

SECTION 07563  
SUMMARY OF THE WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Built-Up Mineral Modified Surface Roof Restoration (1.4.C.7/8 and 9)(2.4)

1.2 SCOPE OF WORK

- A. Provide all materials, labor and equipment required for the installation of the Cool-Sil™ Roof Coating Restoration (RCR) System, or approved equivalent, over the existing modified bitumen or smooth surface built-up roof including all ancillary products. Basis of design is Garland Roofing Products or approved equal.
- B. Repair all sheet metal defects.
- C. Remove and repair broken mortar with Garland's R-mer Seal, or approved equal.
- D. Pressure wash the roofs.
- E. Repair all flashing defects
- F. Seal all details, penetrations, curbs, drains, etc per specification with Garland's KEE Lock Mastic and GarMesh, or approved equal.
- G. Surface Preparation:
  - a. Prime roof with Garland's Cool Sil Bleed Blocker Primer, or approved equal, at one (1) gallon per 100 square feet (sq ft).
- H. Three course all seams of the built-up roofing system with Cool-Sil™, or approved equal, and polyester.
- I. Install Cool-Sil™ at three (3) gallons per 100 sq ft.

1.3 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings of roof system.
- B. Underwriters Laboratories, Inc. (UL) UL 790: Class A Fire Hazard Classification.
- C. ASTM D 816 - Standard Test Methods for Rubber Cements.
- D. All silicone products must be domestically produced. Products produced outside of the US will not be accepted.
- E. Coating manufacturer must produce its own product. Private labeled silicone coating products will not be accepted.

1.4 SUBMITTALS

- A. Product Data: Product data on silicone coating, physical and chemical properties, preparation of substrate required, product limitations, and cautionary requirements.
- B. Safety Data Sheets (SDS) for all products used onsite during the project.
- C. Shop Drawings: Roof plan and details showing extent of roofing, intersections with adjacent surfaces, and details of expansion joints, counterflashing, and other items for a complete roofing system.
- D. Manufacturer's Installation Instructions: Indicate installation requirements and procedures.
- E. Certificates:
- F. Product certificates signed by the manufacturer certifying materials are in compliance with the specified performance characteristics, performance criteria, and physical requirements.
- G. Sample copy of PM warranty
- H. Maintenance Data: For RCR System to include in maintenance manuals.
- I. Final Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.
- J. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

- K. 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.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.
- B. Manufacturer:
  - a. Company specializing in the manufacturing of the system specified in this Section.
  - b. A minimum of 10,000,000 square feet of a similar system installed.
- C. Installer:
  - a. Installer must be a Certified Licensed Applicator (CLA) by the Manufacturer providing the warranty and is capable of receiving the specified warranty.
  - b. CLA to ensure all personnel are properly trained and have a full understanding of all OSHA safety requirements.
- D. Manufacturer Field Representative:
  - a. Provide a qualified representative of the Manufacturer providing the warranty to monitor and periodically inspect the installation.

#### 1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.
  - a. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, University Representative, and roofing system manufacturer's representative.
  - b.
- B. Objectives include:
  - a. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
  - b. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
  - c. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
  - d. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
  - e. Review and finalize schedule related to roofing work and verify availability of materials, installers' personnel, equipment, and facilities needed to make progress and avoid delays.
  - f. Review required inspection, testing, certifying procedures.
  - g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
  - h. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store liquid materials and other products in their original unopened containers or packaging until ready for installation.
- B. Materials shall be clearly labeled with the manufacturer's name, product identification, safety information, and lot numbers.
- C. Store materials indoors whenever possible.
- D. Protect stored products from freezing.
- E. Comply with the manufacturer's instructions for handling and safety procedures.
- F. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

## 1.8 PROJECT CONDITIONS

- A. Maintain logs of environmental conditions (temperature, precipitation, humidity, and wind speed) documenting conditions are within limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside of manufacturer's limits.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- C. Do not install silicone coating under the following conditions:
  - a. When ambient temperature is below 35° F.
  - b. At temperatures less than 5° F above dew point.

## 1.9 WARRANTY

- A. Upon completion of the work, provide the Manufacturer's written and signed limited labor and materials Warranty. The Warranty shall specify that, if a leak develops in the roof during the term of the warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the University Representative, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.
  - a. Warranty Period:
    - i. 10 years year labor and material warranty covering leaks due to silicone material failure.
- B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
  - a. 1. Warranty Period:
    - i. a. Two (2) years from date of acceptance.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Garland Company, Inc., or approved equal.

### 2.2 ROOF RESTORATION SYSTEM PRODUCTS

- A. Insulation Board
  - a. Match existing material
- B. Butyl Fleece Tape
  - a. The Garland Company: UniBond™ ST, or approved equal.
- C. Cleaners and Primers
  - a. General Purpose Primer, or approved equal.
- D. Silicone Caulk Sealant
  - a. The Garland Company: All-Sil™, or approved equal.
- E. Flashing Grade Sealant
  - a. The Garland Company Cool-Sil FG Flashing Grade Sealant, or approved equal.
- F. Reinforcing Fabric
  - a. The Garland Company Grip Polyester Firm Polyester, or approved equal.
- G. Moisture Relief Vents
  - a. The Garland Company: Cool-Sil SC Silicone Skylight Coating, or approved equal.
- H. Silicone Coating
  - a. The Garland Company Cool-Sil HS Silicone Coating, or approved equal.

### 2.3 SILICONE COATING MATERIALS

- A. Silicone base and topcoat to be Cool-Sil HS Silicone Coating by Commercial Innovations, Inc. and complying with the following minimum properties:

- a. Tensile Strength: ASTM D412, 247.
- b. Elongation: ASTM D412, 237 percent minimum at break at 75° F.
- c. Water Vapor Permeance: ASTM D-96, 10.7 at 20 mils.
- d. Fire resistance: ASTM E108, UL 790 Class A.
- e. Color: Owner to select standard topcoat color.
- f. Solids Content: 92% ±3%
- g. VOC Content: < 50 grams/liter
- h. Initial Solar Reflectivity: .89
- i. Initial Thermal Emissivity: .90
- j. SRI Value: 113

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify roof slope prior to beginning installation. There is to be no single area of standing water on the roof 24 hours after a rain, greater than 100 sq. ft. and more than ½" deep.
- B. Identify all seam failures, flashings failures and inadequate sheet metal details.
- C. Inspect all roof drains to ensure proper performance.
- D. Inspect all roof system fasteners for back out.

### 3.2 ROOF PREPARATION AND REPAIR

- A. General: Seal all pipes, penetrations, etc. with mastic and reinforcement.
- B. Membrane Cleaning:
  - a. Thoroughly pressure-wash roof surface and all other areas to receive new coating with a minimum of 2,000 psi water pressure. Be sure not to damage existing membrane during this process.
  - b. After the surface has dried, apply a General Purpose Primer at a rate of 1 gallon per 100 square feet.
  - c. Any areas of grease contamination are to be cleaned with an industrial strength detergent.
- C. Existing Wet Insulation Areas:
  - a. Roof areas containing moisture below the roof surface shall either be replaced, or for areas less than 500 sq. ft. with moderate moisture content, a moisture relief vent shall be installed.
  - b. Wet Insulation Replacement N/A
  - c. At the leading edges of roof patches, apply three (3) courses of coating and fabric utilizing the Guardian Polyester Soft and Cool-Sil HS Silicone Coating, or approval equal.
    - i. Apply 32 mils of silicone coating over the surface to receive fabric per manufacturer's recommendations.
    - ii. Embed fabric into silicone coating while still wet. Smooth out fabric and ensure there are no wrinkles or fishmouths.
    - iii. After the base coating has cured, apply a generous coat of Cool-Sil HS silicone coating, or equal, over the fabric to ensure complete seal.

### 3.3 INSTALLATION

- A. General Installation Requirements:
  - a. Install in accordance with manufacturer's instructions. Apply to minimum coating thickness required by the manufacturer.
  - b. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
  - c. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements. 4. Protect work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore work damaged by installation of the roofing system.
  - d. Ensure surface is completely dry.

- e. Ensure subsequent coats of primer or silicone coating is completely cured.
- f. Install silicone coating in one or two passes over entire roof surface to achieve a final thickness of 30 to 35 mils.
- g. While spraying the silicone coating, special effort should be made to have pass lines overlap on membrane seams as to provide additional coating thickness on the seams.
- h. Coating to be back rolled with a roller at all edges and penetrations to prevent overspray, proper adhesion, and provide a clean straight edge.
- i. NOTES:
  - i. Any subsequent membrane repairs after the coating installation should be done only with silicone products. Repairs should be completed with a three-course coating and fabric if needed.

### 3.4 CLEANING

- A. Remove overspray from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

### 3.5 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.
- F. Ensure roof surface is free of traffic for minimum of 12 hours after silicone coating application or until coating is completely cured.
- G. Ensure any subsequent work does not cause damage to finished roof system. If necessary, install protection over finished roof area.

### 3.6 FIELD QUALITY CONTROL

- A. Roof project to be inspected by a manufacturer's representative a minimum of three (3) days per week.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation upon completion and submit report to Owner/Architect. There shall be no items on the roof that could inhibit the inspection process, such as, solar panels, decking systems, etc.
  - a. Notify Owner at least 48 hours in advance of date and time of inspection.
    - i. Repair or remove and replace components of roofing system where inspection results indicate that they do not comply with specified requirements.

### 3.7 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, University Representative, installer, installer of associated work, roofing system manufacturer's representative and others directly concerned with performance of roofing system.
- B. Walk roof surface areas, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. Identify all items requiring correction or completion and furnish a copy of list to each party in attendance.
- C. If core cuts verify the presence of damp or wet materials, the installer shall be required to

replace the damaged areas at his own expense.

- D. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation that is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- E. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION

SECTION 07 31 13  
ASPHALT SHINGLE ROOFING  
CALIFORNIA STATE POLYTECHNIC UNIVERSITY, HUMBOLDT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provide all labor, equipment, and materials to install a composition shingle roof system over the properly prepared substrate. The scope of work includes but is not limited to:
  - a. Full removal and disposal of existing roofing materials.
  - b. Locate and repair/replace all areas of damaged substrate.
  - c. Installation of HPR Underlayment.
  - d. Install new aluminum metal components per manufacturers recommendation and best industry standards.
  - e. Install new composition shingles per manufacturers specifications.

1.2 RELATED SECTION

- A. General Conditions

1.3 REFERENCES

- A. ASTM B209 - Aluminum-Alloy Sheet and Plate
- B. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- C. ASTM D228 - Method of Testing Asphalt Roll Roofing, Cap Sheets and Shingles.
- D. ASTM D4586 - Asphalt Roof Cement, Asbestos Free.
- E. ASTM D3161 - Wind Resistance of Asphalt Shingles
- F. ASTM D3018 - Class A Asphalt Shingles Surfaced with Mineral Granules.
- G. ASTM A361 - Sheet Steel, Zinc Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
- H. ASTM B370 - Copper Sheet and Strip for Building Construction.
- I. NRCA - Steep Roofing Manual.
- J. ARMA - Residential Asphalt Roofing Manual.
- K. UL 790 - Tests for Fire Resistance of Roof Covering Materials.
- L. UL 997 - Wind Resistance of Prepared Roof Covering Materials.

1.4 SYSTEM DESCRIPTION

- A. It is the intent of this specification to install a long-term, quality roof system that meets or exceeds all current NRCA guidelines as stated in the most recent edition of the NRCA Roofing and Waterproofing Manual. Please discuss any concerns with the University Representative and Roofing System Manufacturer.

1.5 SUBMITTALS

- A. Submit under provisions of Section 07 31 13.
- B. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.

- C. Samples: Submit two (2) samples of each product specified.
- D. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required.
- E. Submit one color board for color approval from the University Representative.
- F. Submit a copy of an unexecuted manufacturer's warranty for review.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 12 years documented experience.
- B. Installer: Company specializing in steep slope roofing installation with a minimum five (5) years' experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work and at any time roofing work is in progress. Maintain proper supervision of workmen. Maintain a copy of the specifications in the possession of the Supervisor/Foremen and on the roof at all times.
- D. Immediately correct roof leakage during construction. If the Contractor does not respond within 24 hours, the University has the right to hire a qualified contractor and back charge the original contractor.

#### 1.7 PRE-INSTALLATION CONFERENCE

- A. Pre-Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing which must precede or follow roofing work (including mechanical work if any), University Representative, roofing system manufacturer's representative.
- C. Objectives of conference to include:
  - 1. Review foreseeable methods and procedures related to roofing work.
  - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
  - 3. Review roofing system requirements (drawings, specifications and other contract documents).
  - 4. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
  - 5. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry



and undamaged.

B. Store and handle roofing in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

D. It is the responsibility of the contractor to secure all material and equipment on the job site. If any material or equipment is stored on the roof, the contractor must make sure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.

#### 1.9 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the roofing system manufacturer will provide the following at no charge:
- Keep the University Representative informed as to the progress and quality of the work as observed.
  - Provide job site inspections a minimum of two days a week with photo conformation and reported to the University's Representative.
  - Report to the University's Representative in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
  - Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

#### 1.10 PROJECT CONDITIONS

- Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- Do not apply roofing materials or membrane to damp deck surface.
- Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- Nailing requirements of composition shingles must conform to all applicable local codes.

#### 1.11 SEQUENCING AND SCHEDULING

- Sequence installation of composition roofing with related units of work specified in other sections to ensure that roof assemblies including roof accessories, flashing, trim and joint sealers are protected against damage from effects of weather, corrosion and adjacent construction activity.
- Every stage of progress completed must be inspected by University's representative prior to moving forward to next stage of the installation.

#### 1.12 WARRANTY

- Upon completion of roof installation, and acceptance Manufacturer will supply to the University a 50-year manufacturers' composition limited shingle warranty.
- Contractor will submit a minimum of a two-year workmanship warranty to the University with a copy directly to membrane manufacturer.

#### 1.13 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Any item or materials submitted as a substitution to the manufacturer specified must comply in all respects as to the quality and performance of the brand name specified. The University shall be the sole judge as to whether an item submitted as a substitute is truly equal. All items as listed under section 07311 1.5 submittals must be presented to the district a minimum of (10) days prior to the bid date for review.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. When a particular trade name or performance standard is specified it shall be indicative of a standard required.
- B. Provide products as manufactured by
  - a. The Garland Company – Rmer Seal.
  - b. PABCO Prestige dimensional shingle 300 lbs per 100 sq ft or equal.

### 2.2 DESCRIPTION

- A. Asphalt Shingles: UL Class A Rating and Wind Resistance Label, glass fiber mat base, mineral surface, color selected by University Representative.

### 2.3 SHEET MATERIALS

- A. Underlayment: Rmer Seal by The Garland Company, Inc.

### 2.4 RELATED MATERIALS

- A. Nails: Standard round wire shingle type, aluminum, 10-12 gauge, barbed or deformed shank, with heads 3/8" to 7/16" in diameter. Nails must be long enough to penetrate into solid wood deck at least 3/4" or just through plywood and oriented strand board decks.
- B. Plastic Cement: ASTM D4586 Type I or Type II. Flashing Bond by The Garland Co.
- C. New, non-corrosive, metal step flashing, minimum 24 gauge (or equivalent) to be used as step flashing around chimneys, dormers, and side walls.
- D. Skylight flashing. Inspect existing flashing with Manufacturer. Replace per manufacturer's recommendation.
- E. New four-pound lead roof jacks with factory tops to be used around all plumbing vents. Paint all pipes when completed.
- F. Urethane Sealant: One-part, non-sag sealant as recommended and furnished by the membrane manufacturer for moving joints. Tuff Stuff by The Garland Company.
  - a. Tensile Strength (ASTM D412) 250 psi
  - b. Elongation (ASM D412) 950%
  - c. Hardness, Shore A (ASTM C920) 35
  - d. Adhesion-in-Peel (ASTM C920) 30 pli

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that deck surfaces and project conditions are ready to receive work of this section.
- B. Verify that deck is supported and secured to structural members.
- C. Verify that deck is clean and smooth, free of depressions, projections or ripples, and is properly sloped to drains.
- D. Verify that adjacent roof members do not vary more than 1/4 inch in height.
- E. Verify that deck surfaces are clean and dry.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Place one ply of Rmer Seal underlayment as manufactured by The Garland Company and have ends lapped a minimum of 4 inches over itself. Stagger end laps of each consecutive layer a minimum of 3 feet. In valleys, run Rmer Seal minimum 6 inches over valley protection. Nail in place per manufacturer's requirements.
- B. At all vent pipes, install a 2 square foot piece of Rmer Seal underlayment.
- C. At all vertical walls, install Rmer Seal so that it extends at least 6 inches up the vertical wall and 12 inches onto the horizontal roof.
- D. At all chimneys, install Rmer Seal around entire chimney extending up all vertical surfaces at least 6 inches and 12 inches onto the horizontal roof.
- E. Install shingles in accordance with manufacturer's instructions.
- F. Install 6 nails per shingle, as recommended by local building codes. Staples are not acceptable.
- G. Install Hip and Ridge shingles per manufacturer's instructions.

### 3.3 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required under provisions of Section 07311.
- B. Correct defects or irregularities discovered during field inspection.
- C. Require attendance of roofing materials manufacturers' representative at site during installation of the roofing system.

### 3.4 CLEANING

- A. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- B. Repair or replace defaced or disfigured finishes caused by work of this section.
- C. Perform daily cleanup around building. Magnet on wheels to be used to pick up all metal shavings, staples, nails, etc.

### 3.5 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, installer, installer of associated work, University Representative, 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. 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.
- D. Notify the material manufacturer and the district upon completion of corrections.
- E. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

### 3.6 UNIVERSITY SUPPLIED MATERIALS

- A. Contractor must include in their base bid any additional materials to complete the roofing project. Contractor must provide all labor to install owner supplied materials as part of their bid.
- B. All materials not specifically included in the owner supplied materials section will be the responsibility of the contractor to provide and install in compliance with section 07 56 10.
- C. Freight charges of University supplied materials will be the responsibility of the University.
- D. Contractor must take delivery of materials, properly cover and store at jobsite or their shop.

- E. Contractor must be able to provide certification in writing from roof system manufacturer that the contractor is approved to install the specified roof system and provide all warranty requirements of this section.
- F. The University will not supply materials in association with this project.

END OF SECTION

SECTION 07 55 02  
SELF ADHERED MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, equipment, and supply all materials to install modified bitumen roof system over the properly prepared substrate.
- B. Scope includes but is not limited to:
  - 1. Remove and dispose of all loose gravel and edge metal.
  - 2. Mechanically attach ½" Densdeck Prime cover board.
  - 3. Apply SA Primer at ½ gallon per square.
  - 4. Install HPR SA FR Base Sheet.
  - 5. Heat Weld all Seams for Proper Adhesion.
  - 6. Install StressPly SA FR Mineral Cap Sheet.
  - 7. Heat Weld all Seams for Proper Adhesion.
  - 8. Install new Kynar Coated edge metal and fascia.
  - 9. Apply Pyramic Plus LO coating at a rate of 3 gallons per square. (1.5+1.5)

1.2 SECTION INCLUDES

- A. Self-Adhered 2 Ply Roofing
- B. Accessories.

1.3 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing: Wood nailers and cant strips.
- B. Section 07220 - Insulation Board: Insulation and fastening.
- C. Section 07620 - Sheet Metal Flashing and Trim: Weather protection for base flashings.

1.4 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 E 108 - Standard Test Methods for Fire Test of Roof Coverings
- D. Factory Mutual Research (FM): Roof Assembly Classifications.
- E. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.
- G. ASCE 7, Minimum Design Loads for Buildings and Other Structures
- H. California Title 24 Energy Efficient Standards.

## 1.5 DESIGN / PERFORMANCE REQUIREMENTS

- A. Perform work in accordance with all federal, state and local codes.
- B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
  - 1. Factory Mutual Class A Rating.
  - 2. Underwriters Laboratory Class A Rating.
  - 3. Warnock Hersey Class A Rating.
- C. Design Requirements:
  - 1. Uniform Wind Uplift Load Capacity
    - a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
      - 1) Design Code: ASCE 7, Method 2 for Components and Cladding.
      - 2) Importance Category:
        - a) III.
      - 3) Importance Factor of:
        - a) 1.0
      - 4) Wind Speed: 120 mph
      - 5) Ultimate Pullout Value: 574 pounds per each of the fastener
      - 6) Exposure Category:
        - a) B.
      - 7) Design Roof Height: 14 feet.
      - 8) Roof Pitch: 1 :12.
  - 2. Live Load: 20 psf, or not to exceed original building design.
  - 3. Dead Load:
    - a. Installation of new roofing materials shall not exceed the dead load capacity of the existing roof structure.
- D. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.
- E. Roof system shall have been tested in compliance with the following codes and test requirements:
  - 1. Underwriters Laboratories:
    - a. Certification TGFU
  - 2. Warnock Hersey
    - a. ITS Directory of Listed Products
  - 3. FM Approvals:
    - a. RoofNav Website

## 1.6 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. 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.
- 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. 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.

## 1.7 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 and edge metal 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 Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

## 1.8 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.

## 1.9 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. Adhesive storage shall be between the range of above 40 degree F (4 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

#### 1.10 COORDINATION

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

#### 1.11 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.

#### 1.12 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 Year NDL
      - 1) All components of the new roof system including: primer, mastic, mesh, coatings, modified sheets, kynar coated sheet metal, shall be manufactured by a single source manufacturer and be covered under the warranty.
      - 2) Warranty shall cover the calculated wind speed of 120 MPH through the manufacturer providing warranty; no third party coverage of warranty will be accepted.
- B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work. Contractor will submit a copy to the membrane manufacturer and owner.
  - 1. Warranty Period:
    - a. 3 years from date of acceptance.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis of Design: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: [www.garlandco.com](http://www.garlandco.com). Local Representative: Zach Holliman 530-966-1586
- 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.



## 2.2 SELF ADHERED ROOF SYSTEM

- A. Base (Ply) Sheet: One ply bonded to the prepared substrate with self-adhesive.
  - 1. HPR SA FR Base Sheet:
- B. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate with self-adhesive.
  - 1. StressPly SA FR Mineral:
- C. Interply Adhesive: Use over approved cover boards or wood decks for base sheet only.
  - 1. SA Primer:
- D. Flashing Base Ply: One ply bonded to the prepared substrate.
  - 1. HPR SA FR Base Sheet:
- E. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate.
  - 1. StressPly SA FR Mineral:
- F. Flashing Ply Adhesive:
  - 1. Flashing Bond:
- G. Surfacing:
  - 1. Surface Coatings
    - a. Pyramic: 2 coats of 1.5 gallons per square base and top coat for a total of 3 gallons per 100 sq ft. Both base and top coat must be back rolled.

## 2.3 ACCESSORIES:

- A. 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

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

3. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
  4. 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.
  5. Insulation is to be mechanically attached in accordance with the insulation manufacturer's recommendations unless otherwise required by the applicable Code.
  6. 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.
- B. Deck Preparation for Self-Adhered Roof System: Primed DensDeck shall be installed as specified in Section 05300. Sweep or blow away any dust, dirt or sand particles that could interfere with adhesion to approved substrate Georgia Pacific (GP) DensDeck Prime, DensDeck DuraGuard, or USG Securrock and prime with self-adhering primer at the specified coverage rate. All materials shall be provided by the membrane manufacturer.

### 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. 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.
- C. 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
- D. 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 SELF ADHERED ROOF SYSTEM

- A. Base Ply: Prior to installation sweep or blow away any dust, dirt or sand particles, on the surface that could interfere with adhesion.
1. Prime the roof cover board at the recommended coverage rate with SA Primer at a rate of 0.50 gal per 100 sq.ft. Allow the primer to dry before installing the base sheet but it should be tacky for the base sheet application.
  2. Start HPR SA FR Base Sheet application at the low point of the roof with appropriate roll width to offset side laps 18 inches (457 mm) from side laps of base sheet. Install

flush to roof edge if over base sheet, otherwise turn the HPR SA FR Base Sheet over the fascia minimum 2 inches (50 mm) and nail 9 inches (230 mm) o.c. At perimeter flashing extend the HPR SA FR Base Sheet up a minimum of 8 inches (203 mm). Design so that side laps are against the flow of water.

3. Fold membrane back halfway lengthwise to remove the split release film. Press membrane securely into place, and repeat with the opposite half of the membrane. Use a heavy, weighted roller over entire surface of the HPR SA FR Base Sheet membrane to secure membrane. Work outwards to eliminate voids. When working with full rolls on large roofs, leave the membrane in position and remove the split release film from underneath the membrane.
  4. Overlap side laps of subsequent HPR SA FR Base Sheet membrane lengths 4 inches (100 mm) and end laps 8 inches (203 mm). Offset (stagger) end laps minimum 3 feet (0.9 m). Cut end laps at opposing diagonal corners at a 45 degree angle approximately 3 inches (76 mm) from the corners to minimize "T"- seams. Apply a bead or small trowel dab (quarter size) of Flashing Bond or Garla-Flex at the edge of the angled cut to avoid a capillary.
  5. Use of a hand-held hot air gun at joint area prior to rolling membrane to maximize adhesion. Apply a bead of Flashing Bond or Garla-Flex, at all HPR SA FR Base Sheet side and end laps to eliminate a capillary.
  6. Use a heavy, weighted roller over the entire surface of HPR SA FR Base Sheet to secure it in place and prevent voids, working outward from center of sheet.
  7. Repeat the above steps to properly build 1 to 2 plies, as specified, of HPR SA FR Base Sheet.
  8. Don't leave the installed HPR SA FR Base Sheet exposed to the weather; cover with StressPly SA FR Mineral cap sheet the same day.
- B. Modified Cap Ply(s): Prior to installation sweep or blow away any dust, dirt or sand particles, on the HPR SA FR Base Sheet that could interfere with adhesion.
1. Install StressPly SA FR Mineral starting at the low point of the roof with an appropriate roll width to offset sidelaps from the underlying membrane a minimum of 18 inches (457 mm). Work with manageable lengths for proper handling. Position with salvage edge release strip at high side of roof. Install in shingle fashion, with no laps against the flow of water.
  2. Once positioned, lift and fold back lengthwise the lower half of the membrane, remove the split release film, and press firmly into place. Repeat with the other (high side of the roof) half of the membrane. Follow the same layout and split release film procedures as for HPR SA FR Base Sheet, but overlap side laps 4 inches (100 mm) and end laps 8 inches (203 mm).
  3. Use a heavy, weighted roller over the entire surface of the StressPly SA FR Mineral sheet to secure it in place and prevent voids, working outward from the center of the sheet.
  4. As subsequent membrane lengths are installed, remove the salvage edge release strip just prior to overlapping to keep the adhesive area protected and clean. Cut end laps at opposing diagonal corners at a 45 degree angle approximately 4 inches (100 mm) from the corners to minimize "T" seams. Use Flashing Bond or Garla-Flex trowel grade, over the full 8 inch (200 mm) width of each end lap prior to overlapping. Apply a uniform 1/8 to 1/4 inch (3 to 6 mm) troweling of the Flashing Bond or Garla-Flex the full width of the endlaps to the underlying membrane; then install the overlapping sheet.
  5. Always apply Flashing Bond or Garla-Flex the width of any overlap when applying the StressPly SA FR Mineral cap over another mineral surface such as the StressPly SA FR Mineral endlap.
  6. Install HPR SA FR Base Sheet and StressPly SA FR Mineral at vertical and other flashing over the already installed StressPly SA FR Mineral field plies.
- 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 in accordance with Garland's recommendations.

- D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114 and in accordance with Garland's recommendations.
- E. Metal Work: Install new surface mounted counter flashings at roof to wall transitions. Install new Kynar coated fascia wrap on entire building. Install in accordance with in accordance with Garland's recommendations.
- F. Pipe Jacks and drains: No lead will be allowed on this building. Zinc must be used as pipe jacks and drain sheets.
- G. Termination Bar: Provide 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.
- H. Flashing Base Ply: At all vertical and other flashing details, install HPR SA FR Base Sheet and StressPly SA FR Mineral over the already installed StressPly SA FR Mineral field plies.
  - 1. Prime the horizontal surface with SA Primer at a rate of 0.5 gal per 100 sq.ft. and allowed to dry.
  - 2. Over installed StressPly SA FR Mineral field plies apply a 3 foot (0.9 m) wide HPR SA FR Base Sheet extending a minimum of 10 inches (254 mm) onto the field of the roof. Apply a uniform 1/8 to 1/4 inch (3 to 6 mm) thick troweling of Flashing Bond or Garla-Flex, on to the existing StressPly SA FR Mineral field cap.
  - 3. Apply Flashing Bond or Garla-Flex at a 1/8 to 1/4 inch (3-6 mm) thick to fully seal laps before application of StressPly SA FR Mineral.
  - 4. Before installing StressPly SA FR Mineral flashing ply to mineral surfaced field ply, apply Flashing Bond or Garla-Flex, wherever the membrane overlaps onto mineral surfacing. Proceed with StressPly SA FR Mineral cap sheet installation. Apply a 3 foot (0.9 m) wide StressPly SA FR mineral extending a minimum of 10 inches (254 mm) onto the field of the roof, being sure to cover the base ply.
  - 5. Use appropriate hand-held hot air welding tool and seam roller to seal small unbonded areas in valleys, etc..
- I. Surface Coatings: Apply roof coatings in strict conformance with the manufacturer's recommended procedures.
- J. Flashing Cap Ply: Apply as specified for Flashing Base Ply in strict conformance with the manufacturer's recommended procedures.

### 3.5 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.

### 3.6 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.

### 3.7 FIELD QUALITY CONTROL

- A. Inspection: Provide manufacturer's field observations a minimum of three times per work week. 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 and 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.

### 3.8 SCHEDULES

- A. Base (Ply) Sheet:
  - 1. HPR SA Base Sheet: 80 mil SBS (Styrene-Butadiene-Styrene) self-adhered base sheet with a woven fiberglass scrim reinforcement.
    - a. Tensile Strength, ASTM D 5147
      - 1) 2 in/min. @73.4 +/- 3.6 deg. F MD 60 lbf/in XD 39 lbf/in
      - 2) 50mm/min. @23 +/- 2 deg. C 10.5 kN/m XD 6.8 kN/m
    - b. Tear Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 100 lbf XD 95 lbf
      - 2) 50mm/min. @ 23 +/- 2 deg. C 445 N XD 422.70 lbf
    - c. Elongation at Maximum Tensile, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 4% XD 4%
      - 2) 50mm/min. @ 23 +/- 2 deg. C MD 4% XD 4%
- B. Thermoplastic/Modified Cap (Ply) Sheet:
  - 1. StressPly SA FR Mineral: 140 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced self-adhered, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
    - a. Tensile Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
    - b. Tear Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
    - c. Elongation at Maximum Tensile, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 3.5% XD 3.5%
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 3.5% XD 3.5%
    - d. Low Temperature Flexibility, ASTM D 5147, Passes -15 deg. F (-26 deg. C)
- C. Interply Adhesive:
  - 1. SA Primer: Cold process polymer emulsion-based primer. Performance Requirements:
    - a. Non-Volatile Content ASTM D 3960 42%-46%

- b. Density ASTM D1475 8.75 lbs./gal.
  - c. Viscosity Brookfield ASTM D2196 2000-2400 cPs
  - d. Flash Point None
2. Surface Coatings:
- a. Surfacing:
    - 1) Pyramic: White elastomeric roof coating, Energy Star approved acrylic roof coating:
      - a) Weight/Gallon 12 lbs./gal. (1.44 g/cm<sup>3</sup>)
      - b) Non-Volatile % (ASTM D 1644) 66 min
      - c) Reflectance 81%

END OF SECTION