

**SECTION 07528**

**MODIFIED BITUMEN SHEET ROOFING**

**PART 1 GENERAL**

1.01 WORK INCLUDED

- A. The work included herein describes the installation of new roofing systems.

1.02 SYSTEM DESCRIPTION

- A. Modified Bitumen Roofing System: SBS asphalt applied two-ply membrane system with granular surface. The two ply system shall be installed over a base sheet if required by the roofing manufacturer.
- B. Installation of this system is based on a 20-year specification.

1.03 SUBMITTALS

- A. Submit samples, shop drawings and product data under provisions of Section 01300.
- B. Submit product data for the following:
  - 1. Modified Bitumen Roofing
  - 2. Flashings
  - 3. Base sheet (if required by roofing manufacturer)
  - 4. Insulation
  - 5. Fasteners
  - 6. Sealants
  - 7. Primer
  - 8. Modified Asphalt Elastomeric Flashing Cement
- C. Submit membrane, flashing, and insulation samples.
- D. Submit certification from roof system manufacturer that the insulation materials are approved for use with the roof system to meet warranty requirements.

- E. Submit, for each roof system, thermal barrier calculations to justify adequate insulation thickness is provided to meet total thermal barrier R-18 value.
- F. Submit properly scaled and dimensioned insulation plan for modified bitumen roof system to be installed. Plan shall show as a minimum:
  - 1. Direction and degree of insulation slope.
- G. Submit shop drawings of all details to be installed in the field. Indicate detail locations on a roof plan.
- H. Submit manufacturer's installation instructions under provisions of Section 01300.
- I. Submit manufacturer's certificate stating that products meet or exceed specified requirements.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in applying bituminous roofing with minimum three years documented experience and approved by materials manufacturer.
- C. Work of this Section to conform to manufacturer's printed instructions and to provisions of this section and drawings. Where conflicts exist between the manufacturer's requirements and those described herein or on the drawings, the more stringent requirement, as judged by the Architect, shall apply.

#### 1.05 REGULATORY REQUIREMENTS

- A. Conform to Standard Building Code for roof assembly fire hazard requirements.
- B. Fire Hazard Classification: UL Class A.
- C. Roof Assembly Classification: FM Class I-75 Construction, in accordance with FM Construction Bulletin 1-28.
- D. National Roofing Contractors Association: Roofing and Waterproofing Manual.
- E. Conform to applicable portions of applicable plumbing codes, state and local codes pertaining to plumbing materials, construction and installation of products.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in strict accordance with manufacturer's recommendations.
- B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- C. Store products in weather protected environment, clear of ground and moisture.
- D. Stand roll materials on end.
- E. At a minimum, materials are to be covered/protected by reinforced tarpaulins.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing membrane during inclement weather.
- B. Do not apply roofing membrane to damp or frozen deck surface.

1.08 WARRANTY REQUIREMENT

- A. Roofing System Manufacturer:
  - 1. Provide a twenty-year, no dollar limit, material and labor, watertightness warranty provided by the roofing manufacturer.
  - 2. Provide the Warranty Rider with the manufacturer's warranty. Warranty shall include all of the provisions noted therein.

- B. Special Project Warranty Rider:

The following "Special Project Warranty Rider" must be acknowledged on the face and attached to the standard manufacturer's warranty, indicating that this Special Project Warranty Rider shall supersede any language, terms, or limitations to the contrary in the standard manufacturer's warranty.

Special Project Warranty Rider: Submit a written warranty, executed by manufacturer, agreeing to repair or replace manufactured roof panels that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, deformation or deterioration of manufactured roof panels beyond normal weathering. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

The Roofing System manufacturer's warranty shall not contain terms, conditions, or limitations less restrictive than the following:

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1. The penal sum of the materials and watertightness warranty shall be limited to the cost of the labor to install, materials, and components provided by the manufacturer but in no case less than the cost to initially provide and install the manufactured roof, soffit, and wall panel system.
2. The manufacturer shall include in the warranty all workmanship and all components of the roof system, whether or not supplied or made by the manufacturer. Provide an itemized list of all components included in the roof system.
3. The warranty shall provide confirmation that the Contractor is an approved applicator of the warranted roof system as specified.
4. The warranty shall provide the manufacturer's certification or independent test reports confirming that materials utilized in the work meet or exceed all performance criteria required by the technical specifications and warranty requirements
5. In order for the manufacturer and Contractor to be relieved of any and all liability under this 20 year watertightness warranty because of failure of the Owner to provide written notice within 30 days of the discovery of any leaks, it must be shown that the Owner willfully, or habitually failed to make proper, timely notice.
6. The Owner's notification of a leak is not in and of itself authorization for the manufacturer to investigate the cause of the leak.
7. There shall be no limitations or exclusions in the warranty for wind speed less than maximum gale force (Beaufort scale) winds (63 MPH).
8. During the term of this warranty, with proper 24 hour notice, the manufacturer, its sales representatives, or employees shall have free access to the roof during regular business hours.
9. The manufacturer's obligation under this warranty shall not depend on bills for installation, supplies, and services being paid in full, provided the Contractor has received payment from the Owner for work completed.
10. The manufacturer shall fully examine the project specifications and drawings, and determine that the proposed design shall provide for adequate ventilation. The manufacturer shall require the Contractor to

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make all necessary modifications to provide adequate ventilation at no cost to the Owner. There shall be no limitations or exclusion of warranty coverage for any effects or consequences of condensation based on ventilation design.

11. The Contractor shall provide a two-year warranty. The manufacturer shall have warranty responsibility for the entire warranty period.
12. The manufacturer shall certify that they have received the design drawings for adequate framing and panel slope, crickets, and water diverters. The Contractor shall be required to take adequate steps during construction to avoid ponded water. There shall be no limitation or exclusion in the warranty coverage for ponded water.
13. Nothing in this list of requirements shall be construed to limit the Owner from using any and all legal remedies available in the event of a roofing problem that in the Owner's opinion has not been properly addressed and satisfactorily resolved.
14. Warranty period is 20 years after date of Substantial Completion of the entire project.
15. The guarantor shall provide training to the Owner's personnel to teach them the proper procedures to use in making permanent minor repairs and modifications to the roof system, and that said repairs and modifications by trained Owner personnel will have no adverse effect on the warranty provided by the roofing panel manufacturer.
16. The guarantee shall provide that the manufacturer agrees to repair any leaks that occur as a result of failure of any material or workmanship in the Metal Roof Panel Assembly or any components of the roofing system within the specified warranty period. Failures include, but are not limited to, deformation or deterioration of the roof panel beyond normal weathering.

### C. Roofing Contractor

1. The Roofing Contractor shall provide a two year labor and material warranty. The Contractor shall outline the procedure for service under the warranty, including base of operation for crews proposed to perform warranty service.

- D. Contractor shall correct deficiencies required by manufacturer to issue warranty at no cost to Owner.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS - SHEET AND BITUMEN MATERIALS**

- A. Roofing membrane: Granular surfaced, two-ply system with interply asphalt bitumen. UL Class A, primary membrane manufacturers 20 year type system. Approved manufacturers: Firestone Building Products, GAF Materials Corp.; Johns Manville; Siplast Inc.; Soprema Roofing and Waterproofing, Inc.; and Tremco Inc.

### **2.02 MODIFIED BITUMEN SHEET MATERIALS**

A. Roof Membrane System:

1. Top Ply (Cap Sheet): ASTM D 6162, Type I, Grade G or ASTM D 6164, Type I, Grade G with a Class A fire-rated (FR), minimum 160-mil thick, granular surfaced, composite glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen. Color shall be "white".
2. Base Ply (First Layer): ASTM D 6162, Type I, Grade S or ASTM D 6164, Type I, Grade S, minimum 120 mils thick, smooth surfaced, composite glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen.
3. Base Sheet (if required by roofing manufacturer): ASTM D4601, Type II.
4. Sacrificial Sheet (at locations shown on drawings): ASTM D 6164, Type II, Grade G with a Class A fire-rated (FR), minimum 197-mil thick, granular surfaced, composite glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen. Color shall be "Black".

B. Base Flashing:

1. Top Ply (Cap Sheet): ASTM D 6162, Type I, Grade G or ASTM D 6164, Type I, Grade G with a Class A fire-rated (FR), minimum 160-mil thick, granular surfaced, composite glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen. Flashing to be torch applied. Color shall be "white" per ASTM E 108.
2. Base Ply (First Layer): ASTM D 6162, Type I, Grade S or ASTM D 6164, Type I, Grade S, minimum 120 mils thick, smooth surfaced, composite

glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen. Flashing to be self-adhering or torch applied.

## 2.03 INSULATION MATERIALS

- A. The insulation system shall consist of a base layer of 3 inch (minimum) mechanically fastened, polyisocyanurate insulation base board and a top layer of hot mopped perlite board meeting the standards shown below. For areas where tapered insulation is shown, it shall be tapered polyisocyanurate insulation at a rate of 1/4 inch per foot. All crickets shall be polyisocyanurate insulation, hot applied, and shall slope at a rate of 1/2 inch per foot. Insulation boards shall be of an *average* thickness required to meet total system thermal barrier R-18 value.
1. Base and tapered Insulation: Isocyanurate board, minimum 2.0 pounds per square foot density; ASTM C 1289.
  2. Top Layer: 3/4" Perlite mineral aggregate board; ASTM C 728.

## 2.04 BITUMINOUS MATERIALS

- A. Asphalt Bitumen: ASTM D 312, Type IV (unless roofing manufacturer requires Type III), Special Steep; point of application temperature 425 degrees F or  $\pm$  25 degrees F of listed EVT at 75 centipoise.
- B. Asphalt Primer: ASTM D 41.
- C. Modified Asphalt Elastomeric Flashing Cement: ASTM D 4586, Type I for horizontal application, Type II for vertical applications. Non-asbestos.

## 2.05 CANTS

- A. Cant Strips: Perlite conforming to ASTM C 728; preformed to 45 degree angle with nominal 3-1/2-inch horizontal and vertical lengths, as approved by the primary membrane manufacturer.

## 2.06 INSULATION FASTENERS

- A. Type as approved by roof system and insulation manufacturers, and the requirements below. Size, spacing, and application rates to meet Factory Mutual I-75 Windstorm Rating and Factory Mutual Standard 4470 requirements for wind uplift resistance and corrosion resistance of length to penetrate only the top flute of the metal deck.
1. Insulation to Steel Deck: Extended corrosion resistant carbon steel screws with composite fluorocarbon coating in a matrix of organic polymers, resins,

pigments and corrosion inhibitors. Finish must survive 30 or more cycles of Kesternich testing (DIN 50018) with no significant corrosion. With steel or plastic plate for Factory Mutual I-75 approved installation.

2.07 WALK PADS

- A. Walk Pads: Roofing manufacturer's standard modified bitumen roof walk pad; minimum size 12" x 24".

2.08 EPDM FLASHING

- A. EPDM Coping Flashing: Forty five (0.045 inch) mil, black EPDM, by Carlisle Syntec or approved equal.

2.09 SACRIFICIAL SHEET

- A. Sacrificial Sheet (at locations shown on drawings): ASTM D 6164, Type II, Grade G with a Class A fire-rated (FR), Minimum 197-mil thick, granular surfaced, composite glass fiber polyester reinforced, styrene-butadiene-styrene (SBS) modified bitumen. Color shall be "Black".

**PART 3 EXECUTION**

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work. Verify that deck is supported and secured and that it is clean and smooth, free of depressions, waves, or projections.
- B. Verify that all surfaces to which roofing or flashing is to be applied are dry and free of snow or ice.
- C. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and wood cant strips, wood nailing strips and reglets are in place. Verify with the general contractor that all new penetrations/curbs are set in the proper place prior to installing the new roofing.
- D. Beginning of installation means installer accepts existing surfaces.
- E. Verify under deck conditions are clear for fastener installation.

3.02 APPLYING INSULATION AND TAPERED INSULATION BOARD

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- A. Verify substrate and adjacent materials are dry and ready to receive insulation. Verify edge detail is solidly set and ready for installation of insulation. Verify substrate is free of irregularities.
- B. Apply units in parallel courses with cross joints broken (brick pattern). Stagger joints from underlying insulation boards 6 inches, minimum. Edges must be butted, without forcing. Fill voids less than ¼ inch with flashing cement and strike smooth. Voids larger than ¼ inch shall be filled with insulation. Repair damaged surfaces with base ply patches set in flashing cement.
- C. Mechanically attach the base layer of insulation boards to the metal deck as specified to the top flutes of the metal deck.
- D. Mop additional layer and/or tapered insulation to insulation boards in a 100% application of hot asphalt at a rate of 30 pounds per square. Where multiple layers of board are used, adhere subsequent layers with 30 pounds per square of hot asphalt to the underlying boards. Insulation is to be mopped by hand. The use of asphalt dispensing equipment will not be permitted.
- E. Apply no more insulation than can be sealed with membrane in same day. Insulation board which becomes wet shall be removed and replaced.

### 3.03 MEMBRANE APPLICATION

- A. Membrane and flashing shall be installed in accordance with primary membrane manufacturer's published recommendations modified by the Project Manual and Drawings.
- B. Heating of Asphalt Bitumen: Have laboratory calibrated thermometer on site. Do not heat asphalt above the manufacturer's written recommended maximum limit. If information is not furnished by the manufacturer, the following maximum heating temperatures shall be used as guidelines:

|                       |          |               |
|-----------------------|----------|---------------|
| Dead Level Asphalt    | Type I   | 475 degrees F |
| Flat Grade Asphalt    | Type II  | 500 degrees F |
| Steep Grade Asphalt   | Type III | 525 degrees F |
| Special Steep Asphalt | Type IV  | 525 degrees F |

The following two restraints shall also apply to the asphalt:

1. It should NOT be heated to or above the actual COC Flash Point. (ANSI/ASTM Method D 92, Test for Flash & Fire Points by Cleveland Open Cup.)
2. It should NOT be heated and held above the Finished Blowing Temperature (FBT) for more than four hours.

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- C. Application of Asphalt: Moppings of asphalt shall be continuous and applied at the rate recommended by the primary roofing membrane manufacturer. Asphalt shall be applied at EVT (Equiviscous Temperature) plus or minus 25 degrees Fahrenheit.
- D. Base Sheet Installation (if required)
1. Make surfaces free of moisture, foreign material, oil, grease, dirt, and other debris before start of base sheet application.
  2. Install base sheet in hot asphalt over the perlite board as recommended by the roofing manufacturer. Attach base sheet in accordance with manufacturer's requirements, these specifications, and to meet current FM I-75 uplift rating.
- E. Base Ply Application:
1. Attachment of base ply shall be according to recommendations set forth by the National Roofing Contractors Association (NRCA) and membrane manufacturer.
  2. Embed base ply in full, solid, and uniform mopping of hot asphalt bitumen over tapered insulation starting at the low point. Membrane must be firmly and uniformly set into the asphalt without voids, air pockets, and wrinkles. Base ply shall be smooth and free of fishmouths or tears. Membrane shall be broomed in if recommended by the primary membrane manufacturer. The base ply is to be hand mopped only. The use of asphalt dispensing equipment shall not be permitted
  4. Base ply side laps shall be a minimum of four inches. Base ply end laps shall be a minimum of six inches.
  5. A 12 inch minimum offset between the side and end laps of the base ply and the first membrane sheet layer shall be maintained.
  6. Extend base ply from the field up cant strips and up vertical surfaces at least two inches above cants.
  7. Prevent foot or vehicle traffic from crossing newly laid base ply until bitumen cools to below softening point.
- E. Top Ply Application:

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1. Install base ply flashing prior to installation of top ply membrane. Prior to starting installation of the top ply, repair all deficiencies in the base ply and remove all debris to provide a smooth, clean surface.
  2. Starting at the low point, embed top ply over base ply in a full, solid, and uniform mopping of hot asphalt bitumen, in shingle fashion.
  3. Follow manufacturer's recommendations for staggering laps between plies of modified bitumen membrane.
  4. Interply moppings of hot steep Type IV asphalt bitumen shall be applied at an approximate rate of 25 pounds per 100 square feet or as required by the roofing manufacturer to meet warranty requirements.
  5. Embed top ply in full, solid, and uniform mopping of hot asphalt bitumen over the base ply starting at the low point. Membrane must be firmly and uniformly set, without voids, air pockets, and wrinkles into the asphalt. Top ply shall be smooth and free of fishmouths or tears. Membrane shall be broomed in if recommended by the primary membrane manufacturer. The base ply is to be hand mopped only. The use of asphalt dispensing equipment shall not be permitted.
  6. A 1/4 to 1 inch "bleed-out" should be seen coming from side and end laps. Lap ends six inches and edges four inches.
  7. Apply granules to areas of bleed-out while the asphalt is still hot.
  8. Extend modified bitumen sheets from the field up cant strips and up vertical surfaces at least two inches above cants. Install sheets continuously in one direction from the field of the roof.
  9. Install water cutoffs at the end of day's operation. Remove prior to resuming additional work. Seal perimeters into watertight condition.
  10. Prevent foot or vehicle traffic from crossing newly laid modified bitumen membrane until bitumen cools to below softening point.
- F. Sacrificial Sheet Application:
1. Install the sacrificial sheet at locations shown on drawings following the same procedures outlined for the Top Ply Application.

### 3.03 FLASHINGS AND ACCESSORIES

- A. Base Flashing Installation: Install base flashing in accordance with primary membrane manufacturer's published recommendations and details for a 20 year

warranted roof system unless those recommendations and details are modified by these specifications.

- B. Apply base flashing materials in longest practical lengths to minimize seams.
- C. Apply base flashings to seal membrane to vertical elements.
- D. Extend base flashing as required.
- E. Nail base flashing one inch from top edge fastened on eight inch centers.
- F. Prime all metal flanges to receive strip-in ply or to be set in mastic. Cover the metal flange completely with ply.

### 3.07 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed.
- B. Correct identified defects or irregularities.

### 3.08 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by bitumen or any other source of soiling caused by work, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or disfigured finishes to remain in place at no additional cost to the Owner.
- D. Remove construction debris from the site daily.

### 3.09 PROTECTION

- A. Expedite installation to ensure that work started in any particular area on any day will result in a fully completed and protected roof system on that day. Water cutoff flashing, sealing, and lap jointing must be completed on a daily basis.
- B. Protect adjacent building surfaces against damage from roofing work.
- C. Provide necessary protective measures for inclement weather and to ensure the normal function of the building during the repair operations.

END OF SECTION