

# S.B.S. MODIFIED BITUMINOUS ROOFING

## SECTION 6 - PRIMARY MEMBRANE

### 6.1 GENERAL

- .1 Unless otherwise approved, S.B.S. modified bituminous primary membrane shall be comprised of a two ply primary membrane consisting of a base sheet and a cap sheet. All S.B.S. modified bituminous membrane components must be from the same manufacturer.
- .2 Modified bituminous membrane systems can be categorized as a conventional design (membrane applied above insulation), a protected membrane design (membrane applied below insulation) or a combination design (membrane applied between two insulation layers).
- .3 For all designs the modified bituminous membrane shall be uniformly adhered to and supported by an accepted substrate. The primary membrane shall be joined and sealed to the vapour retarder membrane extension at perimeters and penetrations.
- .4 Application a of modified bituminous roofing systems must not be undertaken when the air temperature at roof level is colder than -18°C and a wind velocity of more than 14.5 km/h, or an equivalent wind chill factor of 1300. Roofing systems components shall not be applied during periods of rain, snow or similar moisture conditions.

### 6.2 DESIGN CONSIDERATIONS

- .1 When developing a modified bituminous membrane system design, the design authority shall take the following items into consideration:

#### 6.2.1 Drainage Provision

- .1 The Warranty Certificate does not warrant the roof drainage system.
- .2 The Warranty Certificate covers the watertight integrity of the primary membrane and the seal of the roof flashing component, e.g. lead flashing, drain or scupper flange. The design authority shall ensure that the drainage system is designed in accordance with the governing Plumbing and Building Code to provide positive drainage and accommodate minimum roof drainage slopes as follows:
  - a) Minimum 1:100 (1/8"/ft.) for Conventional Membrane Designs.
  - b) Minimum 1:50 (1/4"/ft.) for Protected Membrane or Combination Designs.
- .3 Some isolated ponding water can be anticipated when drainage slope is provided.
- .4 ARCA Warranty Ltd. recommends that emergency or overflow drainage be incorporated into the roof drainage systems. The Warranty Certificate requires that emergency drainage be provided in designs using "flow control" type roof drains.
- .5 Splash pads shall be installed beneath drain outlets discharging water onto lower roofs to prevent the erosion of the membrane protection and damage to the primary membrane.

## 6.2.2 Roof Slope

- .1 Modified bituminous membrane base sheets may be adhered with hot bitumen when the roof slope is 1:6 (2"/ft.) or less. When the roof slope is 1:8 (1.5"/ft.) or less the primary membranes may run parallel or perpendicular to the roof slope.
- .2 Bitumen adhered modified bituminous membrane base sheets shall be mechanically fastened to nailers when roof slope is greater than 1:8 (1.5"/ft.). The primary membranes shall run parallel to the roof slope.
- .3 For insulated conventional roof designs, mechanically fastening of the membrane plies requires the installation of nailers. Please refer to Section 5, Insulation, Subsection 5.4, for the application standards for the spacing and installation of nailers.
- .4 A single ply of modified bituminous membrane cap sheet may be used when roof slope exceeds 1:16 (3/4"/ft.).
- .5 Protected membrane and combination designs do not require mechanical fastening of the primary membrane.

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## 6.2.3 Temporary Membrane

- .1 A minimum two (2) ply vapour retarder comprised of roofing felt adhered with hot bitumen may be used as a temporary membrane. A separator is required over wood decks and an auxiliary leveling surface is required over steel decks prior to application of the vapour retarder as a temporary membrane.
- .2 For two-stage construction, the installation of the vapour retarder membrane is the first stage. The vapour retarder membrane shall be inspected and repaired prior to the remaining roofing components being installed.
- .3 Un-insulated conventional and protected membrane designs do not qualify for two-stage construction.

## 6.3 MODIFIED BITUMINOUS ROOFING SYSTEMS COMPONENTS

### 6.3.1 Asphalt

- .1 When asphalt is the bitumen used to adhere modified bituminous base sheets, the asphalt shall be manufactured in compliance with CSA A123.4-98 and asphalt type is based on the roof slope as follows:
- |    |                |  |
|----|----------------|--|
| a) | Type 2 Asphalt | For slopes 1:12 (1"/ft.) and less            |
| b) | Type 3 Asphalt | For slopes 1:6 (2"/ft.) and less (*See Note) |

\*Note: Additional membrane fastening required when roof slope exceeds 1:8 (1.5"/ft.).

- .2 Bitumens must not be heated in excess of their Final Blowing Temperature, i.e. the temperature at which the bitumen was oxidized.
- .3 Equiviscous Temperature (EVT) is the recommended application temperature range for bitumen and shall be measured at the point of application. EVT is provided by the bitumen manufacturer and may differ with the bitumen type.

### 6.3.1 Asphalt Cont'd

- .4 Asphalt shall be applied over the substrate at its Equiviscous Temperature (E.V.T.) application range using an approximate application rate of 1.2 kg/m<sup>2</sup> (25 lbs/100 ft<sup>2</sup>). The asphalt may be applied by hand with a roofer's mop or mechanically applied with an asphalt applicator. The asphalt shall be applied with sufficient coverage to ensure full adhesion of the base sheet. For cold weather applications, the mopping distance between the hot asphalt and the base sheet roll shall not exceed 1000 mm (1 meter) at the point of application.

### 6.3.2 S.B.S. Modified Bituminous Membranes

- .1 Modified bituminous membranes shall comply with the requirements of CGSB 37-GP-56M. All modified bituminous membrane components shall be from the same manufacturer. When a Warranty Certificate is required, select the appropriate primary membrane system from the list of ARCA Warranty Ltd. accepted SBS modified bituminous systems.
- .2 To prevent moisture infiltration membrane rolls shall be covered during shipment and storage out of doors. Store rolls on end and on pallets above the roof/ground surface. Do not stack pallets to prevent damaging roll ends.

#### 6.3.2.1 Primary Membrane Base Sheets

- .1 Base sheet membranes may be polyester, fiberglass or composite reinforced with the top surface covered with plastic film or sanded.
- .2 Self-adhesive base sheet membranes shall be fabricated with intermittent adhesive strips on the underside. Full adhesive surface is not accepted for primary membrane application.

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#### 6.3.2.2 Primary Membrane Cap Sheets

- .1 Cap sheets may be smooth surfaced (for use in protected membrane and combination designs) or granular surface coated (for use in conventional designs). Cap sheets shall be polyester reinforced or shall contain polyester reinforcement.
- .2 Primary membrane cap sheets shall be thermally fused (torched) to the base sheet membrane. Asphalt is not accepted for adhering primary membrane cap sheets.

## 6.4 INSTALLATION

### 6.4.1 Primary Membrane Base Sheets

- .1 Primary membrane base sheets may be applied in an application of hot bitumen, mechanically fastened, torch adhered, or self-adhesive a.k.a. peel & stick (see 6.3.2.1.2). The use of cant strips at roof junctions is optional.
- .2 Primary membrane base sheets may be adhered with hot bitumen to wood fiberboard, fesco/perlite fiberboards, gypsum board, plywood, oriented strand board and concrete substrates. Primary membrane base sheets may be adhered to minimum 3 mm (3/16") thick asphalt core board with hot bitumen when polyisocyanurate insulation forms the primary insulation layer.

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#### 6.4.1 Primary Membrane Base Sheets Cont'd

- .3 Primary membrane base sheets may be torch adhered to concrete, gypsum board and asphalt core board substrates, where approved by ARCA Warranty Ltd.
- .4 For protected membrane designs, the base sheet maybe torch adhered or mopped in hot bitumen to a gypsum board auxiliary leveling surface attached to the structural deck.
- .5 Base sheet side and end laps may be sealed with hot asphalt or thermally fused with a torch. Base sheet side laps shall be a minimum 65 mm (2.5") wide with the end laps a minimum of 150 mm (6") wide. Stagger base sheet side and end laps a minimum distance of 300 mm (12") from adjacent laps.
- .6 When the application of the cap sheet does not follow the base sheet application within the same day, base sheet side and end laps shall be checked for proper adhesion and seal. The primary membrane base sheet shall not be left exposed for more than ninety (90) days.
- .7 Base sheet membranes shall be unrolled, permitted to relax and re-rolled prior to their application. Commence base sheet application at roof drains or at slope bottoms and install membrane rolls to shed water away from the side laps. When using hot asphalt, restrict bitumen bleed out at lap edges. During cold applications, base sheet membrane may be heated using a propane torch to soften the bitumen and aid adhesion.
- .8 When not bitumen adhered, base sheets shall terminate at the base of vertical projections or at the toe of the cant strip.
- .9 Bitumen adhered base sheets shall be turned up the vertical substrate and adhered with a mopping of hot bitumen at the perimeter of each self-contained roof section.
- .10 The bitumen adhered base sheet extension shall be anchored to the vertical substrate, except at the curbed roof penetrations, employing one of the following methods:
  - a) A continuous flat steel bar, 25 x 1.1 x 3048 mm long, minimum AZ 55 Galvalume coated, pre-punched with 7.0 mm diameter holes located 12.7 mm (1/2") from each end and at 150 mm (6") centres for the remainder of it's length. Minimum #14 corrosion resistant fasteners, appropriate for the vertical substrate, shall attach the bar. The bottom of each bar shall be located no higher than 25 mm (1") above the surface of the primary membrane base sheet.
  - b) When there is a reduced perimeter height, minimum 12.7 mm (1/2") primed plywood or 11mm (7/16") thick oriented strand board, extending above the surface of the primary membrane base sheet, shall completely cover the 75 mm (3") high base sheet extension and the vertical substrate. Minimum #14 corrosion resistant screws, spaced at maximum 300 mm (12") centres, shall uniformly attach both the sheathing and base sheet extension to the vertical substrate.
  - c) Corrosion resistant fifty (50) mm (2") diameter circular metal fastening plates and minimum #14 screws, approved by the membrane manufacturer, spaced at maximum 300 mm (12") centres are accepted substitutes. The bottom of the fastening plate shall be placed no lower than 25 mm (1") above the base sheet surface.
- .11 Nailing of base sheet extensions in any form is not permitted.

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#### 6.4.1 Primary Membrane Base Sheets Cont'd

- .12 The completed base sheet shall be inspected for defects and repaired prior to cap sheet application.
- .13 Self-adhesive primary base sheets may be applied to most substrates as per membrane manufacturer recommendations and instructions. Self-adhesive membranes are not to be applied to fiberboard substrates.

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#### 6.4.2 Primary Membrane Cap Sheets

- .1 Primary membrane cap sheets shall be thermally fused to the base sheet membrane with propane torches recommended by the membrane manufacturer. Begin cap sheet installation by centering a double-selvage edge starter roll centered over the roof drain centerline or at the bottom of the slope. When a starter roll is not available degranule side laps by embedding granules by heating and troweling in granules from a 75 mm (3") width along the non-selvage edge. Allow rolls to relax and re-roll granule side in, starting at the roll ends. Align prepared rolls and heat weld to the base sheet so a bead of bitumen is visible along the selvage edge as the cap sheet is applied.
- .2 At end laps cut underlying cap sheet selvage edge corners at 45° angle and trowel in granules for a minimum width of 150 mm (6") to form the end lap. All overlapping surfaces shall be de-granulated or granule free prior to torch adhering. Stagger cap sheet end and side laps a minimum distance of 300 mm (12") from the base sheet membrane laps. Check all lap edges for proper adhesion and seal. Terminate cap sheets at the base of vertical projections or at the toe of the cant strip when used.

#### 6.5 MEMBRANE LOAD PROTECTION

- .1 Under no circumstances shall any equipment load be supported directly on the surface of an unprotected primary membrane.
- .2 For roof mounted equipment exceeding 91 kg (200 lbs.) in mass or when roof loads exceed 5 kPa (105 PSF), they shall be supported on curbs, sleepers or pedestals attached to the structure or decking that extend a minimum distance of 200 mm (8") above the finished roof surface. Roof mounted equipment includes antennae, signs, service lines, skylights, hatches and walkways. For new construction where H.V.A.C. equipment is supported by pedestals, a minimum clearance of 762 mm (30") shall be provided beneath the equipment to permit installation of the roofing system. Equipment supports shall be designed by a structural engineer and shall conform to the Alberta Building Code.
- .3 Equipment loads maximum 91 Kg (200 lbs.) in mass, may be supported by free floating sleepers or support pads loose laid over the roofing system. Free floating sleepers shall be pressure preservative treated wood, pre-cast concrete, metal or specialty product. Free floating sleepers and pads shall be placed on a minimum 25 mm (1") thick layer of Type 4 insulation attached to the base of the supports without the use of mechanical fasteners. A ply of mineral surfaced cap sheet applied to the primary membrane may be substituted for the Type 4 insulation protection layer.
- .4 When guy wires are used to anchor roof mounted equipment, their anchorage points shall be waterproofed with 200 mm (8") high curbs or with gum boxes.

## 6.5 MEMBRANE LOAD PROTECTION Cont'd

- .5 H.V.A.C. units, skylights and hatches shall be supported by insulated metal or wooden curbs supported by and fastened to the structural deck to prevent displacement that extend a minimum distance of 200 mm (8") above the surface of the roofing system.
- .6 To protect the primary membrane from concrete paver and/or walkway damage, a minimum 25 mm (1") thick layer of Type 4 insulation shall be placed between the walkway/pavers and the S.B.S. cap sheet surface. Place the Type 4 insulation so that the roof drainage is free to flow under the pavers/walkway.

## 6.6 Accepted S.B.S. Modified Bituminous Membrane Systems

IKO	Spec No.	BASE PLY	CAP PLY
Uninsulated	1	Modiflex MF-95-FS or Roofcraft Base FR	Torchflex TP-180, TP-250 or Armourcool Granular
Insulated	2	Modiflex MF-95-FS or Roofcraft Base FR	Torchflex TP-180, TP-250 or Armourcool Granular
Protected Membrane	3	Modiflex MP 180	Torchflex TP-180, TP-250
Fast-N-Weld (mechanically fastened)	4	Fast-N-Stick 180 Base	Torchflex TP-180, TP-250 or Armourcool Granular

SOPREMA	Spec No.	BASE PLY	CAP PLY
Uninsulated  Colvent (Self-adhesive over approved substrates excluding fibreboard)	1	Soprabase FR or Elastophene PS Colvent 810	Sopralene Flam180 or 250 Gr. Soprastar Flam HD Gr Colvent Traffic Cap 860 Soprastar Flam HD Gr
Insulated	2	Elastophene PS or Soprabase FR or Xpress Board	Sopralene Flam180 or 250 Gr. Soprastar Flam HD Gr
Protected Membrane (mopped)	3	Elastophene 180	Elastophene (mopped with SEBS)
Protected Membrane (torched)	4	Sopralene Flam 180	Sopralene Flam 180 or 250
Single Ply Unilay (min. slope 3%) Torch seam only	5	N/A	Unilay 750
Soprafix (mechanically fastened)	6	Soprafix 630 (610 deleted March 23, 2011)	Traffic Cap 660 Soprastar Flam HD Gr.
Colvent (Self-adhesive over Colgrip A insulation)	7	Colvent 810	Colvent Traffic Cap 860 Soprastar Flam HD Gr.
Sopraply	8	Sopraply 510 or 520 Xpress Board	Sopraply Traffic Cap 560 Sopraply Cap 550 Soprastar Flam HD Gr.

<b>SIPLAST</b>	<b>Spec No.</b>	<b>BASE PLY</b>	<b>CAP PLY</b>
Uninsulated	1	Paradiene 20	Parafor 30 TG, 50 TG or Paradiene 30 CR FR TG (reflective cap)
Insulated	2	Paradiene 20 or Paradiene 20 TG	----- Parafor 30 TG
Protected Membrane (torched)	3	Paradiene 20 TG	----- Parafor 30 TG
Combination (mopped)	4	Paradiene 20	Paradiene 20 TG or Parafor 30 TG
Single Ply (min. slope 7%)	5	N/A	Paradiene 20 TG, 30 TG or Parafor 50 WS