

SECTION 07552 - MODIFIED BITUMINOUS MEMBRANE ROOFING

GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Base Bid Roof System: The Contractor will use the system described under Part 2 product section insure the physical characteristics of the submitted product meet the requirements of the specification.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Two-ply, modified bituminous membrane roofing system.
 - 2. 80 mil SBS base sheet, 160 mil mineral surfaced modified surface membrane
 - 3. Roof expansion assemblies.
 - 4. Roofing insulation. Tapered polyisocyanurate insulation in isolated areas of the field of roof and for crickets. Uniform thickness insulation for the field of roof
 - 5. Roof membrane surfacing material.
 - 6. Roof flashings and counter flashings.
 - 7. Walkways.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for wood blocking, curbs and nailers
 - 2. Division 7 Section "Sheet Metal Flashings and Trim"
 - 3. Division 7 Section "Metal Wall Panels"
 - 4. Division 7 Section "Roof Accessories" for curbs and roof drains
 - 5. Division 7 Section "Joint Sealants."

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.
- B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt within a range of plus or minus 25 deg F (14 deg C) measured at the mop cart or mechanical spreader immediately before application

1.4 PERFORMANCE REQUIREMENTS

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

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1. Roofing system shall comply with the following:
 - a. 136 mile per hour wind speed.

1.5 SUBMITTALS

- A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:
 1. Base flashings, cants, and membrane terminations.
 2. Tapered insulation, including slopes.
 3. Crickets, saddles, and tapered edge strips, including slopes.
- C. Samples for Verification: Of the following products:
 1. 12-by-12-inch (300-by-300-mm) square of modified bituminous, smooth-surfaced cap sheet and all base sheets.
 2. 12-by-12-inch (300-by-300-mm) square of roofing insulation.
 3. 12-by-12-inch (300-by-300-mm) square of walkway pads.
 4. 6 insulation fasteners of each type, length, and finish.
 5. Flashing and counter flashing.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system and is eligible to receive the no dollar limit roofing manufacturer's warranty.
- E. Manufacturer Certificates: Signed by roofing system manufacturer certifying that the roofing system complies with requirements specified in the "Performance Requirements" Article. Upon request, submit evidence of complying with requirements.
- F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of components of roofing system with requirements based on comprehensive testing of current product compositions.
 1. Indicate compliance of bulk roofing asphalt materials delivered to Project with requirements. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.
 2. Include continuous log showing time and temperature for each load of bulk bitumen, indicating date obtained from manufacturer, where held, and how transported before final heating and application on roof.

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- H. Research/Evaluation Reports: Evidence of roofing system's compliance with building code in effect for Project from a model code organization acceptable to authorities having jurisdiction.
- I. Maintenance Data: For roofing system to include in the maintenance manuals specified in Division 1.
- J. Warranty: Sample copy of no dollar limit roofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.
- K. Inspection Report: Copy of roofing system manufacturer's inspection report and a qualified independent testing agency's report of completed roof installation.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing roofing similar to that required for this Project; who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive the no dollar limit roofing manufacturer's warranty.
- B. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; complying with ASTM E 108, for application and slopes indicated. (Fire rated sheet).
- C. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Meet with the same participants and review the same items listed for the pre-installation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.
- D. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.
 - 1. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing installer; roofing system manufacturer's representative; deck installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods of removing the existing roofing and insulation. Examine existing roof deck structure, slope and area of replacing roofing for daily output.
 - 3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.
 - 5. Review loading limitations of deck during and after roofing.

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6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
7. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
10. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.
11. Review all roofing openings, sizes, location, curb or post supports.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weather tight location to ensure no significant moisture pickup and maintain at a temperature exceeding roofing system manufacturer's written instructions. Store rolls of felt and other sheet materials on end on pallets or other raised surfaces. Do not double-stack rolls.
 1. Handle and store roofing materials and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.
- B. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 50 deg F (10 deg C).
- C. Deliver and store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- D. Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.
- B. This project requires the use of a state of the art fume recovery system whenever the asphalt kettle is in use. There will be no exceptions unless a self-pumping asphalt tanker is used in lieu of the kettle. ***No kettle may be used unless it is properly equipped with a fume recovery system.*** Kettle size must be a minimum of 1,000 gallons

1.9 WARRANTY

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and

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shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

- B. No Dollar Limit Roofing Manufacturer's Warranty: Submit a written warranty including roof insulation and all copings and edge metal, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks in the roof membrane and base flashings resulting from defects in materials or workmanship for the following warranty period. Warranty shall also include a 90 miles per hour wind warranty:
 - 1. Warranty Period: 20 years Edge to Edge.
 - 2. Must include all metal roofing, wall and edge components
- C. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including membrane roofing, base flashing, roofing insulation, fasteners, and vapor retarders, if any, for the following warranty period:
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Modified Built Up Roof System:

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. SBS Modified Bituminous Base Sheet:
Garland Co., Inc. Basis of Design
 - 2. Other manufactures approved based on compliance with the specification”
Tremco
 - 3. Approved equal

2.2 Modified Built Up Roof System Base Sheet

- A. Base Ply of Field System: SBS modified bituminous sheet (Styrene-Butadiene- Styrene) 80 mil, smooth surfaced rubber modified roofing membrane reinforced with a dual fiberglass scrim.
 - 1. Use: Base ply of 2-ply, modified bituminous membrane roofing system.
 - 2. Reinforcing: Fiberglass.
 - 3. Finish: smooth
- B. Physical Properties: Provide SBS -modified bituminous membrane materials with the following properties when tested according to ASTM D 5147:
 - 1. Thickness: 80 mils minimum.
 - 2. Tensile Strength: 215 bf/in. at 73.4 deg F (MD). 215 lbf/in. at 73.4deg F (CMD).
 - 3. Elongation at Maximum Load: 4.5 percent minimum at 73.4 deg F in each direction.

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4. Tear Strength: 275 lbf. at 73.4 deg. F (MD). 275 lbf. at 73.4 deg. F (CMD).
 5. Low-Temperature Flexibility: Pass at minus 30 deg F.
- C. Base Ply of Flashing System: SBS modified bituminous sheet (Styrene-Butadiene-Styrene) 40 mil, smooth surfaced rubber modified roofing membrane reinforced with a dual fiberglass mat.
1. Use: Base ply of 2-ply, modified bituminous membrane flashing system.
 2. Reinforcing: fiberglass.
 3. Finish: smooth
- D. Physical Properties: Provide SBS -modified bituminous membrane materials with the following properties when tested according to ASTM D 5147:
1. Thickness: 40 mils minimum.
 2. Tensile Strength: 225 bf/in. at 73.4 deg F (MD). 225 lbf/in. at 73.4deg F (CMD).
 3. Elongation at Maximum Load: 4.0 percent minimum at 73.4 deg F in each direction.
 4. Tear Strength: 300 lbf. at 73.4 deg. F (MD). 300 lbf. at 73.4 deg. F (CMD).
 5. Low-Temperature Flexibility: Pass at minus 30 deg F.

2.3 Modified Built Up Roof System

- A. SBS/SIS modified bituminous sheet (Styrene-Isoprene-Styrene/Styrene-Butadiene-Styrene) 160 mil, bio based mineral surfaced rubber modified roofing membrane with Kevlar fiber and reinforced with a dual fiberglass and polyester scrim mat.
1. Use: Roof membrane.
 2. Use: Finish ply of 3-ply, modified bituminous membrane roofing system.
 3. Reinforcing: Polyester and fiberglass.
 4. Finish: light grey mineral
- B. Physical Properties: Provide SBS/SIS/ES -modified bituminous membrane materials with the following properties when tested according to ASTM D 5147:
1. Thickness: 160 mils minimum.
 2. Tensile Strength: 500 lbf/in. at 73.4 deg F (MD). 550 lbf/in. at 73.4deg F (CMD).
 3. Elongation at Maximum Load: 6.0 percent minimum at 73.4 deg F in each direction.
 4. Tear Strength: 900 lbf. at 73.4 deg. F (MD). 950 lbf. at 73.4 deg. F (CMD).
 5. Water Absorption: Less than .8 percent mass change.
 6. Low-Temperature Flexibility: Pass at minus 30 deg F.
 7. Compound Stability: Not less than 225 deg F.
 8. Rapidly Renewable Content < 2.5%
 9. LEED Material Resources Contribution (Renewable content) 13%

2.4 Modified Adhesives and Mastics

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- A. Cold Applied Membrane Adhesive: V.O.C. compliant ASTM D3019. Performance Requirements:
 - 1. Non-Volatile Content ASTM D4479 70%
 - 2. Density ASTM D1475 7.89 lbs./gal. (0.9kg/l)
 - 3. Viscosity Stormer ASTM D562 16-20 sec.
 - 4. Flash Point ASTM D93 100°F min. (37°C)
 - 5. Slope: up to 3:12
- B. Roofing Asphalt:
 - 1. Type III steep asphalt for slopes ¼" or less.
 - 2. Type IV steep asphalt for slopes greater than ¼".
- C. Brush Grade Flashing Adhesive
 - 1. Performance Requirements:
 - 2. Non-Volatile Content ASTM D4479 70 min.
 - 3. Density ASTM D1475 8.6 lbs./gal. (1kg/l)
 - 4. Flash Point ASTM D93 100°F (37°C)
- D. Silver Asphalt Roofing Mastic: V.O.C. compliant,
 - 1. Flash Point ASTM D93 >100 °F.
 - 2. Density @ 77°F 8.3 lbs. /gal
 - 3. Non-Volatile 70% min.
 - 4. Viscosity @ 77°F 9-11 seconds
 - 5. Reflectivity ASTM C 1549 >60%
 - 6. Post Industrial Recycled Content 5.19%

2.3 AUXILIARY MEMBRANE MATERIALS

- A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with SBS-modified bituminous roofing.
 - 1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.
- B. Asphalt Primer: ASTM D 41 - VOC compliant.
- C. Asphalt Roofing Cement: ASTM D 2822, asbestos free, VOC compliant as provided by the Membrane manufacturer and silver in color throughout the thickness
- D. Mastic Sealant: Polyisobutylene, plain or modified bituminous, nonhardening, nonmigrating, nonskinning, and nondrying.
- E. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions of FM 4470; designed for fastening base sheets, base-ply felts, and base flashings and for backnailing modified bituminous membrane to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.

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- F. Wood Nailer Strips: Furnish wood nailer strips complying with requirements of Division 6 Section "Rough Carpentry."
- G. Cants: Wood Fiber Cants
- H. Urethane Sealant: One part, non-sag sealant as recommended and furnished by the membrane manufacturer for moving joints.
 - 1. Tensile Strength (ASTM D412) 250 psi
 - 2. Elongation (ASTM D412) 950%
 - 3. Hardness, Shore A (ASTM C920) 35
 - 4. Adhesion-in-Peel (ASTM C920) 30 pli
- I. Pitch Pocket Sealer: Two part, 100% solids, self leveling, polyurethane sealant for filling pitch pans as recommended and furnished by the membrane manufacturer.
 - 1. Durometer (ASTM D2240) 40-50 Shore
 - 2. Elongation (ASTM D 412) 250%
 - 3. Tensile Strength (ASTM D 412) 200 @ 100 mil
- J. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design
- K. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled
- L. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.
- M. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer for intended use.
- N. Rust Inhibitive Paint: As recommended and furnished by the membrane manufacturer for mechanical units and other metal surfaces to control and prevent surface rust.
- O. Energy Star Acrylic Surfacing: Pyramic; Energy Star approved white acrylic roof coating ASTM G26 with 81% reflectivity, 250% Minimum elongation and 250 psi tensile strength.
 - 1. Weight/Gallon 12 lbs./gal. (1.44 g/cm³)
 - 2. Non-Volatile % (ASTM D 1644) 66 min
- P. Liquid Flashing: An asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.
 - 1. Tensile Strength (ASTM D412) 400 psi
 - 2. Elongation (ASTM D412) 300%
 - 3. Density @77°F 8.5 lb/gal typical

2.4 INSULATION MATERIALS

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- A. General: Provide preformed, roofing insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated.
 - 1. Provide preformed, tapered insulation boards where indicated for sloping to drain. Fabricate with the following taper:
 - a. ½" :12" for all crickets
 - b. ¼" :12 in field only where shown on the Proposed Roof Plans
 - 2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
 - 3. Uniform thickness insulation shall be 2 layers of 2.5" insulation installed with staggered joints
 - 4. Insulation assembly is to be included in membrane manufacturer's warranty.
- B. Polyisocyanurate Board Insulation: Rigid, cellular Polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents complying with ASTM C 1289, classified by facer type as follows:
 - 1. Facer Type: Type II, felt or glass-fiber mat on both major surfaces.
 - 2. Polyisocyanurate insulation shall be 2.5" thick per layer
- C. High density fiberboard roof insulation.
 - 1. Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the top side.
 - a. Board size: 4' x 4'
 - b. Thickness: Minimum ½".

2.6 INSULATION ACCESSORIES

- A. General: Furnish roofing insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470, designed for fastening roofing insulation to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- C. Type III steep asphalt
- D. Tapered Edge Strips: Rigid, cellulosic-fiber insulation board, complying with ASTM C 208, Type 2.

2.8 ROOF WALKWAYS

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- A. Walkway Pads: Factory formed recycled rubber, nonporous, with a slip-resisting surface texture, manufactured specifically for adhering to modified bituminous membrane roofing as a protection course for foot traffic, of the following thickness:
 - 1. ¾" thick for use in high traffic areas
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Supplied by membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.
- B. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.
- C. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match the thicknesses of insulation required.
 - 1. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.
- D. Verify that flatness and fastening of metal roof decks comply with installation tolerances specified in Division 5 Section "Steel Deck."
- E. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.5 mm) out of plane.
- F. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Inspect the deck to verify integrity. Bring any areas of questionable integrity to the Construction Manager's attention. Do not cover any areas of questionable welds or deck out of plane.

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3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install modified bituminous membrane roofing system according to roofing system manufacturer's written instructions and applicable recommendations of NRCA/ARMA's "Quality Control Recommendations for Polymer Modified Bitumen Roofing."
 - 1. Install roofing system according to applicable specification plates of NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Start installation of modified bituminous membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Shingling Plies: Install modified bituminous membrane roofing system with ply sheets shingled uniformly. Shingle in direction to shed water.
 - 1. Where roof slope exceeds 1/2 inch per 12 inches (1:24), run sheets of modified bituminous membrane roofing parallel with slope. Backnail top ends of sheets to nailer strips. Use Type IV steep asphalt
- D. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of modified bituminous membrane roofing system with vertical surfaces or angle changes greater than 45 degrees.
- E. Cooperate with inspecting and testing agencies engaged or required to perform services for installing modified bituminous membrane roofing system.
- F. Coordinate installing roofing system components so insulation and roofing plies are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
 - 1. Provide cutoffs at end of each day's work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- G. Asphalt Heating: Heat roofing asphalt and apply within plus or minus 25 deg F (14 deg C) of equiviscous temperature, unless otherwise required by roofing system manufacturer. Do not raise roofing asphalt temperature above the equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F (14 deg C) of flash point. Discard roofing asphalt maintained at a temperature exceeding 500 deg F (260 deg C) for more than 4 hours. Keep kettle lid closed, unless adding roofing asphalt.
 - 1. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 INSULATION INSTALLATION

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- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing roofing insulation.
- C. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches (50 mm) or greater, install required thickness in 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- E. Sump insulation at roof drains and scuppers so completed surface is flush with ring of drain. A minimum 4' sump is required
- F. Install insulation with long joints of insulation in continuous straight lines with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- G. Mechanically attach insulation on metal decks. The fastening pattern shall be 11 fasteners in Zone 1, 17 in Zone 2 and 22 in Zone 3. The zone width is 10% of the minimum building width
- H. All crickets will be fabricated from 1/2" tapered insulation set in Type III special steep asphalt.
- I. Solid mop one layer of 1/2" high density wood fiber insulation to the finished tapered or uniform thickness polyisocyanurate with 33# of Type III asphalt. Stagger all joints.

3.5 BASE PLY INSTALLATION

- A. The modified base ply shall be solidly bonded to the wood fiber recovery board with specified Type III asphalt at the rate of 35 lbs. per 100 sq. ft.
- B. The roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.
- C. Subsequent rolls of modified shall be installed across the roof as above with a minimum of 4" side laps and 8" end laps. The end laps shall be staggered.
- D. Apply asphalt no more than five feet ahead of each roll being embedded.

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- E. Extend membrane to the top edge of all cants in full mopping of asphalt and to the top outside edge of parapet walls / curbs as shown on the drawings.
- F. Seal-off all horizontal edges of membrane with reinforcing membrane fabric embedded in a base coarse of roofing mastic.
- G. All base flashing shall be completed on a daily basis. Do not leave field of roof open on any day

3.7 SURFACE MEMBRANE APPLICATION

- A. The surface membrane shall be solidly bonded to the base layer with cold adhesive at the rate of 2 gallons per 100 sq. ft.
- B. The roll must push a puddle of adhesive in front of it with adhesive held back 4" from the side laps. Care should be taken to eliminate air entrapment under the membrane..
- C. Subsequent rolls of modified shall be installed across the roof as above with a minimum of 4" side laps and 8" end laps. The end laps shall be staggered. The modified membrane shall be laid in the same direction as the base ply, but the laps shall not coincide with the laps of the base layers.
- D. Extend membrane to the top edge of all cants in full mopping of asphalt and to the top outside edge of parapet walls / curbs as shown on the drawings.
- E. **Heat weld** all seams with a Leister Variant or approved modified bitumen heat welding machine. Hand weld T joints and hard to reach areas.
- F. Aesthetics will be a punch list item. The roof must match the owner's standards for appearance.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. All curb, wall and parapet flashings shall be sealed with an application of mastic and mesh on a daily basis. No condition should exist that will permit moisture entering behind, around, or under the roof or flashing membrane.
- B. Prepare all walls, penetrations and expansion joints to be flashed and where shown on the drawings, with asphalt primer at the rate of .75 to one gallon per square. Allow primer to dry tack free.
- C. The 40 mil SBS modified will be used as the flashing membrane and will be adhered to the primed substrate with steep asphalt and nailed off on the outside vertical face of the parapet wall or to the top of the curb. The entire flashing membrane system must be solidly adhered to the substrate. This will be inspected prior to surface membrane installation for compliance.
- D. The field surface membrane will be used as the top flashing ply. It shall be solidly adhered to the based flashing ply 2 gallons per square of brush grade flashing adhesive .

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- E. Seal all vertical laps of flashing membrane with a three course application of Silver Flash and fiberglass mesh.
- F. Secure top of flashing membrane with termination bar and fasten 8-inches o.c.. Flashing can be nailed to the top of all wood curbs with ring shanked nails.
- G. Counter flashing, cap flashings, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other Sections.
- H. Roof accessories, Miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with modified bituminous roofing system work are in other Sections.

3.9 FLASHING MEMBRANE INSTALLATION (Specific)

A. Installation of Lead Toilet Sleeves

1. Run all plies over the field of roof. Seal the base of the stack with elastomeric sealant
2. Install new lead sleeves set in application of elastomeric sealant. Prime the flange of the new lead.
3. Strip in the flange with one ply of SBS Base flashing ply set in hot asphalt. A second ply of SBS/SIS membrane shall be cut so that the hole over the stack is smaller than the previous ply and set in cold adhesive.
4. Caulk the intersection of the membrane and the lead with elastomeric sealant.
5. Heat weld the perimeter of the target patch
6. Turn lead flashing a minimum of 1" down the inside of the pipe.

B. Base Flashing: Equipment Curbs

1. All curb heights are to be a minimum of 10" off the finished roof surface. Prime the vertical surface of the curb with primer at a rate of 100 square ft per gallon and allow to dry.
2. Install a prefabricated cant strip at the base of the curb, firmly embedded in hot asphalt. Run the plies of glass felt over the top of the cant and seal with mastic.
3. Apply SBS Base flashing ply to the sides of the curb in hot asphalt. Extend the base ply out 6" onto the roof surface. The top of the flashing shall be nailed to the top of the curb.
4. Install surface membrane over the base ply with cold adhesive and heat weld the horizontal seam to the surface membrane.
5. Extend the flashing over the top of the curb and nail off. Install counterflashing and set unit.
6. Install mesh and silver roof cement over all vertical seams.

C. Metal Edge Detail

1. Inspect the nailer to assure proper attachment and configuration. Run all plies over the edge. Assure coverage of all wood nailers. Extend base membrane past the nailer a minimum of 1"
2. Fasten plies with ring shank nails 8" O.C.

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3. Install continuous cant dam / cleat fasten 6" O.C on the top flange and 12" O.C on the face and according to manufacture's installation instruction.
4. Strip in cant dam with base flashing ply covering entire vertical area with 6" on to the field of roof in bitumen. Assure ply laps do not coincide with metal laps.
5. The second ply shall be a modified flashing ply installed over the base flashing ply, 9" on to field of roof in bitumen. All stripping plies are to be adhered with cold adhesive
6. Install new metal fascia over the spring lock fascia cant dam.

D. Rising Wall / Parapet Base Flashing

1. Prime the rising wall at a rate of 1 gal per sq. and allow to dry
2. Install a prefabricated fiberglass cant strip at the base of the wall, firmly embedded in hot asphalt.
3. Run plies including membrane from the roof surface up and over the cant a minimum of 2" and securely bond to the wall. Trowel mastic at the top of the cant.
4. Apply the 40 mil SBS from the outside of the parapet (2" below the wood blocking) to 6" onto the roof surface.
5. Adhere the surface membrane onto the base ply and extend it onto the roof surface a minimum of 2" past the first ply of flashing with cold adhesive and heat weld the horizontal seam to the surface membrane.
6. Terminate the flashing under new counterflashing with extruded aluminum bar and seal with elastomeric sealant. Vertical termination required between flashing height changes.
7. The flashing on the parapet wall shall extend to the outside face of the wood nailer and be nailed off 4" on center. Flashing on the rising wall shall be terminated with a termination bar fastened 9" on center under the new metal wall panels
8. Install new coping or counterflashing system as shown on the detail

E. Roof Drain

1. Taper insulation to drain minimum of 48" from center of drain. (96" square)
2. Run roof system plies over drain. Cut the four corners of the sump and allow the membrane to drape naturally into the drain bowl. Cut out plies inside of drain bowl.
3. Set lead / copper flashing (30" square minimum) in 1/4" of mastic. Run lead / copper into drain a minimum of 2". Prime lead / copper at a rate of 10 square feet per gallon and allow to dry.
4. Install base flashing ply (40" square minimum) in cold adhesive. Cut the membrane at the 4 corners of the sump and allow them to drape naturally into the drain bowl. Weld a piece of base sheet over the cut stopping short of the drain clamping ring.
5. Install modified membrane (48" square minimum) in with cold adhesive and heat weld the horizontal seam to the surface membrane. Cut the membrane at the 4 corners of the sump and allow them to drape naturally into the drain bowl. Weld a piece of base sheet over the cut stopping short of the drain clamping ring. This is not an option. Drains done any other way **WILL BE REMOVED AND REFLASHED. WRINKLES IN THE FLASHING MEMBRANE CAN AND WILL BE AVOIDED OR REPLACED.**

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6. Install clamping ring and strainer assure all plies, except those stripping in the cuts are under the clamping ring.

F. Pitch Pocket

1. Remove existing pitch pockets and clean remaining projections so that they are free of all contaminants that may affect the adhesion of the new pourable sealant.
2. Prime the surface which has been sealed with primer and allow to dry.
3. Run plies to the projection and seal with mastic to ensure that it is completely weather tight.
4. Around the projection, install a bed of mastic a minimum of 3/8" deep as a seat for the metal pitch pocket.
5. Fill the pitch pocket to within 1" of the top with non-shrink grout
6. Top off with manufacture's pourable sealer shedding water to the outside of the pitch pocket.
7. Strip in the flange of the pitch pocket with two plies of flashing membrane

G. Liquid Flashing Application

1. Mask target area on roof membrane with tape.
2. Clean all non-porous areas with isopropyl alcohol.
3. Apply 32 wet mil base coat of liquid flashing over masked area.
4. Embed polyester reinforcement fabric into the base coat of the liquid flashing.
5. Apply 48-64 wet mil top coat of the liquid flashing material over the fabric extending 2" past the scrim in all directions.
6. Apply minerals immediately or allow the liquid flashing material to cure 15-30 days and then install reflective coating

3.10 FIELD QUALITY CONTROL

- A. The Contractor shall employ and pay for a qualified third party inspection agent for daily inspection work for this project, **5 days per week minimum**. A daily report shall be submitted to the Owner, Architect and Warranty manufacturer for their records. See Specification Section 01400, Quality Control for details.
- B. If accepted by the Owner, Architect and Warranty manufacturer, it is also the Contractor's option to have the Manufacturer's technical personnel on the job site for daily inspections, **5 days per week minimum**, and to prepare and submit the same reports as the third party inspection agent.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 1. Notify Architect and Owner 48 hours in advance of the date and time of inspection.

3.11 PROTECTING AND CLEANING

- A. Protect modified bituminous membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing,

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inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

- B. Correct deficiencies in or remove modified bituminous roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.12 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

- 1 Owner:
- 2 Address:
- 3 Building Name/Type:
- 4. Address:
- 5. Area of Work: As per the Construction Documents.
- 6 Acceptance Date:
- 7 Warranty Period: 20 years
- 8 Expiration Date:

- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

- D. This Warranty is made subject to the following terms and conditions:

- 1 Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 90 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and

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g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

- 2 When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
- 3 The Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.
- 4 During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
- 6 The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
- 7 This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <DAY> day of <MONTH>, 2017.

- 1 Authorized Signature:
- 2 Name:
- 3 Title:

END OF SECTION 07552