

Section – 075400- Fully Adhered TPO

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. Roof 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 Non Rigid Thermoplastic Sheet 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
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - *Architectural Sheet Metal Manual*
- C. National Roofing Contractors Association (NRCA)
- D. American Society of Civil Engineers (ASCE)
- E. Factory Mutual (FM Global) - *Approval Guide*
- F. Underwriters Laboratories (UL) - *Roofing Systems and Materials Guide* (TGFU R1306)

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, manufacturer's 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. Provide an installed roofing membrane and base flashing system that does not permit the passage of water and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.
- B. 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. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class A- Rating for roof slopes indicated.
- C. Windstorm Classification: Provide a roofing system which will achieve a Factory Mutual 1-60 wind uplift rating, as listed in the current FM Approval Guide.

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. Reference data sheets for product storage requirements.
- 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. 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/GUARANTEE

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 (20) 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. GAF® - 1 Campus Drive, Parsippany, NJ 07054
- B. For substitutions, submit a PSU substitution request.

2.02 AIR AND VAPOR RETARDER SYSTEM

- A. Proprietary formulated elastomeric styrene-butadiene-styrene (SBS) polymer modified bitumen in combination with a high tack self-adhesive, **GAF SA Vapor Retarder** by GAF.

2.03 INSULATION

- A. Red List Free certified, holding both an Environmental Product Declaration (EPD) and a Health Product Declaration (HPD) coated glass-fiber bonded to a core of isocyanurate foam meeting the requirements of ASTM D3273 for resistance to mold growth, **EnergyGuard™ Barrier Polyiso Roof Insulation** by GAF®.
- B. Should meet requirements in section 072100 - thermal insulation as follows
 - 1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 - 2 Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
 - 3 Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 2. Board Thickness: 2 layers 2.6" Total 5.2"
 - 3. Thermal Resistance (LTTR value) of each layer R15. Total R30
 - 4. Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2.

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: 1/4"
 - 2. Board Size: 4' x 8'
 - 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.
 - 1. **EverGuard® TPO;**
 - a) Thickness: 60mil
 - b) Color: Energy Gray - Energy Star Listed, CRRC Listed and Title 24 Compliant.

2.06 FLASHING MATERIALS

- A. Advanced heat and UV protected, 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.
 - 1. **EverGuard® TPO**
 - a) Thickness: 60mil

- b) Color: Energy Gray - Energy Star Listed, CRRC Listed and Title 24 Compliant.

2.07 ADHESIVES, SEALANTS and PRIMERS

- A. Low VOC Sprayable solvent-based adhesive for smooth TPO: **EverGuard® TPO Quick Spray Adhesive LV50**, by GAF®.
- B. Two-part low rise polyurethane foam adhesive for use with insulation and fleece-back membranes, **Oly-Bond 500™ Roofing Adhesive - Equipment-Free Canister** by GAF®.
- C. Low VOC solvent based primer for preparing surfaces to receive butyl based adhesive tapes, **EverGuard® TPO Low VOC Primer**, by GAF®.
- D. Low VOC solvent based cleaner used to clean exposed or contaminated seam prior to heat-welding or priming, **EverGuard® CleanWeld™ Conditioner**, by GAF®.
- E. One-part moisture cure, self-leveling sealant designed for use in pitch pans **EverGuard® One-Part Pourable Sealer** by GAF®.
- F. 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®.

2.08 PLATES & FASTENERS

- A. **Drill•Tec™ HD Screws**: Heavy gauge alloy steel fastener with CR-10 coating with a .245" diameter thread. Miami Dade and Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on wood, concrete and steel decks.
- B. **Drill•Tec™ Insulation Plates**: Galvalume, 3" (76 mm) diameter, suitable for use with Drill•Tec™ Standard and HD screws, and Drill•Tec™ Spikes. Special design available for use with Drill•Tec™ Polymer Screws.

2.09 NAILS & SPIKES

- A. **DRILL-TEC™ Masonry Anchor**: Zinc alloy anchor with stainless steel or zinc plated steel pin available in either 1/4" or 3/16" diameter. Designed to attach termination bars to concrete or masonry walls.

2.10 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, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. **EverGuard® 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® TPO 45 Mil 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® TPO Coated Metal**, by GAF.
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. 3/4" x 10' with 0.090" cross section, **DRILL-TEC™ Termination Bar**, by GAF.
5. 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® TPO Expansion Joint Covers**, by GAF
6. .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® T-Joint Patches**, by GAF.

B. ROOF EDGE ACCESSORIES

1. A 6 inch (14 cm) wide, smooth type, heat-weldable polyester scrim reinforced thermoplastic polyolefin membrane strip. Designed for use as a cover strip over non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6" X 100'. **EverGuard® TPO Heat-Weld Cover Tape**, 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® 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® 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® 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® TPO Universal Corners** by GAF.
5. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to EverGuard TPO membrane. Size 6" x 6" x 5.5" high **EverGuard® TPO Preformed Corners** by GAF.

6. 8" diameter, nominal .050" vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings, **EverGuard® TPO Fluted Corner**, by GAF.

D. PENETRATION ACCESSORIES

1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" to 6" diameter pipes), including square tube. Hot-air welded directly to EverGuard TPO membrane, supplied with stainless steel clamping rings, **EverGuard® TPO Preformed Vent Boots** by GAF.
2. 0.045" thick molded TPO membrane preformed boots are split to accommodate most common pipes and conduits and available in three standard sizes, **EverGuard® TPO Split Pipe Boots**, by GAF.
3. 0.045" thick molded TPO membrane preformed square boots are split to accommodate most common square penetrations and conduits and available in three standard sizes, **EverGuard® 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® TPO Pourable Sealer Pocket**
5. Constructed from spun aluminum and preflashed using .055" thick smooth type, unreinforced thermoplastic polyolefin membrane. Available in a wide range of sizes to allow a proper fit into any size roofing drain. **EverGuard® TPO Drain** by GAF
6. Aluminum drain unit coated with a weldable TPO compound. TPO membrane can be heat welded directly to the drain body, resulting in a strong, secure installation. Each drain is fitted with a BlueSeal® mechanical drain seal for a secure, tight seal into the building drain system. Available in two sizes (3" and 4"), and custom sizes are available. **EverGuard® TPO Coated Metal Drain** by GAF

E. WALKWAYS

1. 1/8" thick extruded and embossed TPO roll 34.25" x 50', heat welds directly to roofing membrane. Unique "diamond tread" traction surface and features a 2" (51 mm) welding strip (smooth border) along each longitudinal edge that is compatible with hand or automatic welders. Available in gray or safety yellow, **EverGuard® TPO Walkway Rolls**, GAF.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the surfaces and site conditions are ready to receive work.
- B. Verify that the deck is supported and secured.
- C. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.

- D. Verify that the deck surfaces are dry and free of ice or snow.
- E. Verify that all roof openings or penetrations through the roof are solidly set, and that all flashings are tapered.

3.02 SUBSTRATE PREPARATION

A. Plywood Deck

1. Plywood sheathing must be exterior grade, minimum 4 ply, and not less than 3/4" (19 mm) 19/32" (Miami Dade County) thick.
2. Preservatives or fire retardants used to treat the decking must be compatible with roofing materials.
3. The deck must be installed so that all four sides of each panel bear on and are secured to joist and cross blocking. The panels must be secured in accordance with APA–The Engineered Wood Association recommendations "H" clips are not acceptable.
4. Panels must be installed with a 1/8" to 1/4" (3mm – 6mm) gap between panels and must match vertically at joints to within 1/8" (3mm).
5. Decking should be kept dry and roofed promptly after installation.
6. Deck shall be attached with approved fasteners at required spacing. Consult local building codes for specific requirements.

3.02 NAILER INSTALLATION

A. Acceptable Material

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.

3.03 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 #:
- 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.

3.04 AIR/VAPOR BARRIER

A. GENERAL

1. Air/vapor retarder components must typically be installed when required by design professional to address internal building air pressure or humidity conditions on the structural deck or directly over a minimal layer of EnergyGuard™ insulation or fire barrier.
2. EnergyGuard™ insulation must be installed over the vapor retarder to raise the location of the dew point temperature above the level of the vapor retarder.
3. Designers should consider requiring air retarders:
 - a) On all air porous decks, with openings in the walls or area directly below the roof deck that exceeds 10% of the total wall area.
 - b) When the internal pressurization of the building is in excess of 5 lbs. per sq. ft. (239 Pa).
 - c) When buildings have large openings or overhangs.
 - d) In conditions where positive internal pressure is applied suddenly, as may be the case at aircraft hangers or distribution centers—otherwise, the roofing system may fail due to pressure impact.
4. Refer to FM Global Loss Prevention Data Sheets 1-28 and 1-29 for specific installation procedures for all roofs with large openings.
5. For roofs to be guaranteed by GAF:
 - a) Air retarders are required for all extended-length guarantees on buildings where large wall openings greater than 10% of the total wall area can be open during a windstorm, including opening due to storm damage.

B. APPLICATION – ADHERED

1. Apply compatible adhesive to the structural deck or fire barrier board per air vapor retarder manufacturers' recommendations.
2. Install the air/vapor retarder components loose applied to the deck or fire barrier board so that wrinkles and buckles are not formed. Broom air/vapor barrier components to ensure embedment into the adhesive.
3. Overlap air/vapor retarder components a minimum of 6" (152 mm) for side and end laps. Adhere laps together with compatible adhesive.
4. Seal perimeter and penetration areas with foam sealant.
5. Install insulation boards over the air/vapor barrier and mechanically attach the boards to the deck or adhere the boards to the air/vapor retarder with compatible adhesive to achieve the desired roof system uplift resistance.
6. A continuous vapor seal is essential around roof edges, parapets, roof-to-wall transitions, and directly above interior dividers/partitions separating between cold and warmer controlled environments.
7. Where applicable, ensure the insulated wall panel cap is set in EverGuard® Water Block Sealant and secured to the wall panel at 6" on center maximum.
8. Fill panel lows with trowel grade polyurethane sealant to achieve a level, smooth surface approximately 4" to 6" from the top of the panel.
9. Secure cured membrane flashing through the area of the panel that was leveled using generous application of EverGuard® Water-Block Sealant and the DRILL-TEC™ Termination Bar fastened to achieve constant compression against the panel.

10. The transition vapor seal can be completed by turning the cured flashing over the roofing membrane setting each layer in generous beads of EverGuard® Water-Block Sealant as outlined in the applicable GAF detail.

3.04 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. Install insulation boards with staggered board joints in one direction (unless taping joint).
4. Install insulation boards snug. Gaps between board joints must not exceed $\frac{1}{4}$ " (6 mm). All gaps in excess of $\frac{1}{4}$ " (6 mm) must be filled with like insulation material.
5. Wood nailers must be 3-1/2" (89 mm) minimum width or 1" (25.4 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.
6. Do not kick insulation boards into place.
7. 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.
8. Roof tape, if required over insulation joints, must be laid evenly, smoothly and embedded in a uniform coating of hot steep asphalt with 4" (102 mm) end laps. Care must be taken to assure smooth application of tape, and full embedment of the tape in the asphalt.
9. Do not install any more insulation than will be completely waterproofed each day.

B. INSULATION APPLICATION

1. The insulation must be securely attached to the roof deck. A minimum FMRC 1-60 attachment is recommended. Refer to FMRC Approval Guide for FM fastening patterns. Factory Mutual requires fastener density increased in corner areas for FM 1-60 as well as perimeter and corner area fastener density increases for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-7, 1-28, and 1-49.
2. Apply LRF O Adhesive directly to the substrate using a ribbon pattern. Space beads as required by job specification, typically 6" or 12" (152 mm or 305 mm) o.c.
3. LRF O Adhesive should be approximately 70°F (22°C) when being dispensed. As adhesive is applied, allow the adhesive to begin rising, then place board.
4. The substrate must be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
5. 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.
6. Install insulation layers applied with bands of OlyBond 500 spaced 12" o.c. Approximate coverage rate is $\frac{1}{2}$ to 1 gallon per 100 square feet, depending on the substrate. Allow the foam to rise $\frac{3}{4}$ " to 1" (25.4 mm). 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" (152 mm) to eliminate continuous vertical gaps.
7. The substrate must be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.

8. Install insulation layers applied with 3/4" beads of Insta-Stik spaced 12" o.c. Press 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" (152 mm) to eliminate continuous vertical gaps.
9. Loose apply the base layer of insulation for subsequent layers to be simultaneously attached or for ballast applications. Minimal fastening should be performed to avoid movement of the boards.
10. Fill all flutes with a loose applied base layer of insulation. Insulation must be of equal height as metal ribs, seams or flutes to allow for subsequent layers to be applied without interference. Minimal fastening should be performed to avoid movement of the boards.
11. If subsequent layers of insulation are to be attached with insulation adhesive, the base layer must be mechanically attached with a minimum fastener density of 1 fastener every 2 square feet.

3.01 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. Be sure to wait for solvent to flash off prior to welding.
 - 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.

A. FULLY 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,
9. Roof membrane must be mechanically attached along the base of walls with screws and plates 6" (152 mm) on center.
10. Adhesives should be applied to membrane at the rates listed on the pail.
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. Apply LRF Adhesive directly to the substrate using a ribbon pattern. Space beads as required by job specification, typically 6" or 12" (152 mm or 305 mm) o.c.
17. Apply low rise foam in canisters should be applied in "spatter method" for fleece-back membrane applications ONLY.
18. Roll in membrane using a 150 lb. membrane roller or equivalent.

3.02 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. Non-coated metal edge details must be installed in accordance with current EverGuard® construction details and requirements.
6. All twenty (20) year EverGuard® systems require the use of coated metal edges where applicable. Bonding adhesive and/or cover tape is not acceptable.
7. All cut edges of reinforced membrane must be sealed with EverGuard® TPO Cut Edge Sealant.

8. EverGuard Extreme® flashings and accessories are required for use with EverGuard Extreme® membranes.
9. Consult the EverGuard® Application and Specifications Manual or GAF Contractor Services for more information on specific construction details.

B. 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.

3.03 TRAFFIC PROTECTION

- A. Install walkway pads at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
- B. Walkway rolls or pads must be spaced 6" (152 mm) apart to allow for drainage between the pads.
- C. Heat-weld walkway rolls or pads to the roof membrane surface continuously around the perimeter of the pad/roll.

3.04 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.

3.05 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.

3.06 MAINTENANCE

- A. Inspections to the roof shall be performed annually by a GAF® **Master Select™** contractor.
- B. An annual roofing system maintenance program shall be performed by a Master **Select™** contractor in accordance with GAF®'s 10 Point Maintenance Program provided with your Diamond Pledge™ guarantee.
- C. Submit copies of the roof inspection form, accompanying photographs (a minimum of 6 photos showing the condition of the roof and critical details), and a record of all roofing system maintenance to the GAF® Technical Support Services Department within sixty (60) days of the anniversary date of the completion of the roofing system. Annual roof inspections must be started within the first two (2) years of the guaranteed term.

END OF SECTION