SECTION 07540

THERMOPLASTIC SINGLE-PLY ROOFING

214 Miami Ave W
Venice, FL 34285

PREPARED BY:

GAF Design Services

PROJECT NO: PD-00018522

Note: GAF does not practice architecture or engineering. This document is provided as a guide specification and is based on criteria provided to GAF. GAF has not observed the jobsite conditions, contract specifications, or other documents and shall not be construed in any manner to be the designer of record.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Thermoplastic Polyolefin Single-Ply Roofing Membrane
2. Thermoplastic Polyolefin Flashings
3. Thermoplastic Polyolefin Accessories
4. Insulation

B. Related Sections
1. Section 06100: Rough Carpentry
2. Section 07620: Sheet Metal Flashing and Trim
3. Section 15430: Plumbing Specialties

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards
1. ASTM D-751 – Standard Test Methods for Coated Fabrics
2. ASTM D-2137 - Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
3. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
5. ASTM D-471 - Standard Test Method for Rubber Property—Effect of Liquids
6. ASTM D-1149 - Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
7. ASTM C-1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
8. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
9. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres
10. ASTM G155 - Standard Practice For Operating Xenon Arc Light Apparatus For Exposure Of Non-Metallic Materials
11. ASTM D573 - Standard Test Method For Rubber - Deterioration In An Air Oven

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - *Architectural Sheet Metal Manual*

C. National Roofing Contractors Association (NRCA)

D. U.S. Green Building Council (USGBC)
1. Leadership in Energy and Environmental Design (LEED)

E. California Title 24 Energy Efficient Standards

F. ENERGY STAR

G. Cool Roofing Rating Council (CRRC)

H. Florida Building Code

1.03 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) *Roofing and Waterproofing Manual* for definitions of roofing terms related to this section.

1.04 SUBMITTALS

A. Product Data: Provide product data sheets for each type of product indicated in this section.

B. Shop Drawings: Provide manufacturers standard details and approved shop drawings for the roof system specified.

C. Samples: Provide samples of insulations, fasteners, membrane materials and accessories for verification of quality.

D. Certificates: Installer shall provide written documentation from the manufacturer of their authorization to install the roof system, and eligibility to obtain the warranty specified in this section.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: GAF shall provide a roofing system that meets or exceeds all criteria listed in this section.

B. Installer's Qualifications:
1. Installer shall be classified as a ***Master or Master Select™*** contractor as defined and certified by GAF.

C. Source Limitations: All components listed in this section shall be provided by a single manufacturer or approved by the primary roofing manufacturer.

D. Final Inspection
Manufacturer's representative shall provide a comprehensive final inspection after completion of the roof system. All application errors must be addressed and final punch list completed.

1.06 PRE-INSTALLATION CONFERENCE

A. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, architect, owner, GAF representative and any other persons directly involved with the performance of the work. The installer shall record conference discussions to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to roofing work.

1.07 PERFORMANCE REQUIREMENTS

A. GAF shall provide all primary roofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.

1.08 REGULATORY REQUIREMENTS

A. All work shall be performed in a safe, professional manner, conforming to all federal, state and local codes.

B. Florida Building Code: Provide a roofing system which will achieve a -232.5psf (465psf) wind uplift rating, as listed in the most current Florida Building Code Evaluation Report.
1. FL5293-R54 (W-42)

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver all roofing materials to the site in original containers, with factory seals intact. All products are to carry a GAF label.

B. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range.

C. Do not expose materials to moisture in any form before, during, or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.

D. Remove manufacturer supplied plastic covers from materials provided with such. Use "breathable" type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.

E. Materials shall be stored above 55°F (12.6°C) a minimum of 24 hours prior to application.

1.10 PROJECT CONDITIONS

A. Weather
1. Proceed with roofing only when existing and forecasted weather conditions permit.
2. Ambient temperatures must be above 45°F (7.2°C) when applying hot asphalt or water based adhesives.

1.11 WARRANTY

A. Provide Manufacturers standard EverGuard® Diamond Pledge™ Guarantee with single source edge-to-edge coverage and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.
1. Duration: Twenty-Five (25) years from the date of completion.
a) Covered components include GAF roofing membrane, liquid-applied membrane or coating, base flashing, high wall waterproofing flashing, insulation, expansion joint covers, preflashed accessories, and metal flashings used by the contractor of record that meet SMACNA standards (the "GAF Roofing Materials").
b) Materials and workmanship of listed products within this section are included when installed in accordance with current GAF application and specification requirements. Contact GAF Design Services for the full terms and conditions of the guarantee.
c) Leaks caused by any non-GAF materials, such as the roof deck, existing materials, or non-GAF insulation are not covered.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Acceptable Manufacturer: GAF, Commercial Roofing Products Division, which is located at: 1 Campus Drive; Parsippany, NJ 07054; Toll Free Tel: 877-423-7663 (option 4, then option 3); Email: designservices@gaf.com; Web: www.gaf.com

2.02 VAPOR RETARDER

A. SBS Modified self-adhering vapor retarder for use in approved GAF roof assemblies. Each full roll contains 6 squares (56.1 m^2) of roofing material, 105' x 69". **GAF SA Vapor Retarder XL** by GAF.

2.03 INSULATION

A. Rigid polyisocyanurate board, with a glass-reinforced cellulosic felt facer. Conforms to or exceeds the requirements of ASTM C 1289 Type II, Class 1, Grade 2. **EnergyGuard™ Polyiso Insulation**, with the following characteristics:
   1. Board Thickness: 2.6”
   2. Thermal Resistance (LTTR value) of: 15.0
   3. Board Size: 4’ x 4’
   4. Compressive Strength: 20 psi

B. Rigid, tapered polyisocyanurate board, with a glass-reinforced cellulosic felt facer. Conforms to or exceeds the requirements of ASTM C 1289 Type II, Class 1, Grade 2. **EnergyGuard™ Tapered Polyiso Insulation**, with the following characteristics:
   1. Board Thickness: ¼” Tapered
   2. Thermal Resistance (LTTR value) of: varies
   3. Board Size: 4’ x 4’
   4. Compressive Strength: 20 psi

2.04 COVER BOARD

A. Fiber-reinforced gypsum panel with an integral water-resistant core. **Securock® Gypsum Fiber Roof Board** by US Gypsum.
   1. Board Thickness: ¼”
   2. Board Size: 4’ x 4’
   3. Thermal Resistance (R value) of: .20

2.05 MEMBRANE MATERIALS

A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved. White membrane is Energy Star Listed, CRRC Listed and Title 24 Compliant.
   1. **EverGuard® TPO 60 Mil Membrane by GAF**.
      a) 10’ X 100’, each roll contains 1000 sq. ft. of material weighing 322 lbs.
      b) Color: White

2.06 CURB/WALL FLASHING MEMBRANE

A. GENERAL
   1. EverGuard® membrane flashing should be of the same type and thickness as the roof membrane. EverGuard® Freedom™ TPO can be used with EverGuard® TPO membrane for flashing in the same thickness as the field membrane.
   2. Because colored TPO membranes may exhibit different welding characteristics, please call the GAF Design Services hotline at 800-766-877-423-7663 Option 4, Option 3 before attempting to weld different-colored TPO membranes with white membranes or flashings.
   3. EverGuard® TPO Fleece-Back membranes are optional flashing membranes for all EverGuard® TPO systems. These membranes may be a solution when a contaminated substrate is encountered.

B. FLASHING MEMBRANE
   1. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved. White membrane is Energy Star Listed, CRRC Listed and Title 24 Compliant.
      a) **EverGuard® TPO 60 Mil Membrane by GAF**.

2.07 ADHESIVES, SEALANTS AND PRIMERS

A. Sprayable, Low VOC solvent-based contact adhesive used for bonding smooth EverGuard® and EverGuard® Extreme® TPO membranes. One canister covers 10 squares. **EverGuard® TPO Quick Spray Adhesive LV50** by GAF.

B. Two component, low rise polyurethane foam adhesive. VOC free and contains no solvents. Dispensed using the Millennium Cyclone and Cyclone II pump, or another suitable low pressure pump which equally mixes Part 1 and Part 2. Also available as a simple to use cartridge with disposable mixing tip for small jobs. **LRF M Adhesive** by GAF.

C. Two component, low rise, solvent-free, polyurethane foamable adhesive that contains low GWP (global warming potential) propellants. The canister dispenses from two pre-pressurized, disposable cylinders using a two-component, disposable adhesive applicator and two 25-ft. hoses. **LRF Adhesive M Canister Low-Rise Foam Adhesive** by GAF.

D. Two component, construction grade low-rise polyurethane foam adhesive. The "A" and "B" components are dispensed from two pre-pressurized disposable cylinders utilizing a two-component disposable foam applicator. **LRF Adhesive XF** distributed by GAF.

E. Two component, low-rise polyurethane adhesive. Appropriate for application temperatures of 40°F+ (4.4°C). Available in Bag-in-Box, 15 Gal (57L) drums, and SpotShot. **Oly-Bond 500™** distributed by GAF.

F. Solvent based primer for preparing surfaces to receive butyl based adhesive tapes, **EverGuard® TPO Primer**, by GAF.

G. Solvent based seam cleaner used to clean exposed or contaminated seam prior to heat welding, **EverGuard® TPO Seam Cleaner, by GAF.**

H. Solvent based, trowel grade synthetic elastomeric sealant. Durable and UV resistant suitable for use where caulk is typically used. Available in 10 oz. tubes, **FlexSeal™ Caulk Grade Roof Sealant** by GAF.

I. Commercial grade roofing sealant suitable for sealing the upper lip of exposed termination bars and penetrations and around clamping rings and comes with a 20 yr. ltd warranty against leaks caused by manufacturing defects. Meets the performance criteria of ASTM D412, ASTM D2196, ASTM D1475 and ASTM D1644, **FlexSeal™** Roof Sealant, by GAF.

J. Low VOC solvent based primer for preparing surfaces to receive butyl based adhesive tapes, **EverGuard® TPO Low VOC Primer**, by GAF.

K. Low VOC TPO cleaner designed to clean exposed or contaminated seams prior to heat welding to remove any residual soap or revitalize aged membranes. Contains only 50 grams per liter of Volatile Organic Content and has been formulated using a blend of primarily VOC-exempt ingredients to be in compliance with air quality regulations for single ply roofing products. **EverGuard® TPO CleanWeld® Conditioner** by GAF.

L. One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange. **EverGuard® Water Block**, by GAF.

M. One-part, moisture-cure, self-leveling sealant designed for use in pitch pans on single ply roof systems. **EverGuard® One-Part Pourable Sealant**.

2.08 FLASHING ACCESSORIES

A. GENERAL FLASHING ACCESSORIES

1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, available in White, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. **EverGuard Extreme® TPO Detailing Membrane**, by GAF.
2. An 8 inch (203 mm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, available in White, **EverGuard Extreme® TPO Flashing Membrane**, by GAF.
3. 25 mil TPO membrane laminated to galvanized sheet metal for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. **EverGuard Extreme® TPO Coated Metal**, by GAF.
   a) Metal type: Available in 24 gauge, 20 gauge, Aluminum, and Stainless steel
   b) Sheets per pallet: Available in 5, 10, or 30
   c) Sheet Size: 4’ x 10’ or Custom size
   d) Sheet Color: White
      i) Custom colors available
4. Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener. Pre-punched slotted holes at 6” on center or 8” on center. ¾” x 10’ with 0.090” cross section, **DRILL-TEC™ Termination Bar,** by GAF.

B. FIELD OF ROOF ACCESSORIES
1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. **EverGuard Extreme® TPO UN-55 Detailing Membrane**, by GAF.
2. An 8 inch (20 cm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, **EverGuard Extreme® TPO Utility Flashing Membrane**, by GAF.
3. 24 gauge steel with 0.025” thick TPO based film as required for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. Standard sheet size 4’ x 10’, sheet weight 47 lbs. Custom sizes available, **EverGuard Extreme® TPO Coated Metal**, by GAF.
4. Pre-manufactured expansion joint covers used to bridge expansion joint openings in a roof structure. Fabricated to accommodate all roof to wall and roof to roof applications, made of .060” reinforced TPO membrane, available in 5 standard sizes for expansion joint openings up to 8” wide. **EverGuard Extreme® TPO Expansion Joint Covers,** by GAF
5. .055” thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60, 70 and 80 mil membrane applications. **EverGuard Extreme® T-Joint Patches**, by GAF.

C. WALL & CURB ACCESSORIES
1. .045” reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in adhered systems. Size 6” x 100’, **EverGuard Extreme® RTA (Roof Transition Anchor) Strip™,** by GAF
2. 55 mil TPO membrane and 24 gauge coated metal prefabricated into standard and custom size thru wall scuppers**.** Available in two sizes: 4" x 6" x 12" (l x w x d) with a 5.75" x 3.75" opening and 8" x 10" x 12" (l x w x d) with a 9.75" x 7.75" opening, **EverGuard Extreme® TPO Scupper,** by GAF
3. .045” or .060” thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs that are 24”, 36”, 48”, and 60” in size. Four corners are required to flash the curb, **EverGuard Extreme® Corner Curb Wraps,** by GAF.
4. 0.060” thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to EverGuard® TPO membrane. Size 4” x 4” with 6” flange, **EverGuard Extreme® TPO Universal Corners** by GAF.
5. 8” diameter, nominal .050” vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings, **EverGuard Extreme® TPO Fluted Corner**, by GAF.

6. 0.050” molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to EverGuard TPO membrane. Size 6” x 6” x 5.25” high **EverGuard Extreme® TPO Inside Corners** by GAF.

D. PENETRATION ACCESSORIES
1. 0.075” thick molded TPO membrane sized to accommodate most common pipe and conduits, (1” (25.4 mm) to 6” diameter pipes), including square tube. Hot-air welded directly to EverGuard® TPO membrane, supplied with stainless steel clamping rings, **EverGuard Extreme® TPO Preformed Vent Boots** by GAF.
2. 0.045” or 0.60” thick molded TPO membrane preformed boots are split to accommodate most common pipes and conduits and available in three standard sizes, **EverGuard Extreme® TPO Split Pipe Boots**, by GAF.
3. 0.045” or 0.60” thick molded TPO membrane preformed square boots are split to accommodate most common square penetrations and conduits and available in three standard sizes, **EverGuard Extreme® TPO Square Tube Wraps**, by GAF.
4. .070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations, weldable and 9" x 6" x 4" (l x w x h). **EverGuard Extreme® TPO Pourable Sealer Pocket**
5. 055” thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 and 80 mil membrane applications. **EverGuard® TPO Drain** by GAF

E. WALKWAYS
1. 1/8” thick extruded and embossed TPO roll 34” x 50’, heat welds directly to roofing membrane. Unique herringbone traction surface. Available in gray or yellow, **EverGuard® TPO Walkway Rolls**, GAF.

2.09 PERIMETER EDGE METAL

A. Designed with 8" concealed splice plates with dual non-curling isocryl butyl sealant strips allow for thermal movement of materials and sealing of joints. Factory-fabricated miters provide a clean, aesthetically pleasing appearance, and can help save time by eliminating the need for field fabrication. A 12", 20 ga. spring clip provides for positive attachment, helping to ensure stability for the system. Splice plates and fasteners are included. Manufactured in 12’ (6.1 m) standard lengths and tested per ANSI/SPRI/FM 4435/ES-1 Standard to comply with the International Building Code, **EverGuard® Coping,** by GAF

1. Cover Material:
   a) Aluminum
   b) Galvanized steel
2. Cover Finish:
   a) Mill aluminum
   b) Prefinished Kynar 500®
   c) Premium prefinished Kynar 500®
   d) Post finished Kynar 500®
   e) Prefinished anodized aluminum
   f) Post finished anodized aluminum
   g) Custom post-coated Kynar 500® finishes available
3. Thickness:
   a) 24 ga. steel
   b) 22 ga. steel
   c) .040” aluminum
   d) .050” aluminum
   e) .063” aluminum

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Obtain verification that the building structure can accommodate the added weight of the new roofing system.

B. Confirm the adequacy of the new roofing system to provide positive slope to drain. Eliminate ponding areas by the addition of drainage locations or by providing additional pitch to the roof surface.

C. Prepare substrate surfaces thoroughly prior to application of new roofing materials. This is particularly important for re-cover and reroofing applications. Providing a smooth, even, sound, clean, and dry substrate minimizes the likelihood that underlying deficiencies will cause premature deterioration or even failure of the new roofing system.

D. All defects in the roof deck or substrate must be corrected by the responsible parties before new roofing work commences. Verify that the deck surface is dry, sound, clean, and smooth, and free of depressions, waves, or projections.

E. Protect building surfaces against damage and contamination from roofing work.

F. Where work must continue over completed roof areas, protect the finished roofing system from damage.

G. Deck preparation is the sole responsibility of the building owner or roofing contractor. All defects in the roof deck or substrate must be corrected before roofing work commences.

H. Refer to GAF Roof Guarantee Program for specific requirements for extended guarantees.

3.02 SUBSTRATE PREPARATION

A. Tear-off
1. Remove all existing roofing materials to the roof decking, including flashings, metal edgings, drain leads, pipe boots, and pitch pockets, and clean substrate surfaces of all asphalt and adhesive contaminants.
2. Confirm the quality and condition of the roof decking by visual inspection. Fastener pull-out testing must be conducted by the roof fastener manufacturer.
3. Secure all loose decking. Remove and replace all deteriorated decking.
4. Remove abandoned equipment and equipment supports.
5. Confirm that the height of equipment supports will allow the installation of full-height flashings.

B. Steel Deck
1. Metal decks must be a minimum uncoated thickness of 22 gauge (0.8 mm) and shall have a G-90 galvanized finish on all panels.
2. When re-roofing over steel decks, surface corrosion shall be removed, and repairs to severely corroded areas made. Loose or inadequately secured decking shall be fastened, and irreparable or otherwise defective decking shall be replaced.
3. Code standards apply when their requirements exceed those listed here.

3.03 NAILER INSTALLATION

A. Acceptable Wood
1. Solid Blocking: Non-pressure treated wood as required, #2 Grade or better, nominal 1 1 /4" (30 mm) x 4" (102 mm) with a minimum thickness of 3 1 /2" (88 mm).
2. Shim Material: Plywood, 1 /2" (13 mm) x width to match solid blocking.
3. Verify the condition of existing roof nailers and anchor to resist 250 lb. per ft. (550 kg) load applied in any direction. New nailers should meet same load requirements.

4. DRILL-TEC™ HD screws 18" (457 mm) o.c. attachment to structural wood, steel decks with a 1" (25 mm) thread embedment.
5. DRILL-TEC™ spikes or HD screws 18" (457 mm) o.c. attachment to concrete decks. Min. 1" (25 mm) shank or thread penetration.
6. Wood nailers attached to gypsum, concrete, cellular concrete and cementitious wood fiber must be fastened 12" (305 mm) o.c., through the nailer into the substrate with substrate approved DRILL-TEC™ fasteners.
7. Three anchors per length of wood nailer minimum.

B. Metal Blocking
1. 20 Ga. galvanized steel box with pre-punched holes and supplied with corrosion-resistant fasteners.
2. Closure and finish strip required for metal decking.
3. Secure in place using provided #14 x 1½-in. universal fasteners through pre-punched holes to roof edge.
4. Install end cap and top of box section with #14 x 1½-in. universal fasteners.

3.04 INSTALLATION – GENERAL

A. Install GAF's EverGuard® TPO roofing system according to all current application requirements in addition to those listed in this section.

B. GAF EverGuard® TPO Specification #: TFATI60

C. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

3.05 VAPOR RETARDER

A. GAF SA Vapor Retarder XL
1. Roll out the GAF SA Vapor Retarder XL over clean, dry deck and allow to relax. For metal decks, the width of the membrane is designed to match with the top of the flute.
2. Place vapor retarder in desired position. Once the membrane is in place, while holding the membrane tight, peel off the silicone release film by pulling diagonally from the underside of the sheet.
3. Install subsequent rolls of membrane in the same way, taking care to overlap the longitudinal side laps a minimum of 3" (76 mm) and end laps a minimum of 6" (152 mm).
4. For metal decks, at the end of the roll, install a metal plate 6" x 42" (152 mm x 1.07 m) to support the membrane end lap between the metal flutes ensuring a complete end lap seal. Overlap end laps a minimum of 6" (152 mm).
5. Once installed, pressure must be applied over the whole surface using a weighted roller to ensure adequate adhesion to the substrate.
6. Seal perimeter and penetration areas with closed-cell foam sealant. The vapor retarder must be tied into the building's air/vapor retarder system as appropriate with compatible SBS asphaltic materials.
7. Because the water resistance characteristics of vapor retarders can be compromised by storms, physical damage and installation issues, vapor retarders should be covered by a primary roof covering as soon as possible after installation. If the vapor retarder is not immediately covered, particular attention should be paid to implementation of details to ensure a temporary seal or GAF will have no responsibility for any moisture infiltration that results. All T-joints and 90 degree transitions must be sealed with Matrix™ 201 SBS Flashing Cement. If fishmouths or other openings are created at overlap, they must be sealed with Matrix™ 201 SBS Flashing Cement**.** All damage to or leaks through the vapor retarder must be repaired before installing the finished roof.
8. GAF SA Vapor Retarder XL is UV resistant up to 90 days. 90-day UV resistance refers to standardized testing conducted to ensure the product will not physically degrade when exposed to UV.

3.06 INSULATION

A. GENERAL

1. Do not apply roof insulation or roofing until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment. A vapor retarder coated lightly with asphalt may be applied to protect the inside of the structure prior to the insulation and final roofing installation. Before the application of the insulation, any damage or deterioration to the vapor retarder must be repaired.
2. Do not install wet, damaged or warped insulation boards.
3. Insulation boards installed in multiple layers must have the joints between boards staggered in all directions a minimum of 6" (152 mm) between layers.
4. Butt insulation boards together with a 1/4" (6.3 mm) maximum space between adjoining boards. Fit insulation boards around penetrations and perimeter with a 1/4" (6.3 mm) maximum space between board and penetration. Do not kick insulation boards into place.
5. Insulation boards installed over steel decking must have boards placed perpendicular to deck flutes with edges over flute surface for bearing support.
6. Install tapered insulation to provide a sump area a minimum of 36" x 36" (914 mm x 914 mm) where applicable.
7. Wood nailers must be 3-1/2" (8.9 cm) minimum width or 1" (25 mm) wider than metal flange. They shall be of equal thickness as the insulation, and be treated for rot resistance. All nailers must be securely fastened to the deck.
8. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
9. Insulation should not be installed over new lightweight insulating concrete.
10. Remove and replace insulation boards that become wet or damaged after installation.
11. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
12. Where insulation is to be adhered in insulation adhesive, adhesion testing is required. The maximum board size for PolyIso roof insulation is 4' x 4'. Gypsum boards and max ½" HD Wood Fiberboard/Perlite may be adhered in 4' x 8 boards except where code requirements supersede.
13. Do not install any more insulation than will be completely waterproofed each day.

3.07 INSULATION – ALL LAYERS

A. OLYBOND 500
1. The substrate must be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
2. OlyBond 500 must be applied using the specially designed PaceCart dispenser. OlyBond 500 SpotShot shall be applied using one of the specially designed dual cartridge dispensers. OlyBond 500 Equipment Free Canister System dispenses with 25' hose and gun assembly included with product.
3. Install insulation layers applied with bands of OlyBond 500 to achieve proper coverage rates for insulation attachment:
   a) Field: 12" o.c.
   b) Perimeter: 6" o.c.
   c) Corners: 4" o.c.
4. Approximate coverage rate is ½ to 1 gallon per 100 square feet, depending on the substrate. Allow the foam to rise ¾" to 1". Walk each board firmly into place. Stagger the joints of additional layers in relation to the insulation joints in the layer(s) below by a minimum of 6" (15.2 cm) to eliminate continuous vertical gaps.

3.08 SINGLE PLY MEMBRANE APPLICATION

A. GENERAL
1. Substrates must be inspected and accepted by the contractor as suitable to receive and hold roof membrane materials.
2. Place roof membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent securement.
3. Membrane that has been exposed for more than 12 hours or has become contaminated will require additional cleaning methods.

a) Light Contamination - Membrane that has been exposed overnight up to a few days to debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner, a low-VOC cleaner) for TPO membranes.
b) Dirt-Based Contamination - Membrane that is dirt encrusted will require the use of a low-residue cleaner, such as Formula 409® and a mildly abrasive scrubbing pad to remove the dirt. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner) for TPO membranes.
c) Exposure-Based Contamination - Membrane that is weathered or oxidized will require the use of EverGuard® TPO Cleaner, EverGuard® CleanWeld™ Conditioner and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner) for TPO membranes. Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above. Be sure to wait for solvent to flash off prior to welding.
d) Chemical-Based Contamination - Membrane that is contaminated with bonding adhesive, asphalt, flashing cement, grease and oil, and most other contaminants usually cannot be cleaned sufficiently to allow an adequate heat weld to the membrane surface. These membranes should be removed and replaced.

B. Adhered
1. All work surfaces should be clean, dry, and free of dirt, dust, debris, oils, loose and/or embedded gravel, un-adhered coatings, deteriorated membrane, and other contaminants that may result in a surface that is not sound or is uneven.
2. Full-width rolls can be installed throughout the field and perimeter of the roof. Half sheets are not necessary.
3. Overlap roof membrane a minimum of 3" (76 mm) for end laps. For fleece-back membrane, butt ends together and cover joint with 8” (203 mm) wide EverGuard® Flashing Strip heat-welded. Membranes are provided with lap lines along the side laps.
4. Best practice is to install membrane so that the side laps run across the roof slope lapped toward drainage points.
5. All exposed sheet corners must be rounded a minimum of 1" (25 mm).
6. Use full-width rolls throughout the field and perimeter of the roof. Half sheets are not necessary.
7. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
8. Weld shall be a minimum of 1” (25.4 mm) in width for automatic machine welding and a minimum 2” in width for hand welding. Code requirements may supersede these instructions.
9. Roof membrane must be mechanically attached along the base of walls with screws and plates 6” (152 mm) on center.
10. Adhesive should be applied to the membrane at the following rate:
    a) Applied at a total rate of 10 squares (1,000 sq. ft.) per canister equally to both the substrate and the underside of the membrane. Coverage rates may vary depending on the porosity of the substrate.
11. Use appropriate bonding adhesive for substrate surface, applied with a solvent-resistant roller, brush or squeegee.
12. Adhere approximately one half of the membrane sheet at a time. One half of the sheet's length shall be folded back in turn to allow for adhesive application. Lay membrane into adhesive once the bonding adhesive is tacky to the touch.
13. Roll membrane with a weighted roller to ensure complete bonding between adhesive and membrane.
14. Prevent seam contamination by keeping the adhesive application a few inches back from the seam area.
15. Reference the Adhesive securement tables in the EverGuard® Application and Specifications Manuals for substrate adhesion and compatibility.
16. Roll in membrane using a 150 lb. membrane roller or equivalent.
17. To reduce thermal bridging, a full spray of approved Low Rise Foam Adhesive may be used to attach individual insulation layers or adhere the top layer to a mechanically fastened bottom layer.

3.09 FLASHINGS

A. GENERAL
1. All penetrations must be at least 24” (61 cm) from curbs, walls, and edges to provide adequate space for proper flashing.
2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
4. Hot-air weld all flashing membranes, accessories, and coated metal. A minimum 2” wide (hand welder) weld or minimum 1 - 1/2" automatic machine weld is required.
5. All cut edges of reinforced membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
6. Consult the EverGuard® *Application and Specifications Manual* or GAF Contractor Services for more information on specific construction details, or those not addressed in this section

B. Coated Metal Flashings:
1. Coated metal flashings shall be formed in accordance with current EverGuard construction details and SMACNA guidelines.
2. Coated metal sections used for roof edging, base flashing and coping shall be butted together with a ¼” gap to allow for expansion and contraction. Hot-air weld a 6” wide reinforced membrane flashing strip to both sides of the joint, with approximately 1” on either side of the joint left un-welded to allow for expansion and contraction. 2” wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.
3. Coated metal used for sealant pans, scupper inserts, corners of roof edging, base flashing and coping shall be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Hot-air weld a 6” wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.
4. Provide a ½” hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
5. Provide a ½” hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
6. Coated metal flashings shall be nailed to treated wood nailers or otherwise mechanically attached to the roof deck, wall or curb substrates, in accordance with construction detail requirements.

C. Reinforced Membrane Flashings:
1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.
2. Membrane flashing may either be installed loose or Adhered to the substrate surface in accordance with “Construction Detail Requirements”.
3. Apply the adhesive only when outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow for easier adhesive application.
4. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
5. Please note that solvent-based adhesives must be allowed to dry until tacky to the touch before mating flashing membrane. Water-based adhesive must be allowed to flash off completely.
6. Heat-weld all laps in EverGuard® smooth-reinforced flashing membrane in accordance with heat-welding guidelines. All seams in fleece-back membrane and smooth field sheet must be stripped in with 8" (203 mm) flashing strip.
7. For extended length guarantees, separate counterflashing is required; exposed termination bars are not acceptable.

D. Un-Reinforced Membrane Flashings:
1. Un-reinforced membrane is used to field-fabricate penetration or reinforcement flashings in locations where preformed corners and pipe boots cannot be properly installed.
2. Penetration flashings constructed of un-reinforced membrane are typically installed in two sections, a horizontal piece that extends onto the roofing membrane and a vertical piece that extends up the penetration. The two pieces are overlapped and hot-air welded together.

3. Apply the adhesive only when outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow for easier adhesive application. Water-based adhesives are approved for use with smooth TPO membranes for flashings only.
4. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
5. Please note that solvent-based adhesives must be allowed to dry until tacky to the touch before mating flashing membrane. Water-based adhesive must be allowed to flash off completely.

E. Roof Edges:
1. Roof edge flashings are applicable for gravel stop and drip edge conditions as well as for exterior edges of parapet walls.
2. Flash roof edges with coated metal flanged edging with a minimum 3" (76 mm) wide flange nailed 4" (102 mm) on center to wood nailers, and heat weld 8" (203 mm) membrane strip to metal flanges.
3. When the fascia width exceeds 4" (102 mm), coated metal roof edging must be attached with a continuous cleat to secure the lower fascia edge. The cleat must be secured to the building no less than 12" (305 mm) o.c.
4. Flash roof edge scuppers with a coated metal insert that is mechanically attached to the roof edge and integrated as a part of the metal edging.
5. Alternatively, roof edges may be flashed with a 2-piece snap on fascia system, adhering the roof membrane to a metal cant and face nailing the membrane 8" (152 mm) on center prior to installing a snap-on fascia.
   a) Submit design drawings for review and approval to Architect or Specifier before fabrication.
   b) Installing contractor shall check as-built conditions and verify the manufacturer's roof edging details for accuracy to fit the wall assembly prior to fabrication. The installer shall comply with the roof edging manufacturer's installation guide when setting edging.

F. Parapet and Building Walls:
1. Flash walls with EverGuard® TPO membrane adhered to the substrate with bonding adhesive, loose applied or with coated metal flashing nailed 4" (102 mm) on center to pressure-treated wood nailers.
2. Maximum flashing height without intermediate fastening is 24" (610 mm) for loose-applied flashing and 54" (1.4 m) for adhered flashing
3. Secure membrane flashing at the top edge with a termination bar. EverGuard® Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 6" (152 mm) on center for guarantees less than 20 years and 12" (305 mm) on center for guarantees greater than 20 years or that are counter-flashed.
4. Exposed termination bars must be sealed with Flexseal™ Caulk Grade Sealant.
5. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center [6" (152 mm) on center for Ballasted Systems]
6. Metal cap flashings must have continuous cleats or be face fastened 12" (305 mm) o.c. on both the inside and outside of the walls.
7. Flash wall scuppers with a coated metal insert that is mechanically attached to the wall and integrated as part of the wall flashing.
8. Roof Transition Anchor (R.T.A.) Strip may be installed as the alternate method of base securement for a RhinoBond® non-penetrating base attachment detail.

G. Curbs and Ducts:
1. Flash curbs and ducts with EverGuard® TPO membrane adhered to the curb substrate with bonding adhesive, loose applied or with coated metal flashing nailed 4" on center to pressure-treated wood nailers.
2. Maximum flashing height without intermediate fastening is 24" (610 mm) for loose-applied flashing and 54" (1.4 m) for adhered flashing
3. Secure membrane flashing at the top edge with a termination bar. EverGuard® Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 6" (152 mm) on center for guarantees less than 20 years and 12" (305 mm) on center for guarantees greater than 20 years or that are counter-flashed.
4. Exposed termination bars must be sealed with Flexseal™ Caulk Grade Sealant.
5. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center [6" (152 mm) on center for Ballasted Systems]

6. Metal counterflashings may be optional with Adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with Flexseal™ Roofing Cement.
7. All coated metal curb flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings.

H. Roof Drains:
1. Roof drains must be fitted with compression type clamping rings and strainer baskets. Original-type cast iron and aluminum drains, as well as retrofit-type cast iron, aluminum or molded plastic drains are acceptable.
2. Roof drains must be provided with a minimum 36” x 36” sump. Slope of tapered insulation within the sump shall not exceed 4” in 12”.
3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a ½” of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.
4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of water block on the drain flange prior to securement with the compression clamping ring. Typical water block application is one 10.5 ounce cartridge per drain.
5. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate roof membrane drain flashing a minimum of 12” larger than the sump area must be installed. The roof membrane shall be mechanically attached 12” on center around the drain with screws and plates. The separate roof drain flashing shall be heat welded to the roof membrane beyond the screws and plates, extended over the drain flange, and secured as above.
6. Tighten the drain compression ring in place.

I. Expansion Joints:
1. Any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or DRILL-TEC™ Fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb-expansion joints with screws and plates a minimum of 12" (305 mm) o.c. The expansion joint cover bellows shall be at least 2 times the expansion joint opening.
3. Metal nailing strip must be set in FlexSeal™ Caulk Grade Sealant and secured with fasteners and neoprene washers fastened 6" (152 mm) o.c
4. Expansion joints may be field fabricated. Reference appropriate Construction Detail.

J. Scuppers:
1. Coated-metal roof-edge scuppers must be provided with a min. 4" (102 mm) wide flange nailed to wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.
2. Coated-metal wall scuppers must be provided with 4" (102 mm) wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ Fasteners 6" (152 mm) o.c., a minimum of 2 fasteners per side.
4. All corners must be reinforced with EverGuard® PVC or EverGuard® TPO Universal Corners or field-fabricated from EverGuard® non-reinforced materials.
5. Strip-in scupper with flashing membrane target sheet.
6. Alternately, a wall scupper box may be field-flashed using non-reinforced flashing membrane heat-welded to membrane on the wall face and roof deck. Fully adhere to the scupper box and terminate on the outside wall face with a termination bar and FlexSeal™ Caulk Grade sealant.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available

K. Wood Support Blocking:
1. Wood support blocking, typically 4" x 4" (102 mm x 102 mm), is usually installed under light-duty or temporary roof-mounted equipment, such as electrical conduit, gas lines, condensation, and drain lines.
2. Install wood support blocking over a protective layer of EverGuard® TPO walkway rolls or PVC walkway pads. Place wood blocking on oversized slip sheet, fold two sides vertically, and fasten with roofing nails into the blocking.

3.10 TRAFFIC PROTECTION

A. Install walkway rolls at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkway pads must be spaced 6" apart to allow for drainage between the pads.

C. Heat-weld walkway rolls to the roof membrane surface continuously around the perimeter of the roll.

3.11 ROOF PROTECTION

A. Protect all partially and fully completed roofing work from other trades until completion.

B. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas.

C. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.

D. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

3.12 CLEAN-UP

A. All work areas are to be kept clean, clear and free of debris at all times.

B. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.

C. All tools and unused materials must be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.

D. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.

E. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.

F. Clean and restore all damaged surfaces to their original condition.

END OF SECTION