

**SECTION 07 52 16**  
**STYRENE-BUTADIENE-STYRENE MODIFIED BITUMINOUS MEMBRANE ROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies modified bituminous sheet roofing and base flashing installed on new construction with granular, metal foil or smooth surface.
- B. Temporary roofs.
- C. Repairs and alteration work.

**1.2 RELATED WORK:**

- A. Wood cants, blocking and wood edge strips: Section 06 10 00, ROUGH CARPENTRY.
- B. Sheet metal components: Section 07 60 00, FLASHING AND SHEET METAL.
- C. Miscellaneous items: Section 07 71 00, ROOF SPECIALTIES/ Section 07 72 00, ROOF ACCESSORIES.

**1.3 QUALITY CONTROL:**

- A. Supervision of work by persons those are knowledgeable and experienced in roofing.
- B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to modified bituminous sheet roofing for storage, handling and application.
- C. Applicator licensed by manufacturer.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Asphalt materials.
  - 2. Modified bituminous sheet roofing.
  - 3. Roofing cement.
  - 4. Roof walkway (asphalt plank).
  - 5. Fastening requirements.
  - 6. Application instructions.
- C. Samples:
  - 1. Nails and fasteners, each type.

- D. Certificates: Indicating materials and method of application of roofing system meets requirements of Factory Mutual Research Corporation for 1-90 Roofs.
- E. Warranty: As specified.
- G. Documentation of supervisors training and experience showing knowledge of roofing procedure.

**1.5 DELIVERY, STORAGE AND MARKING:**

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer or seller.
- B. Keep materials dry, and store in dry, weather tight facilities or under canvas tarps. Use of polyethylene or plastic tarps to cover materials is not permitted:
  - 1. Store above ground or deck level on wood pallets. Cover ground under pallet stored materials with plastic tarp.
  - 2. Store rolled materials on end. Do not store materials on top of rolled materials.
- C. Protect from damage from handling, weather and construction operations before, during, and after installation.

**1.6 WARRANTY:**

Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend warranty period to two years from acceptance of facility from the contractor.

**1.7 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
  - UU-B-790A.....Building Paper, Vegetable Fiber: (Kraft, INT AMD 1 Waterproofed, Water Repellent And Fire Resistant)
- C. American Society for Testing and Materials (ASTM):
  - D41-05.....Asphalt Primer Used in Roofing, Dampproofing and Waterproofing

- D226-06.....Asphalt-Saturated Organic Felt Used in Roofing  
Waterproofing
- D312-00.....Asphalt Used in Roofing
- D3617-07.....Sampling and Analysis of New Built-up Roof  
Membranes
- D4586-07.....Asphalt Roof Cement, Asbestos Free
- D4897-01.....Asphalt Coated Glass Fiber Venting Base Sheet  
Used in Roofing
- D6162-00.....Styrene Butadiene Styrene (SBS) Modified  
Bituminous Sheet Materials Using a Combination  
of Polyester and Glass Fiber Reinforcements
- D6163-00.....Styrene Butadiene Styrene (SBS) Modified  
Bituminous Sheet Materials Using Glass Fiber  
Reinforcements
- D6164-05.....Styrene Butadiene Styrene (SBS) Modified  
Bituminous Sheet Materials Using Polyester  
Reinforcements
- D. Factory Mutual Engineering and Research Corporation (FM):  
Annual issue.....Approval Guide Building Materials.
- E. Underwriters Laboratories, Inc. (UL):  
Annual issue.....Building Materials Directory  
Annual issue.....Fire Resistance Directory
- F. Warnock Hersey (WH):  
Annual issue.....Certification Listings
- G. National Roofing Contractors Association (NRCA):  
The NRCA Roofing and Waterproofing Manual - Fifth Edition.

**PART 2 - PRODUCTS**

**2.1 ASPHALT MATERIALS:**

- A. Primer: ASTM D41.
- B. Organic Felt: ASTM D226, Type I, 7 Kg 15 lb., perforated.
- C. Asphalt: ASTM D312, Type III or IV for roof membrane.
- D. Venting Asphalt Base Sheet: ASTM D4897, Type II.
- E. Roof Cement: ASTM D4586, Type I or Type II.
- F. Modified Asphalt Sheet:

1. A hot mop applied membrane composed primarily of SBS modified asphalt material fabricated in sheet form and designed for roofing exposed to the weather.
2. Roofing Membrane Sheet: ASRM D 6164, Grade S, Type II polyester-reinforced, SBS-Modified asphalt sheet; smooth surfaced.
3. Roofing Membrane Cap Sheet: ASTM D 6298, Grade G, Type II, glass-fiber-reinforced, SBS- modified asphalt sheet; metal-foil surfaced.
4. Provide the sheet with a release sheet to prevent bonding of the sheet to itself.
5. ASTM D6162, Type II, Grade G or S; ASTM D 6163, Type II, Grade G or S; ASTM 6164, Type II, Grade G.

G. Building Paper (Sheathing Paper):

1. Fed. Spec. UU-B-790, Type I, Barrier paper, Grade D, Water-Vapor permeable, Style 1a, Uncreped, not reinforced; or, Style 1b, Uncreped, not reinforced; red rosin sized.
2. Weighing approximately 0.3 Kg/m<sup>2</sup> (six pounds per 100 square feet.).

**2.2 ROOF WALKWAY:**

- A. Prefabricated asphalt plank consisting of a homogeneous core of asphalt, plasticizers and inert fillers, bonded by heat and pressure between two saturated and coated sheets of felt:
1. Top side of plank surfaced with ceramic granules.
  2. Size: Minimum 13 mm (1/2-inch) thick, manufacturer's standard size, but not less than 300 mm (12 inches) in least dimension and 600 mm (24 inches) in length.

**2.3 FASTENERS:**

D. Nails for Securing Built-up Flashing to Masonry:

1. Hardened steel nails through metal discs at least 25 mm (one inch) in diameter.
2. One piece nails with an integral flat cap at least 24 mm (15/16-inch) across.

E. Nails for Securing Venting Base Sheet to Insulating Concrete:

1. Self-clinching type of galvanized steel having an integral flat cap at least 25 mm (1-inch) across.
2. Nail holding power of not less than 27 Kg (60 pounds) when pulled from approximate 400 Kg/m<sup>3</sup> (26 pound per cubic foot) dense concrete.

**PART 3 - EXECUTION**

**3.1 GENERAL:**

- A. Do not apply if deck will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless system is protected.
- B. Phased construction is not permitted. The complete installation of roofing system is required in the same day except for area where temporary protection is required when work is stopped. C. Entire roof deck construction of section of the building shall be completed before roofing work is begun:
  - 1. Install curbs, blocking, edge strips, cants, and other components where insulation, roofing and base flashing is attached to, in place ready to receive insulation and roofing.
  - 2. Coordinate roof operations with roof insulation and sheet metal work so that insulation and flashings are installed concurrently to permit continuous roofing operations.
- D. Apply dry roofing materials.
- E. Dry out surfaces, that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates.
- F. Except for temporary protection, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, or fog) is present in any amount in or on the materials to be covered or installed:
  - 1. Do not apply materials when the temperature is below 10°C (50 degrees F).
  - 2. Do not apply materials to substrate having temperature of 10°C (50 degrees F) or less.
- G. Phased construction is not permitted. Complete roofing membrane in the same day, including insulation, base flashings, and stripping except for the area where temporary protection is required when work is stopped.
- H. Temporary Protection:

1. Install temporary protection consisting of glaze coats and water cut offs at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
2. Glaze coat exposed surfaces of felts to seal within the bitumen coating. Do not leave felt surfaces or edges exposed.
3. Install temporary cap flashing over the top of base flashings where permanent flashings are not in place to provide complete protection against moisture entering the roof system through or behind the base flashing. Securely anchor in place to prevent blow off and damage by construction activities.
4. Provide for removal of water or drainage of water away from the work.
5. Provide temporary protection for roofing by means of duckboard walkways, plywood platforms, or other materials, as approved by Resident Engineer, for roof areas that are to remain intact, and that are subject to foot traffic and damage. Provide notches in sleepers to permit free drainage.

I. Heating Bitumen:

1. Heat the asphalt to the equiviscous temperature plus or minus  $-4^{\circ}\text{C}$  (25 degrees F) at the time of application:
  - a. Do not heat asphalt greater than  $38^{\circ}\text{C}$  (100 degrees F) above the equiviscous temperature.
  - b. When the equiviscous temperature is not furnished by the asphalt manufacturer, do not heat asphalt above  $275^{\circ}\text{C}$  (525 degrees F) for Type III and IV with temperature not less than  $250^{\circ}\text{C}$  (475 degrees F) at time of application.
2. Do not heat bitumen above the flash point temperature.
3. Provide heating kettles with a thermometer kept in operating condition. Attend kettle during heating to insure that the bitumens are heated within the temperatures specified.
4. Use type III and Type IV asphalt between plies.
5. Do not mix different type of asphalt in kettle.

J. Application of Materials with Hot Bitumen:

1. Apply bitumen in quantities required, immediately followed by membrane materials embedded therein before bitumen cools below the application temperature limit.
    - a. Do not apply more material than can be covered at one time except for glaze coats.
    - b. Recoat cooled bitumen areas.
  2. Roll sheets into bitumen brushing down to firmly embed in the hot bitumen free of wrinkles, fish mouths, blisters, bubbles, voids, air pockets or other defects that prevent complete adhesion:
    - a. Lap sheets shingle fashion starting with starter strips at right angles to slope of roof.
    - b. Commence the laying of sheets at the low points.
  3. Separate sheets or substrate so that subsequent plies do not touch previous placed sheets or substrate unless noted specifically.
  4. Cut to fit closely around pipes, roof drains, bitumen stops, and similar roof projections.
  5. Do not walk on roofing until bitumen has cooled hard and is not tacky.
- K. Laps for Top Sheet and Base Sheet:
1. Base sheet, lapped 75 mm (three inches).
  2. Use 450 mm (18 inch) starting widths, lap top sheet 475 mm (19 inches).
  3. Lap end joints of sheet 150 mm (six inches). Stagger end joints in relation to end joints in adjacent and proceeding plies.
- L. Primer Use 4L/m<sup>2</sup> (one gallon of primer per 100 square feet) of surface area.
- M. Quantities of Asphalt:
1. Per square unless otherwise specified.
  2. Between substrate and sheets: 7 to 11 Kg (15 to 25 pounds).
  3. Glaze Coats: 7 to 11 Kg (15 to 25 pounds).
- N. Nailing or Anchorage of Sheets to Nailable Decks:
1. Use nails or fasteners appropriate for type of deck.
    - a. Nail down along bottom edges at intervals not to exceed 225 mm (nine inches).
    - b. Nail down through last 475 mm (19-inch) wide sheet to both edges at intervals not to exceed 225 mm (9-inches).

- c. Stagger nails down center of sheet in two rows 280 mm (11 inches) apart at intervals of not more than 450 mm (18 inches) in each row.
- d. Nail to edge blocking at not more than 225 mm (9 inches) on center.

**3.2 SURFACE PREPARATION:**

- A. Sweep decks to broom clean condition. Remove all dust, dirt or debris.
- B. Remove projections that might damage materials.
- C. Concrete Decks, except Insulating Concrete:
  - 1. Test concrete decks for moisture prior to application of roofing materials. Heat bitumen as specified and pour approximately one pint of bitumen on surface to which roofing materials are to be applied. If bitumen foams upon contact with the deck or if after bitumen has cooled and bitumen is stripped from deck leaving no residue, the deck is not dry enough for application of prime coat or roofing.
  - 2. Prime concrete decks, including precast units, with primer as specified. Keep primer back four inches from joints in precast units.
  - 3. Allow primer to dry before application of bitumen.
- D. Insulating Concrete:
  - 1. Allow to dry out for at least five days after installation before the placement of materials.
  - 2. If rain occurs during or at end of drying period or during installation of roofing, allow additional drying time before the placement of the roofing materials.
- F. Existing Modified Bituminous Roofs and Repair Areas:
  - 1. At areas to be altered or repaired, remove loose, damaged, or cut sheet that is not firmly adhered only where new penetrations occur or repairs are required.
  - 2. Cut and remove existing roof membrane for new work to be installed. Clean cut edges and install a temporary seal to cut surfaces. Use roof cement and one layer of 7 Kg (15 pound) felt strip cut to extend 150 mm (6 inches) on each side of cut surface. Bed strip in roof cement and cover strip with roof cement to completely embed the felt.

3. At modified bituminous base flashing to be repaired, either bend up cap flashing or temporarily remove cap flashing. Brush and scrape away all deteriorated sheets or surface material of base flashing.

**3.3 INSTALLATION OF MODIFIED BITUMEN MEMBRANE:**

A. General:

1. Where nailers occur at roof edges under gravel stops or penetrations to receive metal base flashing, nail a continuous strip of 400 mm (16-inch) wide dry organic felt envelope over the nailers before the first ply sheet is applied. Strip shall be installed on top of venting base sheet. After membrane is installed, turn the dry felt back over the roofing, and secure in place with hot bitumen before gravel stops or other metal flanges extending out onto the membrane are installed.
2. Where cants occur at vertical surfaces, cut off roofing sheets two inches above top of cant strips, except at prefabricated curbs, scuttles and other roof accessories having integral cants, extend membrane over cant and up vertical surface to top of curb or nailer as shown.
3. Where fascia-cant occurs at roof edges, extend membrane beyond outside cant face and cut off at outside after base flashing is installed.
4. Where reglet occurs at vertical surfaces, extend plies roofing sheets up into reglet the full depth of the reglet.

B. Roofing on Insulation:

Mop down membrane as specified.

C. Roofing on Concrete and Precast Concrete Units:

1. Prime deck as specified.
2. Keep bitumen back four inches from joints in precast units.
3. Mop down membrane as specified.

D. Roofing on Nailable Decks:

1. On insulating concrete, install one ply of venting base sheet with mineral aggregate surface down, nailed to deck with lap as specified and seal lap edges with roof cement.
2. Terminate Venting Base Sheet:

- a. At vertical surfaces: Extend venting base sheet up vertical surface over cants to top of base flashing or curb.
- b. At roof edge under gravel stops install venting base sheet over blocking: Extend base sheet not less than two inches beyond outer edge and turn down so that venting can be accomplished.
- c. At roof edge over fascia-cant: Extend base sheet over top of cant and turn down over outer face of cant to permit venting at the edge.

### **3.5 BASE FLASHING:**

- A. Provide built-up base flashing over cants and as necessary to make work watertight.
- B. Prime vertical surfaces of masonry and concrete with asphalt primer except where vented base sheet is required to provide edge venting.
- C. Apply flashing on top of roofing, up face of cant and up the face of the vertical surface, at least 200 mm (eight inches) above the roofing but not more than 350 mm (14 inches) above the roofing, generally full height beneath counter flashing or top of curb flashing.
  - //1. At fascia-cants, extend to top of cant and cut off at top of cant.
  2. At reglet, extend full depth into the reglet.
  3. Where venting base sheet is used with insulating concrete, do not seal edges of venting base sheet with bitumen; allow for venting. //
- D. Use two plies of modified bituminous sheet.
  1. Extend the first ply 100 mm (four inches) out on the roofing, and the second ply 75 mm (three inches) beyond the first ply. Lap ends 75 mm (three inches) with joints broken 450 mm (18 inches) in each ply. Use smooth surface modified bituminous sheet for first ply.
  2. Use metal-foil surfaced modified bitumen cap sheet.
- E. Set base flashing either in Type III or IV asphalt.
  1. Embed each sheet in asphalt so sheets do not touch.
  2. Set cap sheet in hot bitumen with laps sealed with hot bitumen.
  3. Except for venting roof edges, seal the top edge of the base flashing with roof cement.

- F. Except at metal fascia cants, secure top edge of base flashing with nails on a line approximately 25 mm (one inch) below top edge, spaced not more than 200 mm (eight inches) on center.
1. Cover nail heads with roof cement.
  2. Cover the top of the base flashing with counter flashing as specified in Section 07 60 00, FLASHING AND SHEET METAL. At the fascia cants secure the top edge of the flashing with fascia compression clamp as specified in Section 07 60 00, FLASHING AND SHEET METAL.

**3.6 STRIPPING:**

- A. Coordinate to set flanges of metal flashing in roof cement on top sheet of the modified bituminous roofing and nailing to blocking with Section 07 60 00, FLASHING AND SHEET METAL.
- B. Cover that portion of the horizontal flanges of metal base flashings, gravel stops, and other flanges extending out onto the roofing with modified bituminous sheet.
- C. Extend the sheet out on the roofing 150 mm six inches beyond the edge of the metal flange. Cut edge to fit tight against vertical members of flange.
- D. Prime flange before stripping, embed sheet in hot bitumen.

**3.7 ROOF WALKWAYS**

- A. Install roof walkways where shown. Walkways may be concrete masonry units or prefabricated asphalt plank.
- B. Butt concrete masonry units within 25 mm (one-inch) and set in hot bitumen.
- C. When prefabricated asphalt plank is used. Set the planks in hot bitumen poured over the roof. Maintain minimum 75 mm (three inch) to maximum of 150 mm (six-inch) space between planks.

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