. Three-Tab Shingles
 - 1. Install per Owens Corning, or approved equal, manufacturer instructions.

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.

3.8 FIELD QUALITY CONTROL

- A. Inspection: Provide manufacturer's field observations at start-up and three (3) days per week through project 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 representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
 - 3. Provide observation reports from the representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
 - 4. Provide a final report from the representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

END OF SECTION