Clemson Membrane Roofing Standards

Contents

MODIFIED BITUMEN: TWO-PLY SHEET ROOFING SYSTEM WITH INSULATION

1.01 Installation Requirements

A. Work of this section includes the vapor barrier (to be determined), insulation and a two-ply roof membrane system consisting of a modified bitumen base sheet followed by a granule surfaced, SBS modified bitumen cap sheet.

1. Two-ply SBS modified bitumen membrane flashings in a woven application is required.

2. Roof system attachment to the minimum 22 gage metal or concrete decks shall be in accordance with FM 1A-90 105 120 135 requirements as applicable for project.

   a. Provide a fully adhered vapor barrier (to be determined) and an adhered insulation assembly over concrete decks to meet wind resistance with increased adhesion at perimeters and corners as required.

   b. Mechanical fasteners shall extend through the bearing surface of the roof deck a minimum 3/4-inch. Fasteners shall not penetrate lower metal deck flute. Fasteners shall be in accordance with the requirements of FM Loss Prevention Data Sheets.

   c. Increased attachment shall be provided at perimeter and corners in accordance with structural drawings or equivalent FM/Miami-Dade requirements. Dimensional extents of perimeters and corners shall be as defined by the requirements of ASCE 7-22.

3. Minimum flashing height shall be 8 inches unless approved in writing prior to bid.

4. Base sheets shall be fully adhered in approved adhesive and cap sheet fully adhered in cold applied adhesive.

5. Roof membrane base sheet shall be fully adhered with an approved adhesive and cap sheet fully adhered with cold applied adhesive.

   a. Adhesive/mastic shall be equivalent to Soprema's Colply EF Adhesive, Johns Manville DynaSet 1K, or Siplast SFT Cement in low odor and low-VOC/no-VOC.

   b. Any other manufacturers/products shall be submitted as a substitution/variation request.

6. Cap sheet side laps and end laps shall be heat welded (not torched).

7. Cap sheet shall also have a reflectivity rating of 0.7 or greater by CRRC.

B. Install a two-ply vapor barrier using cold-applied adhesive (to be determined).

C. Roof Insulation assembly shall:

1. Provide a minimum 1.5-inch base layer and an average R-Value of 22 per roof area above the deck.

2. Based on slopes provided with decks, ensure roof areas have a positive slope for the primary and secondary slopes and provides positive drainage. See Tapered Roof Plan(s).

3. First layer of insulation shall be a minimum 1.5″ thick for all roof areas and sufficient to span metal deck openings.

4. Insulation shall adhere to wind and fire ratings specified.

5. Insulation shall be covered under roof warranty.

D. Work in this section also includes vapor barrier (to be determined) and roof insulation for the modified bitumen roof membrane system, associated components and accessories over the existing roof deck.

1. Structurally sloped (primary slope) roof decks:

    a. Provide added primary slope as indicated on the Tapered Roof Plan(s).

    b. Properly attach/secure layer of polyisocyanurate roof insulation to the roof deck.

        1) Gang screw attachment is not permitted on structurally sloped roof decks unless required by manufacturer to meet the specified wind uplift system rating.

    c. Provide secondary slope as indicated on the Tapered Roof Plan(s).

    d. For all roof areas/levels, provide overlay/coverboard minimum thickness of 1/4-inch modified, gypsum roof coverboard installed/secured to attain the specified wind/fire resistance.

    e. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer’s approved adhesive.

    f. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within ¼-inch tolerance in all directions.

2. Non-Structurally sloped roof decks:

    a. Provide tapered insulation to achieve primary slope as indicated on the Tapered Roof Plan(s).

b. Properly attach/secure each layer of polyisocyanurate roof insulation to the roof deck.

1) Gang screw attachment is not permitted on non-structurally sloped roof decks unless required by manufacturer to meet the specified wind uplift system rating.

c. Provide secondary slope as indicated on the Tapered Roof Plan(s).

d. For all roof areas/levels, provide overlay/coverboard minimum thickness of 1/4-inch modified, gypsum roof coverboard installed/secured to attain the specified wind/ fire resistance.

e. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer's approved adhesive.

f. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within ¼-inch tolerance in all directions.

E. Sheet metal flashings and accessories are required and shall meet ES-1..

1.02 Warranty

A. Contractor and manufacturer warranties shall be exclusive and independent of each other. Each warranty shall run directly to the Owner and be dated the substantial completion date or later.

B. Furnish contractor warranty for specific system as provided at the end of this section. In no event shall warranty period be less than three (3) years from the date of substantial completion of the work.

1. If the Contractor fails to perform repairs within seventy-two (72) hours of written notification, the warranty will not be voided because of work being performed by others to repair roofing regardless of manufacturer's warranty to the contrary.

C. Manufacturer's Warranty: Furnish the roof manufacturer's twenty (20) year, no dollar limit warranty to include the following:

1. The warranty shall cover all associated costs for the repair and/or replacement of defective materials of the roof system, including insulation.

2. The warranty shall provide that if within the warranty period the roof deteriorates, splits, weathers excessively or shows any other symptoms of failure, the complete corrective action shall be the responsibility of the manufacturer.

3. The warranty shall, as a minimum, include wind events up to 74 miles per hour.

1.03 Approved Manufacturers

A. Johns Manville

B. Soprema

C. Siplast

1.04 Description of Roofing System

A. SBS Modified Bitumen Two-Ply Roof System with two-ply woven base flashings and insulation.

B. Deck Type

1. Over the metal deck, provide the mechanically fastened base layer of insulation.

2. Over the nailable decks, provide mechanically fastened base sheet.

3. Over non-nailable decks, provide adhesive attachment/securement of insulation layers.

C. Substrate: Deck

D. Assembly

Components	Quantity
Base Sheet	One-Ply
Vapor Barrier (to be determined)	Two-Ply
Roof Insulations	As Specified
Adhesive/Mechanical Attachment (each layer)	As Specified
Overlay Board / Coverboard	As Specified
Adhesive	As Specified
SBS Modified Bitumen Base Sheet MB	1 ply
Manufacturer's Cold Adhesive	Per Manufacturer
SBS Modified Bitumen Cap Sheet RSS	1 ply
Manufacturer's Cold Adhesive	Per Manufacturer

1.05 Materials

A. Adhesive

1. Cold Process Adhesive:

a. Roof membrane manufacture's adhesive specifically intended for the use of roof membrane adhesive and compatible with roof system components.

b. Apply at rate in accordance with manufacturer's printed literature.

c. Adhesives shall adhere to all VOC limitations and requirements (no-VOC, low-VOC and least odor producing products).

2. Roof membrane base sheet shall be fully adhered in approved adhesive and cap sheet fully adhered in cold applied adhesive.

a. Adhesive/mastic shall be equivalent to Soprema's Colply EF Adhesive, Johns Manville DynaSet 1K, or Siplast SFT Cement in low odor and low-VOC/no-VOC.

b. Any other manufacturers/products shall be submitted as a substitution/variation request.

B. Vapor Barrier: (To Be Determined)

1. Manufacturer's recommended two-ply vapor barrier, bitumen-based.

a. Adhere to wind and fire ratings.

b. Include in warranty.

C. Roof Insulation: The following materials meeting the respective requirements, used as specified or required.

1. Polyisocyanurate Board: ASTM C 1289

a. Factory bonded between outer layers of felt, and maximum 4 feet x 8 feet in size for mechanically fastened applications and 4' by 4' in size for adhered applications, with minimum compressive strength of 20 p.s.i.

b. Polyisocyanurate board may be directly applied to metal and combustible roof decks, provided the board meets all fire-acceptable requirements specified in subparagraph "Fire Classification".

c. Maximum thickness is 2.2 inches, unless otherwise approved.

2. Coverboard:

a. Overlay: 3/4-inch perlite or 3/4-inch HD fiber board, 4'x4' maximum size.

1) Perlite Board: ASTM C 728, minimum 3/4 inch and adhere to wind and fire ratings.

2) High Density fiber board, ASTM C 208, minimum 3/4 inch and adhere to wind and fire ratings.

b. Use a coverboard in lieu the perlite or fiberboard overlay if required to attain the wind and fire ratings or warranty.

1) Minimum 1/4-inch thick, 4’x4’ for adhered applications, 4’x8’ for mechanically fastened applications.

2) Glass mat, modified gypsum roof board shall meet the minimum requirements of ASTM C 1177/C 1177M, flame spread – 0, smoke developed – 0, 500 psi Class A non-combustible, equal to Densdeck or Securock and compatible with manufacturer’s system products.

3. Tapered Roof Insulation

a. See Tapered Roof Plan(s) for requirements for primary and secondary slopes.

b. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified.

c. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes.

d. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

e. All roof areas shall have positive drainage.

4. Wood Nailers: Nailers for perimeter of roof and at penetrations and terminations are required, , and shall be the same thickness as the insulation in all locations.

5. Cants, Crickets and Tapered Edge Strips:

a. Fabricated of the same material as the insulation or rigid perlite board, ASTM C 728.

b. Cants shall have 4” vertical height.

c. Wood cants shall be used where indicated or noted on drawings.

D. Base Sheet:

1. Provide the manufacturer’s recommended base sheet over nailable and pourable decks.

E. Membrane Base Sheet Assembly:

1. One-ply modified bitumen base sheet installed in water shedding, shingle fashion with a maximum course exposure 34” unless approved in writing otherwise.

2. Base Sheet: SBS Modified Bitumen, ASTM D 6163, Type I or ASTM 6164, Type I. Minimum 80 mil thickness for each sheet.

F. Cap Sheet:

1. Granule surfaced-white or off-white in color.

2. ASTM D 6163, Type II or ASTM 6164, Type II 130 mils thick minimum.

3. Heat welded side and end laps (not torched).

4. External Class A, fire-rated sheet.

5. Protect modified bitumen roofing system from direct exposure to the weather with mineral roofing granules, factory applied and applied in field at side and end laps immediately after membrane is laid in bitumen.

6. Head laps of field cap sheet shall be hot air welded via use of a hot air welder robot (leister) modified for modified bitumen membrane use and roller. Torch use is not acceptable.

G. Accessories:

1. Flashing Materials

   a. Two-ply SBS modified Bitumen Flashing System (1^{st} ply same as base sheet assembly membrane, 2^{nd} ply same granular surfaced cap sheet membrane). Both plies, fully adhered in bitumen/adhesives.

   b. Side laps secured and sealed in accordance with manufacturer’s printed requirements.

2. Primer: ASTM D 41.

3. Asphalt Roof Cement: ASTM D 4586 / D 4586 M, Type II for vertical surfaces; Type I for horizontal surfaces and compatible with membrane system.

4. Granules: Broadcast into adhesive bleed-out. Use manufacturer’s granules to match cap sheet. Color white. Adhere to manufacturer’s printed requirements for other surfacing material.

5. Adhesive/Bitumen Coating: Use manufacturer’s field coating for bleed-out coverage. This is required especially where hot air welded side and head laps are performed.

6. Fasteners: Provide non-corrosive fasteners as recommended by the Modified Bitumen Sheet manufacturer's printed instructions and meeting the requirements of FM A/S4470.

   a. For felts, use fasteners driven through metal discs or one-piece composite fasteners with heads not less than one inch in diameter or one inch square with rounded or 45-degree tapered corners.

b. Masonry Walls and Vertical Surfaces:

1) Fasteners for Securing Felts, Modified Bitumen Sheets and Metal Items to Masonry Walls and Vertical Surfaces:

a) Hardened steel nails with flat heads, diamond shaped points and mechanically deformed shanks not less than one inch long.

b) Use power-driven fasteners only when approved in writing.

7. Metal Discs (Tin Caps):

a. Flat non-corrosive fasteners as recommended by the modified bitumen manufacturer's printed instructions and meeting the requirements of FM A/S4470; not less than 3 inches in diameter, when using screw type fasteners.

b. Discs shall be formed to prevent dishing or cupping.

8. Walkpads:

a. Walkways shall the manufacturer’s material and compatible with the modified bitumen sheet roofing installed as recommended by the modified bitumen sheet roofing manufacturer.

b. Provide walkpads at all ingress/egress points and all access panels to mechanical equipment, spaced 12 inches apart to ensure proper drainage.

c. Also provide beneath/below non-penetrating supports and splash pans on roofs.

9. Waterproof Underlayment:

a. To be installed beneath all sheet metal components and accessories.

b. Smooth surfaced, self-adhering, polymer modified membrane, ASTM D 1970 / D 1970 M, and compatible with roofing system.

MODIFIED BITUMEN: THREE PLY SHEET ROOFING SYSTEM WITH INSULATION

2.01 Installation Requirements

A. Work of this section includes the vapor barrier (to be determined), insulation and a three-ply roof membrane system consisting of two-ply shingle-fashioned modified bitumen base sheet assembly fully adhered followed by a granule-surfaced, SBS modified bitumen cap sheet fully adhered in the manufacturer's cold process adhesive.

1. Two-ply SBS modified bitumen membrane flashings in a woven application is required.

2. Roof system attachment to the minimum 22 gage metal and concrete decks shall be in accordance with FM 1A-90 105 120 135 requirements.

    a. Provide a fully adhered vapor barrier (to be determined) and an adhered insulation assembly over concrete decks to meet wind resistance with increased adhesion at perimeters and corners as required.

    b. Mechanical fasteners shall extend through the bearing surface of the roof deck a minimum 3/4-inch. Fasteners shall not penetrate lower metal deck flute. Fasteners shall be in accordance with the requirements of FM Loss Prevention Data Sheets.

    c. Increased attachment shall be provided at perimeter and corners in accordance with structural drawings or equivalent FM/Miami-Dade requirements. Dimensional extents of perimeters and corners shall be as defined by the requirements of ASCE 7-22.

3. Minimum flashing height shall be 8 inches unless approved in writing prior to bid.

4. Roof membrane base sheet shall be fully adhered using an approved adhesive and cap sheet fully adhered in cold applied adhesive.

    a. Adhesive/mastic shall be equivalent to Soprema's Colply EF Adhesive, Johns Manville DynaSet 1K, or Siplast SFT Cement in low odor and low-VOC/no-VOC.

    b. Any other manufacturers/products shall be submitted as a substitution/variation request.

5. Cap sheet side laps and end laps shall be heat welded (not torched).

6. Cap sheet shall also have a reflectivity rating of 0.7 or greater by CRRC.

B. Install a two-ply vapor barrier using cold-applied adhesive (to be determined).

C. Roof Insulation assembly shall:

1. Provide a minimum 1.5-inch base layer and an average R-Value of 22 per roof area above the deck.

2. Based on slopes provided with decks, ensure roof areas have a positive slope for the primary and secondary slopes and provides positive drainage. See Tapered Roof Plan(s).

3. First layer of insulation shall be a minimum 1.5" thick for all roof areas and sufficient to span metal deck openings.

4. Insulation shall adhere to wind and fire ratings specified.

5. Insulation shall be covered under roof warranty.

D. Work in this section also includes the vapor barrier (to be determined) and roof insulation for the modified bitumen roof membrane system, associated components and accessories over the existing roof deck.

1. Structurally sloped (primary slope) roof decks:

   a. Provide added primary slope as indicated on the Tapered Roof Plan(s).

   b. Properly attach/secure each layer of polyisocyanurate roof insulation to the roof deck.

      1) Gang screw attachment is not permitted on structurally sloped roof decks unless required by manufacturer to meet the specified wind uplift system rating.

   c. Provide secondary slope as indicated on the Tapered Roof Plan(s).

   d. For all roof areas/levels, provide overlay/coverboard minimum thickness of 1/4-inch modified, gypsum roof coverboard installed/secured to attain the specified wind/ fire resistance.

   e. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer's approved adhesive.

   f. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within 1/4-inch tolerance in all directions.

2. Non-Structurally sloped roof decks:

   a. Provide tapered insulation to achieve primary slope as indicated on the Tapered Roof Plan(s).

b. Properly attach/secure each layer of polyisocyanurate roof insulation to the roof deck.

1) Gang screw attachment is not permitted on non-structurally sloped roof decks unless required by manufacturer to meet the specified wind uplift system rating.

c. Provide secondary slope as indicated on the Tapered Roof Plan(s).

d. For all roof areas/levels, provide overlay/coverboard minimum thickness of 1/4-inch modified, gypsum roof coverboard installed/secured to attain the specified wind/ fire resistance.

e. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer's approved adhesive.

f. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within 1/4-inch tolerance in all directions.

E. Sheet metal flashings and accessories are required as specified and shall meet ES-1.

2.02 Warranty

A. Contractor and manufacturer warranties shall be exclusive and independent of each other. Each warranty shall run directly to the Owner and be dated the substantial completion date or later.

B. Furnish contractor warranty for specific system as provided at the end of this section. In no event shall warranty period be less than three (3) years from the date of substantial completion of the work.

1. If the Contractor fails to perform repairs within seventy-two (72) hours of written notification, the warranty will not be voided because of work being performed by others to repair roofing regardless of manufacturer's warranty to the contrary.

C. Manufacturer's Warranty: Furnish the roof manufacturer's twenty (20) year, no dollar limit warranty to include the following:

1. The warranty shall cover all associated costs for the repair and/or replacement of defective materials of the roof system, including insulation.

2. The warranty shall provide that if within the warranty period the roof deteriorates, splits, weathers excessively or shows any other symptoms of failure, the complete corrective action shall be the responsibility of the manufacturer.

3. The warranty shall, as a minimum, include wind events up to 74 miles per hour.

2.03 Approved Manufacturers

A. Johns Manville

B. Soprema

C. Siplast

2.04 Description of Roofing System

A. SBS Modified Bitumen Three-Ply Roof System with two-ply woven base flashings and insulation.

B. Deck Type

1. Over the metal deck, provide the mechanically fastened base layer of insulation.

2. Over the nailable decks, provide a mechanically fastened base sheet.

3. Over non-nailable decks, provide adhesive attachment/securement of insulation layers.

C. Substrate: Deck

D. Assembly

Components	Quantity
Base Sheet	One-Ply
Vapor Barrier (to be determined)	Two-Ply
Roof Insulations	As Specified
Mechanical Attachment (each layer)	As Specified
Overlay Board / Coverboard	As Specified
Adhesive	As Specified
SBS Modified Bitumen Base Sheet MB	2 ply
Manufacturer’s Cold Adhesive	Per Manufacturer
SBS Modified Bitumen Cap Sheet RSS	1 ply
Manufacturer’s Cold Adhesive	Per Manufacturer

2.05 Materials

A. Adhesive

1. Cold Process Adhesive:

a. Roof membrane manufacture’s adhesive specifically intended for the use of roof membrane adhesive and compatible with roof system components.

b. Apply at rate in accordance with manufacturer's printed literature.

c. Adhesives shall adhere to all VOC limitations and requirements (no-VOC, low-VOC and least odor producing products).

2. Roof membrane base sheet and cap sheet shall be fully adhered in approved adhesive and cap sheet fully adhered in cold applied adhesive.

a. Adhesive/mastic shall be equivalent to Soprema's Colply EF Adhesive, Johns Manville DynaSet 1K, or Siplast SFT Cement in low odor and low-VOC/no-VOC.

b. Any other manufacturers/products shall be submitted as a substitution/variation request.

B. Vapor Barrier (To Be Determined)

1. Manufacturer's recommended two-ply vapor barrier, bitumen-based.

a. Adhere to wind and fire ratings.

b. Include in warranty.

C. Roof Insulation: The following materials meeting the respective requirements, used as specified or required.

1. Polyisocyanurate Board: ASTM C 1289

a. Factory bonded between outer layers of felt, and maximum 4 feet x 8 feet in size for mechanically fastened applications and 4' by 4' in size for adhered applications, with minimum compressive strength of 20 p.s.i.

b. Polyisocyanurate board may be directly applied to metal and combustible roof decks, provided the board meets all fire-acceptable requirements specified in subparagraph "Fire Classification".

c. Maximum thickness is 2.2 inches, unless otherwise approved.

2. Coverboard

a. Overlay: 3/4-inch perlite or 3/4-inch HD fiber board, 4'x4' maximum size.

1) Perlite Board: ASTM C 728, minimum 3/4 inch and adhere to wind and fire ratings.

2) High Density fiber board, ASTM C 208, minimum 3/4 inch and adhere to wind and fire ratings.

b. Use a coverboard in lieu the perlite or fiberboard overlay if required to attain the wind and fire ratings or warranty.

1) Minimum 1/4-inch thick, 4'x4' for adhered applications, 4'x8' for mechanically fastened applications.

2) Glass mat, modified gypsum roof board shall meet the minimum requirements of ASTM C 1177/C 1177M, flame spread – 0, smoke developed – 0, 500 psi Class A non-combustible, equal to Densdeck or Securock and compatible with manufacturer's system products.

3. Tapered Roof Insulation

a. See Tapered Roof Plan(s) for requirements for primary and secondary slopes.

b. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified.

c. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes.

d. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

e. All roof areas shall have positive drainage.

4. Wood Nailers: Nailers for perimeter of roof and at penetrations and terminations are required and shall be the same thickness as the insulation in all locations.

5. Cants, Crickets and Tapered Edge Strips:

a. Fabricated of the same material as the insulation or rigid perlite board, ASTM C 728.

b. Cants shall have 4" vertical height.

c. Wood cants shall be used where indicated or noted on drawings.

D. Base Sheet:

1. Provide the manufacturer's recommended base sheet over nailable and pourable decks.

E. Membrane Base Sheet Assembly:

1. Two-ply, modified bitumen base sheet installed in watershedding, shingle fashion with a maximum course exposure 17" unless approved in writing otherwise.

2. Base Sheet: SBS Modified Bitumen, ASTM D 6163, Type I or ASTM 6164, Type I. Minimum 60 mil thickness for each sheet.

F. Cap Sheet:

1. Granule surfaced-white or off-white in color.

2. ASTM D 6163, Type II or ASTM 6164, Type II 130 mils thick minimum.

3. Heat welded side and end laps (not touched).

4. External Class A, fire-rated sheet.

5. Protect modified bitumen roofing system from direct exposure to the weather with mineral roofing granules, factory applied and applied in field at side and end laps immediately after membrane is laid in bitumen.

6. Head laps of field cap sheet shall be hot air welded via use of a hot air welder robot (leister) modified for modified bitumen membrane use and roller. Torch use is not acceptable.

G. Accessories

1. Flashing Materials

   a. Two-ply SBS modified Bitumen Flashing System (1^{st} ply same as base sheet assembly membrane, 2^{nd} ply same granular surfaced cap sheet membrane). Both plies, fully adhered in bitumen/adhesives.

   b. Side laps secured and sealed in accordance with manufacturer's printed requirements.

2. Primer: ASTM D 41.

3. Granules: Broadcast into adhesive bleed-out. Use manufacturer's granules to match cap sheet. Color white. Adhere to manufacturer's printed requirements for other surfacing material.

4. Adhesive/Bitumen Coating: Use manufacturer's field coating for bleed-out coverage. This is required especially where hot air welded side and head laps are performed.

5. Fasteners: Provide non-corrosive fasteners as recommended by the Modified Bitumen Sheet manufacturer's printed instructions and meeting the requirements of FM A/S4470.

   a. For felts, use fasteners driven through metal discs or one-piece composite fasteners with heads not less than one inch in diameter or one inch square with rounded or 45-degree tapered corners.

   b. Masonry Walls and Vertical Surfaces:

      1) Fasteners for Securing Felts, Modified Bitumen Sheets and Metal Items to Masonry Walls and Vertical Surfaces:

a) Hardened steel nails with flat heads, diamond shaped points and mechanically deformed shanks not less than one inch long.

b) Use power-driven fasteners only when approved in writing.

6. Metal Discs (Tin Caps):

a. Flat non-corrosive fasteners as recommended by the modified bitumen manufacturer's printed instructions and meeting the requirements of FM A/S4470; not less than 3 inches in diameter, when using screw type fasteners.

b. Discs shall be formed to prevent dishing or cupping.

7. Walkpads:

a. Walkways shall the manufacturer’s material and compatible with the modified bitumen sheet roofing installed as recommended by the modified bitumen sheet roofing manufacturer.

b. Provide walkpads at all ingress/egress points and all access panels to mechanical equipment, spaced 12 inches apart to ensure proper drainage.

c. Also provide beneath/below non-penetrating supports and splash pans on roofs.

8. Waterproof Underlayment

a. To be installed beneath all sheet metal components and accessories.

b. Smooth surfaced, self-adhering, polymer modified membrane, ASTM D 1970

THERMOPLASTIC (TP) SHEET ROOFING SYSTEM WITH INSULATION FOR MECHANICALLY FASTENED APPLICATIONS

3.01 Installation Requirements

A. Work of this section includes a mechanically fastened, white, thermoplastic reinforced single ply membrane.

1. Sheet shall also have a reflectivity rating of 0.7 or greater by CRRC, and an SRI rating of 78 or greater.

2. Prefabricated accessories shall be used for available penetrations and all interior/exterior corners.

3. Polymer clad metal shall be used for all edge metals, scuppers, and penetrations.

4. Base flashings shall be fully adhered to vertical substrates and sealed at top edge.

5. Minimum flashing height shall be 8 inches unless approved in writing prior to bid.

B. For conventional low-sloped roof areas:

1. Roof system attachment to the minimum 22 gage metal shall be in accordance with FM 1A-[90] [105] [120] [135] requirements as applicable.

2. Mechanical fasteners shall extend through the bearing surface of the roof deck a minimum 3/4-inch. Fasteners shall not penetrate lower metal deck flute. Fasteners shall be in accordance with the requirements of FM Loss Prevention Data Sheets.

3. Increased attachment shall be provided at perimeter and corners in accordance with structural drawings or equivalent FM/Miami-Dade requirements. Dimensional extents of perimeters and corners shall be as defined by the requirements of ASCE 7-22.

4. Provide a minimum 1/4-inch (1/2-inch) thick coverboard equivalent to Densdeck or Securock.

5. Mechanically fastened, thermoplastic (TP) single ply roof system with required half sheets to meet wind resistance requirements.

C. Roof Insulation assembly shall:

1. Provide a minimum R-Value of 22 above the deck per roof

   area. OR

2. Provide a U-Value of .05 (R=25) for the total assembly per roof area.

3. Based on slopes provided with decks, ensure roof areas have a positive slope for primary and secondary slopes and provides positive drainage. See Tapered Roof Plan(s).
4. First layer of insulation shall be a minimum 1.5 inches thick and sufficient to span metal deck openings.

5. Adhere to wind and fire ratings specified.

6. Insulation shall be included under the roof warranty.

7. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer's approved adhesive.

8. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within 1/4-inch tolerance in all directions. See Section 06 10 00 Rough Carpentry for specific rough carpentry requirements.

3.02 Warranty

A. Contractor's Warranty

1. Contractor and manufacturer warranties shall be exclusive and independent of each other. Each warranty shall run directly to the Owner and be dated the substantial completion date or later.

2. Furnish contractor warranty for specific system as provided at the end of this section. In no event shall warranty period be less than three (3) years from the date of substantial completion of the work.

    1. If the Contractor fails to perform repairs within seventy-two (72) hours of written notification, the warranty will not be voided because of work being performed by others to repair roofing regardless of manufacturer's warranty to the contrary.

B. Manufacturer's Warranty

Furnish the roof manufacturer's twenty (20) year, no dollar limit system warranty to include the following:

1. The warranty shall cover all associated costs for the repair and/or replacement of defective materials of the roof system, including insulation, adhesives and all other roofing components supplied or approved by the roofing manufacturer.

2. The warranty shall provide that if within the warranty period the roof deteriorates, splits, weathers excessively or shows any other symptoms of failure, the complete corrective action shall be the responsibility of the manufacturer.

3. The warranty shall include minimum wind events up to 74 miles per hour.

4. Warranty shall cover the membrane maintaining 75 percent of its reflectivity (white color) after 3 years without cleaning/maintenance.

3.03 Approved Systems:

1. Carlisle SynTec, Sure-Flex (PVC/KEE Blend), .050-inch thickness, mechanically fastened system.

2. Carlisle SynTec, Sure-Flex Fleece Backed (PVC), .060-inch thickness, minimum (.055-inch fleece backing), meeting ASTM D 4434, Type II.

3. Fibertite (KEE), .045-inch thickness, mechanically fastened system), meeting ASTM D 6754.

4. Sarnafil Inc. S327 (PVC),.060 thickness, mechanically fastened system, meeting ASTM D 4434, Type II.

ROOF REPLACEMENT THERMOPLASTIC (TP) SHEET ROOFING SYSTEM WITH INSULATION FOR FULLY ADHERED APPLICATIONS

4.01 Installation Requirements

A. Work of this section includes a fully adhered, white, thermoplastic reinforced single ply membrane.

1. Sheet shall also have a reflectivity rating of 0.7 or greater by CRRC, and an SRI rating of 78 or greater.

2. Prefabricated accessories shall be used for available penetrations and all interior/exterior corners.

3. Polymer clad metal shall be used for all edge metals, scuppers, and penetrations.

4. Base flashings shall be fully adhered to vertical substrates and sealed at top edge.

5. Minimum flashing height shall be 8 inches unless approved in writing prior to bid.

B. For conventional low-sloped roof areas:

1. Roof system attachment to the minimum 22 gage metal shall be in accordance with FM 1A- [90] [105] [120] [135] requirements as applicable for project.

2. Mechanical fasteners shall extend through the bearing surface of the roof deck a minimum 3/4-inch. Fasteners shall not penetrate lower metal deck flute. Fasteners shall be in accordance with the requirements of FM Loss Prevention Data Sheets.

3. Adhesive patterns for the insulation shall be used for insulation to deck and insulation to insulation attachment.

4. Increased attachment shall be provided at perimeter and corners in accordance with structural drawings or equivalent FM/Miami-Dade requirements. Dimensional extents of perimeters and corners shall be as defined by the requirements of ASCE 7-22.

5. Fully adhered, thermoplastic (TP) single ply roof system with required half sheets to meet wind resistance requirements.

6. Provide a minimum 1/4-inch thick coverboard equivalent to Densdeck or Securock.

C. Roof Insulation assembly shall:

1. Provide a minimum R-Value of 22 above the deck per roof

   area. OR

2. Provide a U-Value of .05 (R=25) for the total assembly per roof area.

3. Based on slopes provided with decks, ensure roof areas have a positive slope for

primary and secondary slopes and provides positive drainage. See Tapered Roof Plan(s).

4. First layer of insulation shall be a minimum 1.5 inches thick and sufficient to span metal deck openings.

5. Adhere to wind and fire ratings specified.

6. Insulation shall be included under the roof warranty.

7. Secondary slopes shall have a start thickness no greater than 1/8-inch. Where tapered polyisocyanurate insulation is used, provide a tapered edge strip at the starting edge of the cricket to ensure start thickness is as required. Install tapered edge strips in manufacturer's approved adhesive.

8. Insulation thickness shall be coordinated for wood nailer thickness and adjacent boards within 1/4-inch tolerance in all directions. See Section 06 10 00 Rough Carpentry for specific rough carpentry requirements.

4.02 Warranty

A. Contractor's Warranty

1. Contractor and manufacturer warranties shall be exclusive and independent of each other. Each warranty shall run directly to the Owner and be dated the substantial completion date or later.

2. Furnish contractor warranty for specific system as provided at the end of this section. In no event shall warranty period be less than three (3) years from the date of substantial completion of the work.

   a. If the Contractor fails to perform repairs within seventy-two (72) hours of written notification, the warranty will not be voided because of work being performed by others to repair roofing regardless of manufacturer's warranty to the contrary.

B. Manufacturer's Warranty:

Furnish the roof manufacturer's twenty (20) year, no dollar limit system warranty to include the following:

1. The warranty shall cover all associated costs for the repair and/or replacement of defective materials of the roof system, including insulation, adhesives and all other roofing components supplied or approved by the roofing manufacturer.

2. The warranty shall provide that if within the warranty period the roof deteriorates, splits, weathers excessively or shows any other symptoms of failure, the complete corrective action shall be the responsibility of the manufacturer.

3. The warranty shall as a minimum include wind events up to 74 miles per hour.

4. Warranty shall cover the membrane maintaining 75 percent of its reflectivity (white color) after 3 years without cleaning/maintenance.

4.03 Approved Systems

1. Carlisle SynTec, Sure-Weld Fleece Backed (TPO), .080-inch thickness, minimum (.055 inch fleece backing).

2. Carlisle SynTec, Sure-Flex Fleece Backed (PVC), .060-inch thickness, minimum (.055 inch fleece backing), meeting ASTM D 4434, Type II.

3. Fibertite, SM Fleece Backed (KEE), .045-inch thickness, minimum (.055 inch fleece backing), meeting ASTM D 6754.

4. Sarnafil Inc., G410 Felt Backed (PVC), .060 inch thickness, minimum (.055 inch felt backing), meeting ASTM D 4434, Type II.

APPENDIX A: Warranty AFIDAVIT

MEMBRANE ROOF WARRANTY AFIDAVIT

WHEREAS,____of

(Address)____

_______________, Telephone:__________________________herein called the "Roofing Contractor", has performed roofing work on the following project:

Owner:____

Address:____

____, Telephone:_________________________

Name and Type of Building:____

Address:____

Area of Work:____

Date of Acceptance:____

Guarantee Period: Three Years Date of Expiration: ___________________________________

AND WHEREAS, the Roofing Contractor has contracted to warrant said work against leaks and faulty or defective materials and workmanship for the designated Guarantee Period; NOW, THEREFORE, the Roofing Contractor hereby warrants, subject to the terms and conditions herein set forth, that during the 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 watertight condition.

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

1. Warranty covers only repairs made by contractor to said roof under this contract and does not cover work by others or future defects not directly attributable to work performed.

2. Specifically excluded from this Warranty are damages to the work, other parts of the building and building contents caused by: a) lightning, windstorm, hailstorm, and other unusual phenomena of the elements; b) fire c) failure of the roofing system substrate including cracking, but excluding hairline cracking, settlement, excessive deflection, deterioration, and decomposition; d) faulty construction of parapet walls, copings, vents, equipment supports, and other edge conditions and penetrations not included in the project;

3. repeated vapor condensation on the bottom of roofing; and f) activity on the roofing by others including construction contractors, maintenance personnel, other persons, and animals whether authorized or unauthorized by Owner. When the work has been damaged by any of the foregoing causes, the Warranty shall be null and void until such damage has been repaired by the Owner or by another responsible party so designated.

4. The Roofing Contractor is responsible for damages to work covered by this Warranty.

5. During the Warranty Period, if the Owner allows alteration of the work by anyone other than the Roofing Contractor, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Warranty shall become null and void upon the date of said alterations, but only to extent said alterations affect work covered by this Warranty. If the Owner engages the Roofing Contractor to perform said alterations, the Warranty shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified Owner in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the work, thereby reasonably justifying a termination of this Warranty.

6. During the Warranty Period, if the original use of the roof is changed and it becomes used for but was not originally specified for other use or service more severe than originally specified, this Warranty shall become null and void upon the date of the said change, but only to the extent said change affects work covered by this Warranty.

7. The Owner shall promptly notify the Roofing Contractor of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect the work, and to examine the evidence of such leaks, defects or deterioration.

8. Contractor will promptly inspect reported leaks and if found to be attributed to work performed, make the required repairs.

   a. If leaks are found to be from other sources, contractor shall so inform owner and make the needed repairs. There will be no charge for this service call.

   b. Future service calls and leak repairs not attributed to contractor’s work will be for Owner's account. Cost of repairs will be at a fair and reasonable rate. Materials required will be at cost plus 15%.

9. This Warranty is recognized to be the only warranty of Roofing Contractor on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to him in cases of Roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Contractor of his responsibility for performance of the original work, regardless of whether Contract was a contract directly with Owner, or a subcontract with Owner's General Contractor.

IN WITNESS WHEREOF, this instrument has been duly executed this ___ day of___________, 20___.

Roofing Contractor's Signature:____

Typed Name:____

As Its (position):____

Date:____