

CONSTRUCTION STANDARD SPECIFICATION

SECTION 07527

SBS - MODIFIED BITUMINOUS SHEET ROOFING

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PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specification.
- B. Related Sections include the following:
 - 1. Section 07600 Flashing and Sheet Metal
 - 2. Section 13100 Lightning Protection
 - 3. Section 15401 Plumbing, for roof drains

1.02 DESCRIPTION OF WORK

- A. This section includes all material, labor, equipment, temporary protection and tools for the proper installation and completion of the work as required in this specification.
- B. The following items are specified in this section:
 - 1. Roof Insulation
 - 2. Fasteners
 - 3. Roof membrane
 - 4. Roof membrane flashings
 - 5. Treated wood
 - 6. Sealants
 - 7. Adhesives

1.03 REFERENCES

- A. American Society of Testing and Materials (ASTM)
 - A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - C728 Specification for Perlite Thermal Insulation Board
 - D41 Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
 - D146 Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
 - D312 Specification for Asphalt Used in Roofing
 - D4601 Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
 - D5147 Test Methods for Sampling and Testing Modified Bituminous Sheet Material
 - E84 Test Method for Surface Burning Characteristics of Building Materials
 - E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
 - E903 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
- B. California South Coast Air Quality Management District (AQMD)
 - Rule 1168 Adhesive and Sealant Applications
- C. California Bay Area Air Quality Management District (AQMD)
 - Regulation 8, Rule 51 Organic Compounds, Adhesive and Sealant Products
- D. Factory Mutual (FM)
 - Approval Guide
 - Approval Standards No. 4470 Class 1 Roof Covers
- E. Federal Specification (FS)
 - HH-I-1972/2 Class 1 Insulation Board, Thermal, Polyurethane or Polyisocyanurate, Faced with Asphalt/Glass Fiber Felt on Both Sides of the Foam
- F. National Roofing Contractor's Association (NRCA)
 - Roofing and Waterproofing Manual

- G. Underwriter's Laboratories, Inc. (UL)
Roofing Materials and Systems Directory

1.04 SUBMITTALS

- A. General: Submit the following in accordance with conditions of Contract and Division 1, "Descriptive Submittals."
- B. Submit documentation of Manufacturer's proposed assembly based on substrate conditions as shown on Contract Documents. Such documentation shall indicate compliance with code requirements as specified in paragraph 1.04.E.
- C. Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for each type of roofing product required. Include data substantiating that materials comply with the specified requirements.
- D. Submit copy of the membrane manufacturer's warranty covering materials.
- E. Submit copy of the Roofing Contractor's warranty covering workmanship.
- F. Submit dimensioned shop drawings which shall include:
 - 1. An outline of the roof and roof size.
 - 2. Proposed installation method for insulation and membrane for each different section of roof. Include insulation type (e.g. flat, tapered) and fastener patterns if applicable. Show Contractor's proposed method of achieving specified roof slopes.
 - 3. Proposed profile details of flashing methods for penetrations and terminations if not indicated in the Contract Documents.
 - 4. Proposed location of manufacturer approved walkways. Corners of walkway are to be rounded and welded in accordance with manufacturer's written instruction. All side and end joints shall be hot-air welded a minimum of 2"-inches (51mm). No adhesive shall be present within the lap area.
- G. Submit written documentation from the manufacturer that the proposed roofing system, including insulation and fasteners, meets the applicable requirements and code approvals as referenced in this specification, and that the roofing system meets the requirements for the manufacturer standard warranty, covering material.
- H. Submit locations and name(s) of building owner(s) to meet the installation requirement of 500 roofing squares for more than five (5) years in the Southwest.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet, bitumen, membrane flashings, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.

- B. **Installer Qualifications:** Engage an experienced Installer who is certified by modified bituminous sheet roofing system manufacturer as qualified to install manufacturer's roofing materials. The Roofing Contractor must have completed a minimum of 500 roofing squares of modified bitumen membrane in the Southwest. To qualify for this requirement, the completed membrane must have met all conditions to obtain material and labor warranty, and must be performing successfully.
- C. Membrane manufacturer shall supply a list of projects, completed in the Southwest, where the specified membrane has been in place and performing successfully for a period of not less than five (5) years. A minimum of 500 roofing squares must have been installed to meet this requirement.
- D. There shall be no deviation made from this specification or the approved shop drawings without prior written approval by the manufacturer and the Sandia Delegated Representative (SDR).
- E. **Code Requirements:** The proposed roofing system shall meet the requirements of the following recognized code approval or testing agencies. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in Article 1.03 "Submittals."
 - 1. Underwriters Laboratories, Inc. (UL) Class A membrane.
 - 2. Factory Mutual (FM) 1-60 or 1-90 uplift rating, as indicated on Contract Documents per FM Approval Standard No. 4470.
- F. For new installations, ponding shall not occur in accordance with NRCA Roofing and Waterproofing Manual good roof design practice, which dictates that there shall be no ponding of water present 48 hours after rainfall.
- G. There shall be no more than 20 patches per 10,000sf on new construction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. All products delivered to the job site shall be in the original unopened container or wrappings.
- B. Membrane rolls and insulation shall be stored fully protected from moisture and wind damage.
 - 1. Store membrane rolls on end on pallets or other raised surface.
 - 2. Remove plastic and cover insulation with tarpaulins on a raised surface.
- C. Bonding adhesives shall be stored at temperatures recommended by the manufacturer.
- D. Handle all materials to prevent damage. Any materials which are determined to be damaged, according to the SDR, are to be removed from the job site and replaced at no cost to Sandia National Laboratories.

1.07 PROJECT CONDITIONS

- A. Construction may not be fully represented on the drawings, and some modifications to details may be required to accomplish the intent of the documents.

Contractor shall coordinate with General Contractor and other sub-contractors prior to bidding to ascertain to his satisfaction, that the specifications and drawings are workable and not in conflict with the manufacturer's requirements for material warranty.
- B. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The building and its contents shall be protected against all risks, and any damages shall be repaired or replaced at no cost to SNL. All exterior lighting, equipment, landscaping, and paving shall be protected from damage.
- C. Contractor shall test drains per SDR's direction prior to and upon completion of roofing work to insure that no blockage exists or has occurred.
- D. Only as much of the new roofing as can be made weather tight each day including all flashing work, shall be installed. Plug all roof drains before starting work each day and unplug all drains at the end of each workday.
- E. All surfaces to receive insulation, membrane or flashing shall be thoroughly clean and dry. Should surface moisture occur, the Contractor shall provide the necessary equipment and labor to dry the surface prior to application.
- F. All construction, including equipment and accessories, shall be secured against wind blow-off damage.
- G. Temporary waterstops shall be installed at the end of each day's work and shall be removed before proceeding with the next day's work. Waterstops shall be compatible with all materials, shall not emit dangerous or incompatible fumes, and shall be installed per manufacturer's recommendations and details shown on Contract Documents.
- H. Contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Plywood protection shall be provided for all new and existing roof areas which receive traffic during construction.
- I. Prior to and during applications, all dirt, debris and dust shall be removed from surfaces either by sweeping or vacuuming. Compressed air cleaning is prohibited.
- J. Liquid materials such as solvents and adhesives shall be stored and used away from open flames, sparks and excessive heat.
- K. Membranes and accessories shall not be exposed to a prolonged temperature in excess of 160 degrees F (71 degrees C).
- L. Contaminants, such as grease, fats, oils and solvents shall not be allowed to come into direct contact with the roofing membrane. Any exposures shall be presented to the membrane manufacturer for assessment of impact on the roof system performance.
- M. Site clean-up, including both interior and exterior building areas below or adjacent to the construction area for the roof, shall be complete and to the SDR's

satisfaction. Cleaning of the membrane with gasoline is prohibited. Mineral spirits shall be used to clean tar or asphalt from the membrane. Notify the SDR before using any solvent or cleaner to allow intake fans to be shut down.

- N. All roofing, insulation, flashings, and metal work removed for construction shall be promptly taken off the site to a legal dumping area.
- O. Contractor shall take care during application and storage to insure that overloading of the deck and structure does not occur.
- P. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Coordinate closing or shut-off of vents and intakes during roofing and flashing operations.

1.08 WARRANTY

- A. Upon completion of the work and receipt of final payment, the manufacturer shall submit executed copy of roofing manufacturer's standard limited service warranty agreement including flashing endorsement, signed by an authorized representative of modified bitumen sheet roofing system manufacturer, for ten (10) years after date of substantial completion.
- B. Roofing Contractor shall supply SNL with a minimum two (2) year workmanship warranty. In the event any work related to roofing, flashing, or metalwork is found to be defective or otherwise not in accordance with the Contract Documents within two (2) years of final acceptance, the Roofing Contractor shall remove and replace the defects at no cost to SNL.

PART 2 - PRODUCTS

2.01 GENERAL

Provide a Styrene Butadiene Styrene (SBS) -modified bituminous sheet roofing system that is comprised of fully compatible components for use in the proposed application. All proposed materials shall be compatible with substrate.

2.02 MEMBRANE

- A. SBS Roof Membrane Cap: ASTM D5147; SBS roofing membrane sheet shall be polyester, glass, or composite polyester and glass reinforced sheet with continuous layers of mineral granules factory-applied to top exposed surface. Thickness shall be a minimum of 138 mils (3.5 mm).
- B. Base Sheet
 - 1. Asphalt-impregnated and coated, fiberglass base sheet dusted with mineral granules both sides, complying with ASTM D4601 and ASTM D146.
 - 2. SBS-modified bitumen base sheet, with fiberglass reinforcing mat, dusted with fine mineral granules, both sides, comply with ASTM D5147.

2.03 FLASHING MEMBRANE

Flashing membrane shall be as supplied by the roofing membrane manufacturer. Flashing membranes are generally the same material as the roofing membrane unless otherwise specified on the Contract Documents.

2.04 INSULATION

- A. General: Provide insulating materials to comply with requirements indicated for materials and compliance with referenced standards; in sizes to fit applications, select from the manufacturer's standard thicknesses, widths and lengths.
- B. Polyisocyanurate Board Roof Insulation: Provide cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer's standard facing laminated to both sides to comply with FS HH-I-1972/2 Class 1. Provide in two (2) layers for a total thickness to meet an average R-value of 30.0, unless indicated elsewhere on the Contract Documents.

Surface Burning Characteristics: Comply with ASTM E84 with a maximum flame spread and smoke developed values of 25 and 145, respectively.

Recycled Content: Minimum 9 percent

- C. Insulation, fasteners and adhesive shall be supplied or approved by the roof membrane manufacturer for compatibility with the system, and the required FM and UL requirements. Adhesives shall comply with VOC limits of California South Coast (AQMD), Rule #1168.
- D. Insulation Overlay Board
 - Perlite board, 3/4"-inch (19.1 mm) thick, ASTM C728.
- E. Recovery Board: Provide one half-inch (1/2"-inch, 13mm) Den's Deck, or approved equal, over all insulation and tapered insulation.

2.05 ACCESSORY PRODUCTS

- A. Asphalt: Roofing asphalt, complying with ASTM D312, Type IV.
- B. Primer: Asphalt primer, complying with ASTM D41.
- C. Sealants: As recommended by the membrane manufacturer, to comply with VOC limits of California Bay Area (AQMD), Regulation 8, Rule 51.
- D. Fasteners
 - 1. Nailable Substrates: As recommended by manufacturer specially designed to be used in roofing applications for the attachment of roofing insulation and other accessories.
 - 2. Non-Nailable Substrates: As recommended by manufacturer specially designed to be used in roofing applications for the attachment of roofing insulation and other accessories.
- E. Vented Base Sheet: Provide membrane manufacturer's recommended vented base sheet over decks that require ventilation of water vapor or over existing reroofing

membranes before reroofing, when required or recommended by membrane manufacturer for the intended application or when indicated on Contract Documents.

- F. Wood Nailers: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on the Contract Documents. Wood shall be #2 or better, treated fire retardant lumber. Creosote and asphaltic preservatives are prohibited. Height of nailers shall match that of the insulation thickness or as indicated on the drawings. Nailers shall be firmly anchored at a maximum spacing of 12"-inches (305mm) unless noted otherwise on drawings and capable of resisting a force of 300 pounds per lineal foot (446 kg/m) in any direction. One-half inch (1/2-inch, 13mm) expansion spaces shall be provided between lengths of nailers.
- G. Cant Strips: Provide 45 degree cant strips at all parapet walls, eaves, expansion joints and as recommended by membrane manufacturer.
 - 1. Wood Cant Strips: Treated wood shall be #2 or better, treated fire retardant lumber.
 - 2. Perlite Board Cant Strips: Comply with ASTM C728.
- H. Sheet Metal Accessory Materials: ASTM A653, with 0.20 percent copper, G90 hot-dipped galvanized, 24-gauge (0.61 mm) or heavier.
- I. Expansion Joint Covers: Shall be the manufacturer's prefabricated units.
- J. Roof Walkways: Provide 36"-inch (914 mm) wide cap sheet walkways per manufacturer's recommendations specifically for hot bituminous application on SBS-modified bitumen sheet roofing as a protection course for foot traffic.
- K. B-Line Rooftop Supports or approved equal. To be placed at a minimum of 10'-feet (3m) on center for proper support. Refer to SNL Standard Detail Drawing for rooftop supports, AE5035 and AE5036.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine substrate surfaces to receive SBS-modified bitumen sheet roofing system and associated work, and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected to the satisfaction of the SDR.
- B. Prior to all work of this section, Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- C. Verify that work of other trades that penetrate the roof deck has been completed.
- D. Verify that roofing system may be installed in strict accordance with all pertinent codes and regulations, the original design and the manufacturer's recommendations.
- E. In the event of discrepancy, immediately notify the SDR.

- F. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- G. Upon starting the installation of a new roof, the SDR and the General Contractor and their sub-contractor, if applicable, will designate a portion of the installation to be used as a mock up. This area will be the model of how the roof installation shall be installed. The mock up should include the insulation, a curb, flashing, parapet and an inside and outside corner along with a termination and lap seam.
- H. Throughout the project and at completion, the SDR shall be allowed to inspect the roof, including probing as necessary to ensure proper installation.

3.02 PREPARATION OF SUBSTRATE

- A. General: Comply with the insulation and membrane manufacturer's instructions for preparation of the substrate to receive the roofing system.
- B. Clean substrate of dust, debris, and other substances detrimental to the system work. Remove sharp projections.
- C. Notify the SDR to inspect the substrate. Contractor shall not proceed with installation until the SDR has approved the substrate.

3.03 INSTALLATION OF INSULATION

- A. General: Comply with insulation manufacturer's instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.
- B. Insulation shall be neatly cut to fit around all penetrations and projections.
- C. Install tapered insulation where applicable in accordance with insulation manufacturer's approved shop drawings.
- D. Install tapered insulation around drains creating a drain sump. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.
- E. Do not install more insulation board than can be covered with membrane by the end of the day or onset of inclement weather.
- F. All joints and seams shall be a tight fit to prevent any gaps, voids, and surface irregularities.
- G. Prime surface of concrete deck with asphalt primer at rate of 3/4-gallon (2.84 liters) where applicable, of primer per 100 square feet (9.29 square meters) and allow primer to dry.
- H. Insulation Attachment with Mechanical Fasteners
 - 1. Secure insulation to deck using mechanical fasteners specifically designed and sized for attaching specified insulation to deck type shown. Fasten insulation over entire area of roofing at spacing as required by FM for specified windstorm resistance classification. Run long joints for insulation in continuous straight lines, perpendicular to roof slope with end joints staggered between rows.

2. Perform pull out tests for the SDR to verify deck conditions and actual pull out values prior to installation of the membrane.
3. Use fastener tools with a depth locator as recommended or supplied by the fastener manufacturer to ensure proper installation.

I. Insulation Attachment with Asphalt

1. Insulation shall be fully adhered to the deck with approved adhesives at a rate and pattern acceptable to Factory Mutual and membrane manufacturer's requirements for fastening rates and patterns. Run long joints for insulation in continuous straight lines, perpendicular to roof slope with end joints staggered between rows.
2. Perform pull out tests for the SDR to verify deck conditions and actual pull out values prior to installation of the membrane.

- J. Two-Layer Installation: Where overall insulation thickness is two (2"-inches, 51mm) or greater, install required thickness in two (2) layers staggered from joints of first layer a minimum of twelve (12"-inches, 305mm) each direction. Install second layer in full mopping of hot Type IV asphalt.

3.04 INSTALLATION OF MEMBRANE

- A. Install materials in accordance with manufacturer's instructions for the intended application.
- B. Surface of the insulation or overlay board shall be inspected prior to installation of the roof membrane. The insulation surface shall be clean and smooth with no excessive surface roughness, contaminated surfaces, or unsound surfaces such as broken or delaminated insulation boards.
- C. Membrane shall be installed per the membrane manufacturer's written installation procedures for an approved hot mopped system.
- D. During the course of the work, the entire roof area shall be kept clear of loose or spilled fasteners and metal scraps to guard against puncture of the membrane.

3.05 MEMBRANE FLASHINGS AND STRIPPING

- A. Substrate shall be smooth and free of all dirt and debris.
- B. Area to be flashed shall be primed as recommended by the manufacturer. Allow primer to dry so area is tack-free.
- C. Install SBS-modified bituminous flashing at cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof. Install one (1) ply of flashing sheet material by mopping substrate and back of flashing sheet with Type IV asphalt and embedding flashing solidly against substrate. Extend flashing a minimum of six (6"-inches, 152mm) onto SBS-modified bituminous sheet roofing.
- D. Install SBS-modified bituminous stripping where metal flanges are set on roofing. Install one (1) ply of SBS-modified bituminous stripping in a continuous mopping

to Type IV asphalt and extend stripping a minimum of six (6"-inches, 152mm) onto the roof membrane.

- E. The membrane flashing shall be applied from the low point of the roof to the high point so that all laps shed water. As the membrane flashing is being applied, it must be pressed firmly against the substrate to maximize the adhesion. Particular attention must be taken while the flashing is being installed to prevent possible tenting that is a result of stress put on the membrane when applied improperly.
- F. Projections and Extension Through the Roof: All pipes, vents, ducts, stacks, and openings shall be installed through the roof deck before the roofing is applied. No projections shall be constructed through the perimeter flashing.
- G. Pipe penetrations shall be flashed a minimum of eight (8"-inches, 203mm) above the roofing membrane, and terminate with a stainless steel hose clamp with sealant applied along the top edge. Factory fabricated pipe seals and roof membrane shall be welded as outlined. A buffer layer of membrane shall be installed between hose clamp and flashing sheet to avoid damage.
- H. Roof Drains: Set 30"-inch x 30"-inch (762mm x 762mm) lead flashing sheet in bed of roofing cement on completed modified bituminous roofing sheet. Cover lead sheet with modified bituminous stripping, with stripping extending a minimum of four (4"-inches, 102mm) beyond edge of lead flashing onto roof membrane. Clamp roof membrane, lead flashing, and stripping onto roof membrane.
- I. Install other accessories in accordance with manufacturer's instructions and National Roofing Contractor's Association (NRCA) construction details as applicable.

3.06 WALKWAY INSTALLATION

Walkways: Install walkway pads at location shown in Construction Documents. Hot-air weld along edges a minimum of 2"-inches (51mm) to substrate, and fully adhere walkway pads between welds to substrate with compatible adhesive according to roofing system manufacturer's written instruction. Corners of walkway are to be rounded and hot-air welded in accordance with manufacturer's written instruction.

3.07 TEMPORARY CUTOFF

- A. Flashing shall be installed concurrently with roof membrane in order to maintain a watertight condition as work progresses. When a break in the day's work occurs in the central area of the roof, temporary waterstop shall be constructed to provide a watertight seal.
 - 1. Waterstop shall be installed per manufacturer's recommendations unless otherwise specified per details shown on the Contract Documents.
 - 2. When work on new system is suspended, stagger of insulation joints shall be maintained by installing partial fillers. New membrane shall be carried into the waterstop.
 - 3. When work resumes, contaminated membrane, insulation fillers, etc., shall be removed from work area and disposed off-site. Do not use these materials in new work.

- B. If inclement weather occurs while a temporary waterstop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.

3.08 COMPLETION

- A. Prior to Contractor's request for final inspection by SDR, membrane manufacturer's technical consultant shall provide on-site inspection of installed roofing system.
 - 1. Membrane manufacturer shall provide Contractor and SDR with itemized list of defects or non-compliance with manufacturer's recommendations.
 - 2. Contractor shall immediately correct identified items. Complete corrections before request for final inspection from SDR.
- B. Prior to demobilization from site, work shall be inspected by SDR and Contractor.
 - 1. Itemize defects or non-compliance with these specifications or membrane manufacturer's recommendations in punch list.
 - 2. Contractor shall immediately correct identified items prior to demobilization, to satisfaction of SDR and membrane manufacturer.
- C. Upon completion of roof installation the Contractor shall install a metal sign (minimum size of 8"-inch x 10"-inch, 203mm x 254mm) at each roof entryway providing the following information:
 - 1. Contractor Company Name
 - 2. Membrane Manufacturer
 - 3. SNL Inspector Name
 - 4. Date of Installation

END OF SECTION