

**SECTION 075216 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING**

**PART 1 - GENERAL**  
1.01 SUMMARY  
A. Section Includes:  
1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.  
2. Roof insulation.  
1.02 DEFINITIONS  
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.  
1.03 PREINSTALLATION MEETINGS  
A. Preinstallation Meeting Conference: Conduct conference at Project site.  
1.04 ACTION SUBMITTALS  
A. Product Data: For each type of product.  
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.  
1.05 INFORMATIONAL SUBMITTALS  
A. Research/Evaluation Reports: For components of membrane roofing system, from ICC-ES.  
B. Sample Warranties: For manufacturer's special warranties.  
1.06 CLOSEOUT SUBMITTALS  
A. Maintenance Data: For roofing system to include in maintenance manuals.  
1.07 QUALITY ASSURANCE  
A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.  
1.08 WARRANTY  
A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.  
1. Warranty Period: 10 years from date of Substantial Completion.  
2.01 MANUFACTURERS  
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
1. CertainTeed Corporation.  
2. Carlisle SynTec Incorporated.  
3. GAF Materials Corporation.  
4. Firestone Building Products.  
5. Henry Company.  
6. Johns Manville.  
7. Spilast, Inc.  
8. Tapered Insulation: Provide factory-lapped insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.  
9. Tranco Incorporated.  
B. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.  
2.02 PERFORMANCE REQUIREMENTS  
A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.  
B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.  
C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:  
1. Corner Uplift Pressure: 45 lbf/sq. ft.  
2. Perimeter Uplift Pressure: 30 lbf/sq. ft.  
3. Field-of-Roof Uplift Pressure: 20 lbf/sq. ft.  
D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.  
E. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.  
F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.  
G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.  
2.03 ROOFING SHEET MATERIALS  
A. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft.  
B. Glass-Fiber Base-Ply Sheet: ASTM D 2172, Type VI, asphalt-impregnated, glass-fiber felt.  
C. Roofing Membrane Sheet: ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers); smooth surfaced; suitable for application method specified.  
D. Granule-Surfaced Roofing Sheet: ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers); granule surfaced; suitable for application method specified, and as follows:  
1. Granule Color: White.  
2.04 BASE FLASHING SHEET MATERIALS  
A. Backer Sheet: ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers); smooth surfaced; suitable for application method specified.  
B. Granule-Surfaced Flashing Sheet: ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers); granule surfaced; suitable for application method specified, and as follows:  
1. Granule Color: White.  
2.05 AUXILIARY ROOFING MATERIALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
B. Asphalt Primer: ASTM D 4141, 41M.  
C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.  
D. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.  
E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.  
F. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, color to match roofing.  
2.06 SUBSTRATE BOARDS  
A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch thick.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia Pacific Corporation; Dens Deck DuraGuard.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.  
2.07 ROOF INSULATION  
A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.  
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
a. Atlas Roofing Corporation.  
b. Carlisle SynTec Incorporated.  
c. Dyplast Products.  
d. Firestone Building Products.  
e. GAF Materials Corporation.  
f. Hunter Panels.  
g. Firestone Building Products.  
h. Johns Manville.  
B. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.  
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
a. GAF Materials Corporation.  
b. Johns Manville.  
C. Tapered Insulation: Provide factory-lapped insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.  
D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.  
2.08 INSULATION ACCESSORIES  
A. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.  
CB. Over Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 5/8 inch thick, factory primed.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia Pacific Corporation; Dens Deck Prime.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
2.09 WALKWAYS  
A. Walkway Pads: Reinforced asphaltic composition pads with slip-resisting mineral-granule surface, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2 inch thick, minimum.  
PART 3 - EXECUTION  
3.01 INSTALLATION, GENERAL  
A. Comply with roofing system manufacturer's written instructions.  
B. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.  
3.02 SUBSTRATE BOARD INSTALLATION  
A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.  
1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions.  
3.03 INSULATION INSTALLATION  
A. Nailer Strips: Mechanically fasten 4-inch nominal-width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:  
1. 16 feet apart for roof slopes greater than 1 inch per 12 inches but less than 3 inches per 12 inches.  
2. 48 inches apart for roof slopes greater than 3 inches per 12 inches.  
B. Install tapered insulation under area of roofing to conform to slopes indicated.  
C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.  
1. First Layer Thickness:  
a. Polyisocyanurate Board:  
1) Concrete Roof Deck - 1 inch.  
2) Steel Roof Deck - Wide Rib - 1.5 inches.  
3) Wood Roof Deck - 2 inches.  
b. Perlite Board:  
1) Concrete Roof Deck - 1 inch.  
2) Steel Roof Deck - Wide Rib - 1.5 inches.  
3) Wood Roof Deck - 2 inches.  
D. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.  
E. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:  
1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal/100 sq. ft., and allow primer to dry.  
2. Set each layer of insulation in a solid mopping of hot roofing asphalt.  
3. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.  
F. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together. Tape joints if required by roofing system manufacturer.  
1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.  
2. Apply hot roofing asphalt to underside, and immediately bond cover board to substrate.

**SECTION 075216 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING (CONTINUED)**

3.04 ROOFING INSTALLATION  
A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMANRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:  
1. Deck Type: As indicated on Drawings.  
2. Adhering Method: M (mopped).  
3. Number of Glass-Fiber Base-Ply Sheets: Two.  
4. Number of SBS-Modified Asphalt Sheets: One.  
5. Surfacing Type: JM (mineral-granule-surfaced cap sheet).  
B. Where roof slope exceeds 1/2 inch per 12 inches, install roofing membrane sheets parallel with slope.  
C. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.  
D. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2 inches and 6 inches, respectively.  
E. Install lapped base-sheet course, extending sheet over and terminating beyond eaves. Attach base sheet as follows:  
1. Adhere to substrate in a solid mopping of hot roofing asphalt.  
F. Install glass-fiber base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Extend sheets over and terminate beyond eaves.  
1. Embed each glass-fiber base-ply sheet in a continuous void-free mopping of hot roofing asphalt to form a uniform membrane without glass fibers base-ply sheets touching.  
G. Install modified bituminous roofing sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond eaves.  
H. Unroll roofing sheets and allow them to relax for minimum time period required by manufacturer.  
I. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.  
J. Repair tears and voids in laps and lapped seams not completely sealed.  
1. Install roofing sheets so side and end laps shed water.  
K. Aggregate Surfacing: After installing and testing roofing, base flashing, and stripping, promptly apply flood coat to roof surface with 60 lb/100 sq. ft. of hot roofing asphalt. While flood coat is hot and fluid, cast the following average weight of aggregate in a uniform course:  
1. Aggregate Weight: 60 lb/100 sq. ft.  
3.05 FLASHING AND STRIPPING INSTALLATION  
A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions.  
B. Extend base flashing up wall or parapet a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.  
C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.  
D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.  
E. Roof Drains: Set 1/2"-to-3/8"-inch metal flashing in bed of asphaltic adhesive on completed roofing membrane. Cover metal flashing with roofing cap-sheet stripping, and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.  
3.06 WALKWAY INSTALLATION  
A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard products as tested by walkway pad manufacturer's written instructions.  
END OF SECTION

**SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING**

**PART 1 - GENERAL**  
1.01 SUMMARY  
A. Section Includes:  
1. Adhered thermoplastic polyolefin (TPO) roofing system.  
2. Roof insulation.  
1.02 DEFINITIONS  
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.  
1.3 ACTION SUBMITTALS  
A. Product Data: For each type of product.  
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.  
1.4 INFORMATIONAL SUBMITTALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
1.5 CLOSEOUT SUBMITTALS  
A. Maintenance Data: For roofing system to include in maintenance manuals.  
1.6 QUALITY ASSURANCE  
A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.  
1.7 WARRANTY  
A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within Owner specified warranty period.  
2.01 MANUFACTURERS  
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
1. Carlisle SynTec Incorporated.  
2. Firestone Building Products.  
3. GAF Materials Corporation.  
4. Johns Manville.  
5. Versico Incorporated.  
B. Source Limitations: Obtain components including fasteners for roofing system from manufacturer approved by membrane roofing manufacturer.  
2.2 PERFORMANCE REQUIREMENTS  
A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.  
B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.  
C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:  
1. Corner Uplift Pressure: 45 lbf/sq. ft.  
2. Perimeter Uplift Pressure: 30 lbf/sq. ft.  
3. Field-of-Roof Uplift Pressure: 20 lbf/sq. ft.  
D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.  
2.3 TPO ROOFING  
A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.  
1. Thickness: 60 mils (1.5 mm), nominal.  
2. Exposed Face Color: White.  
2.4 AUXILIARY ROOFING MATERIALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.  
B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.  
C. Bonding Adhesive: Manufacturer's standard.  
D. Slip Sheet: Manufacturer's standard.  
E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.  
F. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.  
2.5 SUBSTRATE BOARDS  
A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch (16 mm) thick.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia-Pacific Corporation; Dens Deck DuraGuard.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.  
2.6 ROOF INSULATION  
A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 felt or glass-fiber mat facer on both major surfaces.  
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
a. Atlas Roofing Corporation.  
b. Carlisle SynTec Incorporated.  
c. Dyplast Products.  
d. Firestone Building Products.  
e. GAF Materials Corporation.  
f. Hunter Panels.  
g. Firestone Building Products.  
h. Johns Manville.  
B. Tapered Insulation: Provide factory-lapped insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.  
2.7 INSULATION ACCESSORIES  
A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.  
B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia-Pacific Corporation; Dens Deck DuraGuard.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
2.8 ASPHALT MATERIALS  
A. Roofing Asphalt: ASTM D 312, Type III or Type IV [ASTM D 6152, SBSB modified].  
B. Asphalt Primer: ASTM D 4141/41M.

**SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING (CONTINUED)**

**PART 3 - EXECUTION**  
3.1 ROOFING INSTALLATION, GENERAL  
A. Install roofing system according to roofing system manufacturer's written instructions.  
B. Complete termination and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.  
C. Adhered roofing and auxiliary materials to lie in an existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.  
3.2 SUBSTRATE BOARD INSTALLATION  
A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.  
1. Fasten substrate board to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions.  
3.3 INSULATION INSTALLATION  
A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.  
B. Install tapered insulation under area of roofing to conform to slopes indicated.  
C. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to substrate using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to substrate type.  
1. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.  
2. Set each subsequent layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.  
3.4 ADHERED ROOFING INSTALLATION  
A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before installing.  
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.  
C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.  
D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.  
E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.  
1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal joint edges of sheet.  
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.  
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.  
F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.  
3.5 BASE FLASHING INSTALLATION  
A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.  
E. Roof Drains: Set 1/2"-to-3/8"-inch metal flashing in bed of asphaltic adhesive on completed roofing membrane. Cover metal flashing with roofing cap-sheet stripping, and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.  
3.06 WALKWAY INSTALLATION  
A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard products as tested by walkway pad manufacturer's written instructions.  
END OF SECTION

**SECTION 076200 - SHEET METAL FLASHING AND TRIM**

**PART 1 - GENERAL**  
1.01 SUMMARY  
A. Section Includes:  
1. Flashing and trim.  
2. Roof insulation.  
1.02 DEFINITIONS  
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.  
1.3 ACTION SUBMITTALS  
A. Product Data: For each type of product.  
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.  
1.4 INFORMATIONAL SUBMITTALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
1.5 CLOSEOUT SUBMITTALS  
A. Maintenance Data: For roofing system to include in maintenance manuals.  
1.6 QUALITY ASSURANCE  
A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.  
1. For copings and roof edge flashings that are SPIR E-1 tested, shop metal shall be listed as able to fabricate required details as tested and approved.  
1.7 WARRANTY  
A. Special Warranty: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.  
1. Finish Warranty Period: 10 years from date of Substantial Completion.  
2.01 MANUFACTURERS  
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
1. Carlisle SynTec Incorporated.  
2. Firestone Building Products.  
3. GAF Materials Corporation.  
4. Johns Manville.  
5. Versico Incorporated.  
B. Source Limitations: Obtain components including fasteners for roofing system from manufacturer approved by membrane roofing manufacturer.  
2.2 PERFORMANCE REQUIREMENTS  
A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.  
B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.  
C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:  
1. Corner Uplift Pressure: 45 lbf/sq. ft.  
2. Perimeter Uplift Pressure: 30 lbf/sq. ft.  
3. Field-of-Roof Uplift Pressure: 20 lbf/sq. ft.  
D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.  
2.3 TPO ROOFING  
A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.  
1. Thickness: 60 mils (1.5 mm), nominal.  
2. Exposed Face Color: White.  
2.4 AUXILIARY ROOFING MATERIALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.  
B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.  
C. Bonding Adhesive: Manufacturer's standard.  
D. Slip Sheet: Manufacturer's standard.  
E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.  
F. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.  
2.5 SUBSTRATE BOARDS  
A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch (16 mm) thick.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia-Pacific Corporation; Dens Deck DuraGuard.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.  
2.6 ROOF INSULATION  
A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 felt or glass-fiber mat facer on both major surfaces.  
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
a. Atlas Roofing Corporation.  
b. Carlisle SynTec Incorporated.  
c. Dyplast Products.  
d. Firestone Building Products.  
e. GAF Materials Corporation.  
f. Hunter Panels.  
g. Firestone Building Products.  
h. Johns Manville.  
B. Tapered Insulation: Provide factory-lapped insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.  
2.7 INSULATION ACCESSORIES  
A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.  
B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.  
1. Products: Subject to compliance with requirements, provide one of the following:  
a. CertainTeed Corporation; GlasRoc Sheathing Type X.  
b. Georgia-Pacific Corporation; Dens Deck DuraGuard.  
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.  
d. Temple-Inland, Inc.; GreenGlass Exterior Sheathing.  
e. USG Corporation; Securock Glass Mat Roof Board.  
2.8 ASPHALT MATERIALS  
A. Roofing Asphalt: ASTM D 312, Type III or Type IV [ASTM D 6152, SBSB modified].  
B. Asphalt Primer: ASTM D 4141/41M.

**SECTION 076200 - SHEET METAL FLASHING AND TRIM (CONTINUED)**

2. Used lapped expansion joints only where indicated on Drawings.  
C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.  
D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.  
E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.  
F. Seams: Fabricate nonwelding seams with flat-lock seams. Tin edges to be sealed, form seams, and solder.  
G. Seams: Fabricate nonwelding seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.  
2.6 WALL SHEET METAL FABRICATIONS  
A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm)-high, end dams. Fabricate from the following materials:  
1. Stainless Steel: 0.016 inch (0.40 mm) thick.  
PART 3 - EXECUTION  
3.1 UNDERLAYMENT INSTALLATION  
A. As indicated in drawings and required by manufacturer.  
3.2 INSTALLATION, GENERAL  
A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, sealants, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.  
1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.  
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.  
3. Splice seams not more than 12 inches (300 mm) apart. Attach each seam with at least two fasteners. Bend tabs over fasteners.  
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.  
5. Torch cutting of sheet metal flashing and trim is not permitted.  
6. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.  
1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or ferrous construction.  
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.  
3. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 078200 "Joint Sealants."  
G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-ink edges of sheets with solder to achieve maximum pull-out resistance.  
H. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.  
I. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.  
J. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.  
K. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.  
3.6 PROTECTING AND CLEANING  
A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.  
B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.  
C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.  
END OF SECTION

**SECTION 076320 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING**

**PART 1 - GENERAL**  
1.01 SUMMARY  
A. Section Includes:  
1. Roof insulation.  
2. Roof flashing.  
1.02 DEFINITIONS  
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.  
1.3 ACTION SUBMITTALS  
A. Product Data: For each type of product.  
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.  
1.4 INFORMATIONAL SUBMITTALS  
A. Sample Warranties: For manufacturer's special warranties.  
1.5 CLOSEOUT SUBMITTALS  
A. Maintenance Data: For roofing system to include in maintenance manuals.  
1.6 QUALITY ASSURANCE  
A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.  
1.7 WARRANTY  
A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within Owner specified warranty period.  
2.01 MANUFACTURERS  
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
1. Carlisle SynTec Incorporated.  
2. Firestone Building Products.  
3. GAF Materials Corporation.  
4. Johns Manville.  
5. Versico Incorporated.  
B. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.  
2.2 PERFORMANCE REQUIREMENTS  
A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.  
B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.  
C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:  
1. Corner Uplift Pressure: 45 lbf/sq. ft.  
2. Perimeter Uplift Pressure: 30 lbf/sq. ft.  
3. Field-of-Roof Uplift Pressure: 20 lbf/sq. ft.  
D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.  
2.3 EPDM ROOFING  
A. EPDM Sheet: ASTM D 4637, Type I, nonreinforced, uniform, flexible EPDM sheet.  
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
a. Carlisle SynTec Incorporated.  
b. Firestone Building Products.  
c. GAF Materials Corporation.  
d. Johns Manville.  
E. Epoxy Seam Sealer: Two-part, noncorrosive, non-cementing compound, recommended by aluminum manufacturer for hooked-type expansion joints with limited movement.  
F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.  
H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.  
2.4 AUXILIARY ROOFING MATERIALS  
A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.  
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.  
2. Sheet Flashing: 60-mil- (1.5-mm)-thick EPDM, partially cured or cured, according to application.  
C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55- to 60-mil- (1.4- to 1.5-mm)-thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.  
END OF SECTION

**SECTION 076320 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING (CONTINUED)**

2. Used lapped expansion joints only where indicated on Drawings.  
C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.  
D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.  
E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.  
F. Seams: Fabricate nonwelding seams with flat-lock seams. Tin edges to be sealed, form seams, and solder.  
G. Seams: Fabricate nonwelding seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.  
2.6 WALL SHEET METAL FABRICATIONS  
A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm)-high, end dams. Fabricate from the following materials:  
1. Stainless Steel: 0.016 inch (0.40 mm) thick.  
PART 3 - EXECUTION  
3.1 UNDERLAYMENT INSTALLATION  
A. As indicated in drawings and required by manufacturer.  
3.2 INSTALLATION, GENERAL  
A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, sealants, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.  
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2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.  
3. Splice seams not more than 12 inches (300 mm) apart. Attach each seam with at least two fasteners. Bend tabs over fasteners.  
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.  
5. Torch cutting of sheet metal flashing and trim is not permitted.  
6. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.  
1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or ferrous construction.  
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.  
3. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 078200 "Joint Sealants."  
G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-ink edges of sheets with solder to achieve maximum pull-out resistance.  
H. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.  
I. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.  
J. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.  
K. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.  
3.6 PROTECTING AND CLEANING  
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END OF SECTION

**SECTION 076320 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING (CONTINUED)**

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