

# EverGuard® Fully Adhered System Installation Specification

## Information Sheet



*Quality You Can Trust Since 1886...  
From North America's Largest Roofing Manufacturer™*

# Fully Adhered Installation Specification

TPO & PVC

## Part 1 – General

### 1.01 System Description

- A. Fully adhered heat-welded thermoplastic sheet roof membrane system
- B. EverGuard® PVC and EverGuard TPO materials are not compatible with one another. DO NOT combine EverGuard PVC and EverGuard TPO membranes, flashings, and flashing accessories together in the same roofing system.

### 1.02 Specification Designations

- A. See Plates.

### 1.03 Regulatory Requirements

- A. Conform to all applicable building and jurisdictional codes, including roof assembly wind uplift and fire resistance requirements.
- B. Follow your local jurisdiction requirements for disposing of used and expired adhesives and sealants.

### 1.04 Delivery, Storage and Protection

- A. Deliver products to site in original containers with seals unbroken and labeled with GAF/EverGuard name, product brand name and type.
- B. Store materials in weather protected environment, clear of ground and moisture, in accordance with GAF's instructions.
- C. All materials stored outside shall be raised above ground or roof level on pallets, and covered with a tarpaulin or other waterproof material. Factory-installed plastic wrapping is not an adequate covering. Extreme heat conditions may require special storage requirements. Contact EverGuard Contractor Services for suggestions.
- D. Follow GAF or EverGuard directions and requirements for protection of materials prior to and during installation.
- E. Materials that are wet or damaged to the extent that they will no longer serve their intended purpose shall not be used. All roof insulation that has been wet is considered damaged, even if later dried out. Remove all damaged materials from the jobsite.

### 1.05 Environmental Requirements & Restrictions

- A. Do not apply roofing materials during inclement or threatening weather.
- B. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.
- C. When ambient temperatures are below 40° F, follow GAF or EverGuard cold weather application procedures.

- D. High or gusting winds make the installation of materials difficult.
- E. Material installation during periods of high ambient temperatures, typically above 90°F, can result in poor installation quality due to condensation on the membrane surface and excessively fast adhesive drying rates. Material installation during periods of low ambient temperatures, typically below 30°F, can result in poor installation quality due to increased material stiffness and vulnerability to damage and excessively slow adhesive drying rates. To avoid these problems:
  - 1. Store materials in a warming box.
  - 2. Use as soon as possible.
  - 3. Allow adhesive to properly cure.
  - 4. Use a weighted lawn roller over membrane.

### 1.06 Working Environment

- A. Provide a safe working environment, including, but not limited to, adequate fall protection, restriction of unauthorized access to the work area, and protection of the building and its occupants.
- B. Safe work practices should be followed, including, but not limited to, keeping tools in good operating order, providing adequate ventilation if adhesives are used, and daily house-keeping to remove debris and other hazards.

## Part 2 – Products

### 2.01 Membrane

- A. EverGuard TPO (smooth reinforced) thermoplastic polyolefin membrane.
- B. EverGuard TPO Fleece Back thermoplastic polyolefin membrane
- C. EverGuard PVC (smooth reinforced) thermoplastic membrane
- D. EverGuard PVC Fleece Back thermoplastic membrane

### 2.02 Flashing

- A. EverGuard membrane flashings to be of same type, thickness and color of roofing membrane except where EverGuard Fleece-Backed membrane is used with smooth reinforced membrane flashings.
- B. EverGuard TPO and PVC Fleece-Back membranes are optional flashing membranes for all EverGuard TPO and PVC roofing systems respectively. These membranes may be a solution when a contaminated substrate is encountered.

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## 2.03 Flashing Accessories

- A. EverGuard pre-formed flashing accessories to be of same type as roofing membrane.
1. EverGuard laminated metal flashings to be a minimum of 25 mils of non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 25 ga. galvanized steel sheet metal.
  2. Pre-formed Vent Boots with stainless steel clamping bands.
  3. Pre-formed Universal Corners for reinforcement of inside and outside corners.
  4. Pre-formed Expansion Joint Covers for roof-roof and roof-wall expansion joints.
  5. Membrane Flashing Strips for miscellaneous applications.
  6. UN-55 Detailing Membrane for flashing of miscellaneous penetrations.
  7. EverGuard TPO Cover Strip for stripping in of flat metal edges.
  8. EverGuard 6" RTS strip.

## 2.04 Fasteners

- A. DRILL•TEC membrane fasteners and plates, insulation fasteners and plates, and flashing fasteners and termination bars. Refer to the Insulation Attachment Table at the end of this section for the correct type, length and diameter.

## 2.05 Adhesives and Sealants

- A. EverGuard® TPO and PVC bonding adhesives, sealants and caulking.
1. EverGuard Bonding Adhesive (solvent-based).
  2. EverGuard H2O Bonding Adhesive (low VOC).
  3. EverGuard 2-Part Pourable Sealant for use in coated metal sealant pans.
  4. EverGuard Caulking for use in sealing termination bars and penetration clamping bands.
  5. EverGuard TPO Cut Edge Sealant.
  6. Roofing asphalt. ASTM D-312, Type III or Type IV.
  7. EverGuard Water Block for use in sealing behind termination bars and at drain flanges as a water cut-off.
  8. EverGuard TPO primer.

## 2.06 Traffic Protection

- A. EverGuard TPO and PVC pads and rolls.

## 2.07 Insulation

- A. EnergyGuard foam insulation of the following types.

Minimum 1" thickness. Board size to be 4' x 8' panels for mechanical attachment, and 4' x 4' for adhered attachment and tapered systems.

1. EnergyGuard and EnergyGuard Ultra polyisocyanurate insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289 (min. 16 psi compressive strength).
2. EnergyGuard extruded polystyrene insulation meeting or exceeding the requirements for ASTM D-578, Type X (min. 15 psi compressive strength).
3. EnergyGuard expanded polystyrene insulation with plastic facer meeting or exceeding the requirements for ASTM D-578, Type II (min. 15 psi compressive strength).

## 2.08 Insulation – High Traffic Applications

- A. EnergyGuard foam insulation of the following types. Minimum 1" thickness. Board size to be 4' x 8' panels for mechanical attachment, and 4' x 4' for adhered attachment and tapered systems.
1. EnergyGuard and EnergyGuard Ultra polyisocyanurate insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289 (min. 25 psi compressive strength).
  2. EnergyGuard extruded polystyrene insulation meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).
  3. EnergyGuard expanded polystyrene insulation meeting or exceeding the requirements for ASTM D-578, Type IX (min. 25 psi compressive strength).

## 2.09 Recover Board

- A. EnergyGuard Perlite insulation, minimum 1/2", ASTM C-728
- B. High density wood fiber insulation, minimum 1/2", ASTM C-208, Class E.
- C. EnergyGuard foam recover board of the following types. Board size to be 4' x 8' panels for mechanical attachment and 4' x 4' for adhered attachment and tapered systems.
1. EnergyGuard and EnergyGuard Ultra 1/2" polyisocyanurate recover board insulation with glass-based facer meeting or exceeding the requirements for ASTM C-1289 (min. 16 psi compressive strength).

## 2.10 Base Sheet

- A. GAFGLAS® Stratavent® Eliminator™ Nailable base sheet.
- B. GAFGLAS® Stratavent® Eliminator™ Perforated base sheet.
- C. GAFGLAS® #80 Ultima™ Base Sheet

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D. GAFGLAS® #75 Base Sheet

## 2.11 Other Accessories

- A. Subject to compliance with requirements, provide the following products not available from manufacturer:
1. Wood Nailers: New wood nailers shall be pressure-treated for rot resistance, #2 or better lumber. Asphaltic or creosote-treated lumber is not acceptable.
  2. Roofing Nails: Galvanized or non-ferrous type and size as required to suit application.
  3. Temporary Sealant: Polyurethane foam sealant or similar as required to provide temporary watertight sealing of roofing.
  4. Air/Vapor Barrier: Polyethylene sheeting, min. 6 mil for TPO only.
  5. Air/Vapor Barrier: Asphalt impregnated kraft paper composite (Permate by BMCA Insulation Products).
  6. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (Dens-Deck® or Dens-Deck® Prime, by Georgia-Pacific).
  7. Urethane Adhesive: Membrane and/or insulation adhesive of acceptable type from approved manufacturer. Requires special approval from EverGuard Contractor Services.

## 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. All defects in the roof deck or substrate shall be corrected by the responsible parties before new roofing work commences. Verify that the deck surface is dry, sound, clean and smooth, free of depressions, waves, or projections. GAF is not responsible for determining the adequacy of the deck.
- D. Protect building surfaces against damage and contamination from roofing work.
- E. Where work must continue over completed roof areas, it is the general contractor's responsibility to protect the finished roofing system from damage. When no general contractor is involved, the roofing contractor is responsible for protecting finished roofing surfaces from damage.
- F. Deck preparation is the sole responsibility of the building owner or roofing contractor. All defects in the roof deck or substrate shall be corrected before roofing work commences.

- G. Prepare substrate surfaces thoroughly prior to application of new roofing materials. This is particularly important for recover and reroofing applications. Preparation includes, but is not limited to, removal of existing flashings, replacement of wet/damaged existing roofing materials, removal of loose aggregate, removal of abandoned equipment, supports and penetrations, replacement of damaged decking, etc. 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.

### 3.02 Preparation of Roofing Area – New and Tear-off Applications

- A. 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.
- B. Confirm quality and condition of roof decking by visual inspection, and by fastener pull-out testing. It is strongly recommended that a moisture survey be performed to existing roofing components that are to be recovered. GAF will not be responsible for damage determined to result from trapped moisture in the existing roof system. Remove and replace all existing roofing materials that contain moisture.
- C. Secure all loose decking. Remove and replace all deteriorated decking.
- D. Remove abandoned equipment and equipment supports.
- E. Confirm that height of equipment supports will allow the installation of full-height flashings.

### 3.03 Preparation of Roofing Area – Recover Applications

- A. Remove all stone ballast, loose gravel, and debris from the roof surface.
- B. Remove blisters and ridges from the roof membrane.
- C. Cut membrane away from all perimeter and penetration securements.
- D. Remove all existing flashings, including metal edgings, drain leads, pipe boots, and pitch pockets, and clean substrate surfaces of all asphalt and adhesive contaminants.
- E. It is strongly recommended that the building owner have a moisture survey performed to ascertain the condition and suitability of the existing roofing materials to receive a recover system. A survey is required if perlite or wood fiber insulation is used in a recover system. GAF will not be responsible for damage to the roofing system if it results from moisture in the existing roofing system. Remove and replace all existing roofing materials that contain moisture.

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- F. Confirm quality and condition of roof decking by visual inspection if possible, and by fastener pull-out testing. Remove and replace all deteriorated decking.
- G. Remove abandoned equipment and equipment supports.
- H. Raise equipment supports to allow the installation of full-height flashings.

## 3.04 Wood Nailer Installation

### A. Acceptable Material

1. Solid Blocking:  
Pressure-treated wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers.
2. Shim Material:  
Pressure-treated plywood, 1/2" x width to match solid blocking.

### B. Existing Nailers

Anchor to resist 250 lb. per ft. load applied in any direction.

1. DRILL•TEC HD screws 18" on center attachment to structural wood, steel decks. Min. 1" thread embedment.
2. DRILL•TEC spikes 18" on center attachment to concrete decks. Min. 1" shank penetration.
3. Polymer screws 12" on center attachment to gypsum concrete, cellular concrete, cementitious wood fiber decks. Min. 1-1/2" thread embedment.
4. 3 anchors per length of wood nailer minimum.

### C. New Nailers

Anchor to resist 250 lb. per ft. load applied in any direction.

1. DRILL•TEC HD screws 18" on center attachment to structural wood, steel decks. Min. 1" thread embedment.
2. DRILL•TEC spikes 18" on center attachment to concrete decks. Min. 1" shank penetration.
3. Polymer screws 12" on center attachment to gypsum concrete, cellular concrete, cementitious wood fiber decks. Min. 1-1/2" thread embedment.
4. 3 anchors per length of wood nailer minimum.

### D. Shim Material

Secure simultaneously with overlying solid wood nailer.

1. Shim material must be continuous; spaced shims are not acceptable.

## 3.05 Gypsum Board Installation

### A. General

1. Gypsum fire barrier board shall typically be installed when required by design professional or code authority to address code or approval requirements.

### B. Placement

1. Butt gypsum boards together with a 1/4" maximum space between adjoining boards. Fit gypsum boards around penetrations and perimeter with a 1/4" maximum space between board and penetration.
2. Install gypsum boards in pieces a minimum of 2' x 2' in size.
3. Gypsum boards installed over steel decking shall have boards placed perpendicular to deck flutes with edges over flute surface for bearing support.
4. Gypsum boards that are wet, warped or buckled shall not be installed and must be discarded. Boards that are broken, cracked, or crushed shall not be installed unless the damaged area is first removed and discarded.
5. Gypsum boards that become wet or damaged after installation must be removed and replaced.
6. Install no more gypsum board than can be properly covered by the end of each day with roofing membrane.

### C. Securement

#### 1. Mechanical Attachment

- a. Use appropriate type and length of DRILL•TEC™ fastener for structural deck type. See Insulation Attachment Table.
- b. Install required number of fasteners per board size and type of roofing system installed.
- c. Additional fasteners must be installed in corner/perimeter roof areas for all EverGuard® systems.
- d. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
- e. Install fasteners such that the fastener plate is pulled slightly below the board surface.

#### 2. Hot Asphalt

- a. Use ASTM D-312, Type III or Type IV asphalt.
- b. Apply asphalt at the rate of 25 lbs. per 100 sq. ft. over the entire surface to which the board is to be adhered.
- c. Asphalt application rates of up to 60 lbs. per 100 sq. ft. may be required if the substrate surface is rough or porous, such as an existing flood coat and gravel surfacing.
- d. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475°F.
- e. Walk in the boards after installation to ensure a proper bond.
- f. Maximum board size: 4' x 4'.

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g. Hot asphalt application requires priming of concrete and gypsum decks and existing asphaltic roofing systems.

### 3. Foam Adhesive

a. Depending on foam adhesive type, apply adhesive in full 1/4" - 1/2" thick coverage or in 3/4"-1" continuous beads according to the manufacturers instructions.

b. Adhesive beads shall be evenly spaced at the rate required for the insulation board size and type of roofing system being installed.

c. Apply adhesive when the air and surface temperature is at least 40°F.

d. Additional adhesive beads must be installed in corner/perimeter roof areas for EverGuard Fully Adhered and TriPOSITE™ systems.

e. Walk in the boards after installation to ensure a proper bond.

f. Maximum board size: 4' x 4'.

### 3.06 Air/Vapor Barrier Installation - Loose Applied

#### A. General

1. Air/vapor barrier sheet shall typically be installed when required by design professional to address internal building air pressure or humidity conditions.

2. Insulation must be installed over the air/vapor barrier sheet and mechanically attached to the deck.

#### B. Application

1. Install air/vapor barrier sheet loose-applied to the deck or fire barrier board so that wrinkles and buckles are not formed.

2. Overlap air/vapor barrier sheet a minimum of 6" for side and end laps. Tape laps together with duct tape.

3. Seal perimeter and penetration areas with foam sealant.

### 3.07 Air/Vapor Barrier Installation – Adhered

#### A. General

1. Air/vapor barrier sheet shall typically be installed when required by design professional to address internal building air pressure or humidity conditions.

2. Insulation must be installed over the air/vapor barrier sheet and mechanically attached to the deck or fully adhered to the air/vapor barrier sheet.

#### B. Application

1. Apply compatible adhesive to the structural deck or fire barrier board at the rate of approximately 1/2 gallon per 100 square feet, applied in approximate 1/2" wide ribbons.

2. Install air/vapor barrier sheet into the adhesive applied to the deck or fire barrier board so that wrinkles and buckles are not formed. Broom air/vapor barrier sheet to ensure full embedment into the adhesive.

3. Overlap air/vapor barrier sheet a minimum of 6" for side and end laps. Adhere laps together with compatible adhesive.

4. Seal perimeter and penetration areas with foam sealant.

### 3.08 Base Sheet Installation

#### A. General

1. Fiberglass base sheet shall typically be installed over all nailable substrates other than gravel-surfaced built-up roofing whenever insulation, recover board, or fire barrier board is installed in hot asphalt.

2. Nailable base sheet shall be applied over substrates that are not suitable for asphalt adhesion.

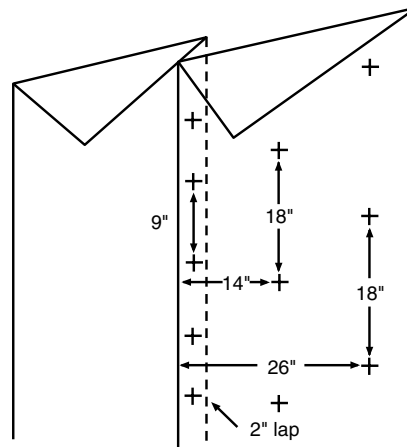
3. Install base sheet so that wrinkles and buckles are not formed.

4. Overlap base sheet a minimum of 2" for side laps and 6" for end laps.

#### B. Mechanical Securement-Nailable Base Sheet

1. Secure venting nailable base sheet through existing substrate to the deck. Use appropriate type and length of approved fastener for structural deck type, and install required number of fasteners in accordance with Figure 1.

Fig. 1



2. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.

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3. Install fasteners such that the fastener plate is pulled flush with the venting base sheet surface and lies flat on the deck surface.

## 3.09 Recover Board/Insulation Installation

### A. General

1. Insulation board shall be installed as required, in accordance with the Design Table.
2. An isocyanurate foam recover board overlay must be installed over expanded or extruded polystyrene insulation for all membrane applications adhered in solvent based bonding adhesive. The use of an overlay board with the joints taped is required for all membrane applications adhered in hot asphalt over polystyrene insulation.
3. The use of extruded and expanded polystyrene insulations is limited to a maximum roof membrane temperature of 165°F. Use under colored membranes requires special approval from EverGuard Contractor Services.
4. The use of extruded or expanded polystyrene insulation is limited in PVC roofing systems to where an overlay board is used or the membrane is fleece-back.

### B. Placement

1. Butt insulation boards together with a 1/4" maximum space between adjoining boards. Fit insulation boards around penetrations and perimeter with a 1/4" maximum space between board and penetration.
2. Install insulation boards in pieces a minimum of 2' x 2' in size. Every piece shall be properly secured to the substrate.
3. Insulation boards installed in multiple layers shall have the joints between boards staggered a minimum of 6" between layers.
4. Insulation boards installed over steel decking shall have boards placed perpendicular to deck flutes with edges over flute surface for bearing support.
5. Insulation shall be tapered to provide a sump area a minimum of 36" x 36" at all drains.
6. Insulation boards that are wet, warped or buckled shall not be installed and must be discarded. Insulation boards that are broken, cracked, or crushed shall not be installed unless the damaged area is first removed and discarded.
7. Insulation boards that become wet or damaged after installation must be removed and replaced.
8. Install no more insulation than can be properly covered by the end of each day with roofing membrane.

### C. Mechanical Securement

1. This application method is suitable for all deck and insulation types.
2. Use appropriate type and length of approved fastener for structural deck type. Install required number of fasteners per insulation type and board size in accordance with the Insulation Attachment Table.
3. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
4. Install fasteners such that the fastener plate is pulled slightly below the insulation board surface.

### D. Adhered Securement-Asphalt

1. Use ASTM D-312, Type III or Type IV asphalt.
2. Apply asphalt at the rate of 25 lbs. per 100 sq. ft. over the entire surface to which the insulation is to be adhered.
3. Asphalt application rates of up to 60 lbs. per 100 sq. ft. may be required if the substrate surface is rough or porous, such as an existing flood coat and gravel surfacing.
4. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475 F degrees.
5. Walk in the insulation boards after installation to ensure a proper bond.
6. Maximum board size: 4' x 4'.
7. Hot asphalt application requires priming of concrete and gypsum decks and existing asphaltic roofing systems.

### E. Adhered Securement-Adhesive

1. Depending on foam adhesive type, apply adhesive in full 1/4" - 1/2" thick coverage or in 3/4"-1" continuous beads according to the manufacturer's instructions.
2. Adhesive beads shall be evenly spaced at the rate required for the insulation board size and type of roofing system being installed.
3. Apply adhesive when the air and surface temperature is at least 40° F.
4. Additional adhesive beads must be installed in corner/perimeter roof areas for EverGuard Fully Adhered and TriPosite™ systems.
5. Walk in the insulation boards after installation to ensure a proper bond.
6. Maximum board size: 4' x 4'.

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## 3.10 Membrane Installation

### A. Placement

1. 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.
2. Full-width rolls shall be installed in the field and perimeter regions of the roof.
3. Overlap roof membrane a minimum of 3" for side laps and for end laps of fully adhered systems that utilize smooth backed reinforced membrane. Membranes are provided with a lap line along the side laps; the black line is for mechanically attached system overlaps and the red line is for adhered and ballasted systems overlap.
4. Install membrane so that the laps run across the roof slope lapped towards drainage points. Butt ends of fleece-backed membrane.
5. All exposed sheet corners shall be rounded a minimum of 1".
6. All cut edges of reinforced TPO membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
7. Overlap roof membrane a minimum of 3" for end laps of EverGuard® PVC and TPO membranes. End laps for EverGuard Fleece-Back Membranes are made by butting adjacent sheets and heat welding an 8" wide EverGuard PVC or EverGuard TPO reinforced membrane flashing strip over the joints.

### B. Supplemental Securement

1. Roof membrane must be mechanically secured at the perimeter, at the base of internal walls and curbs, and at all penetrations with DRILL•TEC Membrane Fasteners and Plates at a 12" on center maximum spacing. Membrane may be heat welded to coated metal flanges. Note: a minimum of 3 fasteners per penetration is required.
2. Alternatively, membrane may be extended vertically 3" up walls and curbs and secured to the wall/curb substrate within 2" of the plane of the roof with DRILL•TEC Membrane Fasteners and inverted Termination Bar at a 12" on center maximum spacing. This detail is required to be used for all pressurized buildings.
3. Mechanically attach membrane with screws and plates to the roof deck at locations of deck angle changes in excess of 5 angle degrees (1" in 12").
4. Fasteners must be installed to achieve the proper embedment depth. Install fasteners vertical to the deck, or horizontal to the wall/curb without lean or tilt.
5. Install fasteners so that the plate is drawn down tightly to the membrane surface. Properly installed fasteners will

not allow the plate/termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

### C. Cold Bonding Adhesive-Smooth Reinforced Membrane

1. Use appropriate bonding adhesive for substrate surface, applied with a solvent-resistant roller, brush or squeegee. When using EverGuard TPO and PVC adhesives, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, Dens-Deck, Dens-Deck Prime, Dens Guard, cured structural concrete absent of curing and sealing compound, untreated OSB, untreated CDX plywood, Type X gypsum board, and dry, sound masonry absent of curing or sealing compounds.
2. Fully adhere membrane sheets with bonding adhesive at the rate of 60 sq. ft. of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 100 sq. ft. of finished, mated surface area per gallon for water-based bonding adhesive. Coverage rates will vary depending on substrate. Porous substrates may require double application of adhesive. Apply bonding adhesive to both the underside of the membrane and the substrate surface. Allow solvents or water in adhesive to flash off.
3. Prevent seam contamination by keeping the adhesive application a few inches back from the seam area.
4. 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.
5. For solvent-based adhesives, mate membrane to the substrate coated with adhesive once the bonding adhesive has flashed off and is tacky to the touch. Water based adhesives must be allowed to dry completely; install membrane within one hour of drying.
6. Roll membrane to ensure complete bonding between adhesive and membrane.

### D. Cold Bonding Adhesive-Fleece Backed Membrane

1. Use appropriate bonding adhesive for substrate surface, applied with a solvent-resistant roller, brush or squeegee. When using EverGuard TPO and PVC adhesives, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, Dens-Deck, Dens-Deck Prime, Dens-Guard, cured structural concrete absent of curing and sealing compound, untreated OSB, untreated CDX plywood, Type X gypsum board, and dry, sound masonry absent of curing or sealing compounds.
2. Fully adhere membrane sheets with bonding adhesive at the rate of 60 sq. ft. /gal. for solvent-based bonding



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adhesives, and at the rate of 100 sq. ft./gal. for water-based bonding adhesive. Coverage rates will vary depending on substrate. Apply bonding adhesive to substrate surface only.

3. Prevent seam contamination by keeping the adhesive application a few inches back from the seam area.
4. Adhere approximately one-half of the membrane sheet at a time, rolling up each half of the membrane in turn to allow for adhesive application.
5. Lay membrane into adhesive as soon as practical; do not allow to dry or string.
6. Broom or roll membrane to ensure complete bonding between adhesive and membrane.

### E. Hot Asphalt-Fleece Backed Membrane

1. Use appropriate asphalt grade for deck slope, either Type III or Type IV.
2. Fully adhere membrane sheets with hot asphalt at the rate of 25 lbs. per 100 sq. ft. Apply asphalt to substrate surface only. A greater quantity of asphalt may be required based upon the substrate surface condition.
3. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.
4. Adhere approximately one-half of the membrane sheet at a time, rolling up each half of the membrane in turn to allow for asphalt application.
5. Lay membrane into asphalt immediately following asphalt application.
6. Broom membrane to ensure complete bonding between asphalt and membrane.

### F. Field Seaming

1. Fabricate field seams using a current-generation automatic hot air welding machine and a 10,000 watt voltage-controlled generator minimum. Outdated welding equipment and inadequate/fluctuating electrical power are the most common causes of poor seam welds.
2. Equipment Settings- The correct speed and temperature settings for automatic welders are determined by preparing test welds at various settings. The welds are tested by application of pressure, causing the seam to peel apart. A satisfactory weld will fail by exposing the scrim reinforcement called a "film tearing bond." A deficient weld fails by separating between the two layers of the membrane.
3. Adjustments to Equipment Settings - Many factors will affect the settings: thicker membranes, lower air temperatures, and overcast skies will generally require a slower speed than would be required with thinner membranes,

higher air temperatures, and sunny skies. The slower speed provides additional heat energy to compensate for heat-draining conditions. The test weld procedure should be conducted at the beginning of every work period (i.e., morning and afternoon) and following a significant change in weather (i.e., air temperature, wind speed, cloud cover.)

4. 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.
5. Weld width shall be a minimum 1-1/2" in width for automatic machine welding. Weld width shall be a minimum 2" in width for hand welding.
6. All cut edges of reinforced TPO membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
7. Fleece-backed membrane end laps shall be covered with 8" wide strips of smooth reinforced membrane, welded to each side of the butt joint.

### G. Membrane Surface Preparation

1. Membrane must be clean of dirt and contaminants, and free from dew, rain, and other sources of moisture. Factory-fresh membrane typically will not require cleaning prior to automatic welding, provided that welding is performed immediately after placement and securement of the membrane.
2. Membrane that has been exposed for over 12 hours or has become contaminated will require additional cleaning methods.
3. Light Contamination - Membrane that has been exposed overnight up to a few days to air-borne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard TPO or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.
4. 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 or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.
5. Exposure-Based Contamination - Membrane that is weathered/oxidized will require the use of EverGuard® TPO or PVC Cleaner 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 or PVC Cleaner. Be sure to wait for solvent to flash off prior to welding.

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Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above.

6. 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. Removal and replacement of the membrane is indicated in these situations.

## 3.11 Flashing Installation

### A. General

1. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
2. All coated metal and membrane flashing corners shall be reinforced with preformed corners or unreinforced membrane.
3. Heat weld all flashing membranes, accessories, and coated metal together to achieve a minimum 2" wide (hand welder) weld.
4. All cut edges of reinforced TPO membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
5. When using bonding adhesive, be sure to use adhesive specific to membrane type.
6. Minimum flashing height is 8".

### B. Coated Metal Flashings

1. Coated metal flashing allows much of the metalwork used in typical roofing applications to benefit from the security of heat-welded membrane seaming, with a corresponding reduction in required metalwork maintenance during the life of the roofing system. Coated metal is required to be used in extended length guarantees.
2. Coated metal shall be formed in accordance with construction details and SMACNA guidelines.
3. Coated metal sections used for roof edging, base flashing, and coping shall be butted together with a 1/4" gap to allow for expansion and contraction. Heat weld a 6" wide reinforced membrane flashing strip to both sides of the joint, with approximately 1" on either side of the joint left unwelded 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.
4. Coated metal used for sealant pans and scupper inserts, and 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. Heat weld a 6" wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.

5. Provide a 1/2" hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
6. Coated metal base flashings must be provided with min. 4" wide flanges nailed to pressure-treated wood nailers. Coated metal base flashings must be formed with a 1" cant.
7. In addition, provide a 1/2" hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
8. Coated metal flashings are nailed to treated wood nailers or otherwise mechanically attached to the roof deck, or to the wall or curb substrate, in accordance with construction detail requirements.

### C. Adhered Reinforced Membrane Flashings - Smooth Surface

1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.
2. When using EverGuard TPO and PVC adhesives, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, Dens-Deck, Dens-Deck Prime, Dens-Guard, cured structural concrete absent of curing and sealing compound, untreated OSB, untreated CDX plywood, Type X gypsum board, and dry, sound masonry absent of curing or sealing compounds.
3. Apply bonding adhesive to both the substrate surface and the underside of the flashing membrane, at the rate of 60 sq. ft. of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 100 sq. ft. of finished, mated surface area per gallon for water-based bonding adhesive. Coverage rates will vary depending on substrate. The solvent adhesive must be allowed to dry until tacky to the touch before flashing membrane application. Water based adhesive must be allowed to dry completely to the touch; install the flashing within one hour of drying.
4. Apply the adhesive only when the outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow easier adhesive application.
5. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
6. All laps in EverGuard smooth-reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.

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7. Porous substrates may require double application of adhesive.
8. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

## D. Adhered Reinforced Membrane Flashings - Fleece Back

1. Apply bonding adhesive to the substrate at the rate of 60 sq. ft./gal for solvent based adhesive and at a rate of 100 sq. ft./gal for water based adhesive.
2. The bonding adhesive must remain wet to the touch for one surface applications.
3. Apply the adhesive only when the outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow easier adhesive application.
4. All selvage edge laps in EverGuard Fleece-Back flashing membrane shall be heat welded in accordance with heat welding guidelines. Lap width is 3”.
5. Non-selvage edge laps in EverGuard Fleece-Back flashing membrane are made by butting adjacent sheets and heat welding an 8” wide strip of EverGuard PVC or EverGuard TPO Flashing membrane over joint.
6. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

## E. Loose Reinforced Membrane Flashing

1. For extended length guarantees separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.
2. Carefully position the EverGuard® smooth reinforced flashing membrane prior to application to avoid wrinkles and buckles.
3. All laps in Everguard smooth reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.
4. Maximum flashing height is 18" unless incremental attachment is used.

## F. Unreinforced Membrane Flashings

1. Unreinforced membrane is used as a field-fabricated penetration/reinforcement flashing only where pre-formed corners and pipe boots cannot be properly installed.
2. Penetration flashings constructed of unreinforced membrane is typically installed in two sections, a vertical piece that extends up the penetration, and a horizontal piece that extends onto the roofing membrane. The two pieces are overlapped and heat-welded together.
3. The unreinforced vertical membrane flashing shall be

adhered to the penetration surface. Apply bonding adhesive to both the penetration surface and the underside of the flashing membrane, at the rate of 60 sq. ft. of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 100 sq. ft. per finished, mated surface area per gallon for water-based bonding adhesive. Coverage rates will vary depending on substrate. Solvent based adhesive must be allowed to dry until tacky to the touch before flashing membrane application. Water based adhesive must be allowed to dry completely to the touch; install the flashing within one hour of drying.

## G. Roof Edging

1. Roof edge flashing is applicable for both gravel stop/drip edge conditions as well as exterior edges of parapet walls.
2. Flash roof edges with coated metal flanged edging with a minimum 3" wide flange nailed 4" on center to pressure-treated wood nailers, and heat weld roof membrane to metal flanges.
3. Coated metal roof edging must be provided with a continuous metal hook strip to secure the lower fascia edge if the fascia width is 4" or greater. The continuous hook strip must be secured to the building a minimum of 12" on center.
4. Alternatively, flash roof edges with a 2-piece snap-on fascia system, adhering roof membrane to metal cant with bonding adhesive and face-nailing the membrane 8" on center prior to installing the snap-on fascia.
5. Galvanized metal edging may be flashed in using EverGuard TPO Self-Adhered Cover Strip after priming both the metal and the TPO membrane for up to 15 year guarantees. Allow approximately 2" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. Caulk the back edge of the tape with EverGuard Caulking when slope exceeds 1" in 12".
6. Flash roof edge scuppers with a scupper insert of coated metal that is mechanically attached to the roof edge and integrated as part of the metal edging.

## H. Parapet and Building Walls

1. Flash walls with membrane flashing adhered to the wall substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to pressure-treated wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the wall surface and membrane flashing underneath all termination bars. Exposed termination bars shall be

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mechanically fastened a maximum of 6" on center; termination bars that are counterflashed shall be fastened 12" on center.

3. Roof membrane must be mechanically attached along the base of walls that are flashed with membrane flashing with screws and plates/termination bar with 12" on center maximum spacing.
4. All coated metal wall flashings must be provided with separate metal counterflashings, or metal copings.
5. Metal counterflashings may be optional with fully adhered membrane wall flashings depending on guarantee duration. All termination bars must be sealed with caulking.
6. Flash wall scuppers with a scupper insert of coated metal that is mechanically attached to the wall and integrated as part of the wall flashing.
7. Maximum flashing height without intermediate fastening:
  - 18" - Loose-Applied Flashing
  - 54" - Adhered Flashing

## I. Round and Square Tube Penetrations

1. Flash penetrations with preformed vent boots provided that the penetrations are accessible from the top. Otherwise, field-fabricate flashing with two-piece field fabricated flashings of unreinforced membrane.
2. All flashings require the installation of a stainless steel draw band around the top of the flashing. Seal the top edge with water block and add draw band with caulking.
3. Roof membrane must be mechanically attached at the base of each penetration with screws and plates a minimum of 12" on center, with a minimum of three fasteners per penetration.

## J. Irregularly-Shaped Penetrations

1. Flash irregularly shaped penetrations with flanged sealant pans formed of coated metal, secured to the deck through the roof membrane with screws 6" on center, a minimum of two per side.
2. Strip in metal flanges and the vertical pop riveted seam with 8" wide membrane flashing strips heat welded to both the roof membrane and the metal flanges.
3. Fill sealant pans with EverGuard 2-part pourable sealant. Alternatively, fill sealant pans with non-shrink quick-set grout, and top off sealant pans with a 2" minimum thickness of 2-part pourable sealant.

## K. Curbs and Ducts

1. Flash curbs and ducts with membrane flashing adhered to the curb substrate with bonding adhesive, or with coated metal flashing nailed 4" on center to pressure-treated wood nailers.

2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the curb/duct surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 6" on center maximum; termination bars that are counterflashed shall be fastened 12" on center.
3. Roof membrane must be mechanically attached along the base of walls that are flashed with membrane flashing with screws and plates/termination bar with a 12" on center maximum spacing.
4. All coated metal curb flashings and loose membrane flashings must be provided with separate metal counterflashings, metal copings, or flashed with equipment flanges.
5. Metal counterflashings may be optional with fully adhered membrane curb and duct flashings depending on guarantee duration.
6. All termination bars must be sealed with caulking.

## L. Expansion Joints

1. Install prefabricated expansion joint covers at all flat type and raised cant/curb type expansion joint conditions. All metal nailing strips must either be nailed to pressure-treated wood nailers, cants or curbs, or secured to walls with screws or expansion anchors appropriate to substrate type.
2. Roof membrane must be mechanically attached along the base of raised cant/curb expansion joints with screws and plates a minimum of 12" on center.
3. Expansion joint bellows must be twice the width of the expansion joint opening to allow for proper expansion/contraction.
4. Metal nailing strip must be set in water block and secured with fasteners and neoprene washers fastened 6" o.c.
5. Alternately, expansion joints may be field fabricated.

## M. Roof Drains

1. Roof drains must be fitted with compression clamping rings and strainer baskets. Both original-type cast iron and aluminum drains, as well as retrofit-type cast aluminum and molded plastic drains, are acceptable.
2. Roof drains must be provided with a min. 36" x 36" sumped area. Slope of tapered insulation within the sumped area 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 1/2" of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.

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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 rate is one 10.5 oz. cartridge per drain.
  5. For fleece-backed roof membrane applications, the fleece-backed membrane is cut just short of the drain flange. A separate smooth reinforced membrane drain flashing sheet is heat welded to the roofing membrane and set into the drain bowl in a full bed of water block, and secured as above.
  6. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate smooth roof membrane drain flashing a minimum of 12" larger than the sump area must be installed. The membrane flashing shall be heat welded to the roof membrane.
  7. Tighten the drain compression clamping ring in place.
- N. Scuppers**
1. Coated metal roof edge scuppers must be provided with a min. 4" wide flange nailed to pressure-treated 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" wide flanges, with additional corner pieces pop-rieveted 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" on center, a minimum of 2 fasteners per side.
  4. All corners must be reinforced with EverGuard PVC or EverGuard TPO Universal Corners.
  5. Strip in scupper with flashing membrane target sheet.
- O. Heater Stacks**
1. Field-fabricated two-piece membrane flashings of EverGuard UN 55 Unreinforced flashing are typically installed at heater stacks.
  2. Heater stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not adhered directly to the heater stack.
  3. Mechanically attach the roof membrane to the structural deck with DRILL•TEC™ screws and plates around the penetration base prior to flashing installation.
  4. All stack flashings must be secured at their top edge by a stainless steel clamping band placed over water block, and sealed with EverGuard Caulking.
5. Field-fabricated membrane flashings must be adhered to the flashing sleeve with EverGuard TPO or EverGuard PVC Bonding Adhesive.
- P. Drain Inserts - PVC Only**
1. EverGuard® PVC roofing membrane is typically terminated at EverGuard PVC drain inserts by heat welding the membrane to the PVC coated drain flange (if available), or by securing the membrane between the drain flange and the clamping ring.
  2. Drain inserts shall only be used in the event the original drain is damaged and cannot be repaired without complete replacement of the drain.
  3. All drains shall be provided with a drain sump of a 36" x 36" minimum dimension.
  4. The drain insert is installed on top of the roofing membrane and is secured to the roof deck 6" O.C. with DRILL•TEC screws.
  5. A separate reinforced membrane drain flashing sheet is heat welded to the roofing membrane. The drain flashing sheet is heat welded to a compatible drain flange.
  6. Install the drain clamping ring over the drain flashing sheet if applicable.
  7. All drains shall be provided with a strainer basket.
- Q. Wood Support Blocking**
1. Pressure-treated wood support blocking, typically 4" x 4", is typically installed under light-duty or temporary roof-mounted equipment, such as electrical conduit, gas lines, and condensation drain lines.
  2. Install wood support blocking over a protective layer of EverGuard PVC or TPO membrane or EverGuard Walkway Pad.
- R. Satellite Dish Support Bases**
1. Install satellite dish support bases over a protective layer of EverGuard Walkway Pad.
- S. Lightning Suppression Clips**
1. Embed lightning suppression clips in EverGuard Caulking applied to a protective layer of EverGuard PVC or EverGuard TPO Flashing membrane heat welded to the roof membrane.
  2. Alternatively, secure lightning suppression clips to the roof surface by means of 2" wide EverGuard PVC or EverGuard TPO Flashing membrane strips heat welded to the roof membrane.
- 3.12 Traffic Protection**
- A.** Install walkway pads/rolls at all roof access locations including ladders, hatchways, stairways and doors, and

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other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

- B. Walkway pads must be spaced 2" to allow for drainage between the pads.
- C. Fully adhere walkway pads/rolls to the roof membrane with solvent-based bonding adhesive, applied at the rate of 1 gal. per 120 sq. ft. to both the walkway and roof membrane surfaces. Press walkway in position once adhesive is tacky to the touch. Finish by placing a bead of caulk around the entire walkway pad or roll.
- D. Alternatively, heat-weld walkway pads/rolls to the roof membrane surface around the entire perimeter of the pad/roll.
- E. TPO walkway pads may also be installed with TPO primer and 3" seam tape. First, roll or brush the TPO primer on the back of the TPO pad along the edges and down the middle of length of the pad. Clean and prime the roof membrane where the pad will be installed. Install tape to the back of the pad where cleaned (edges and middle) and roll in with a silicone hand roller. Remove the release paper and install the taped pads directly onto the roof membrane. Secure the pads by rolling into place.

### 3.13 Temporary Closures

- A. The roofing installation must be made watertight at the end of each day's activity to prevent water infiltration into the completed roofing system installation.
- B. Complete all flashings and terminations as the roofing installation progresses.
- C. At the edge of the completed roofing system installation, extend the roofing membrane a minimum of 6" beyond the edge. Seal the roofing membrane to the surrounding deck or substrate surface with hot asphalt or foam sealant.
- D. Remove all temporary night seal materials prior to continuing with the roof installation and dispose of properly.

### 3.14 Field Quality Control

- A. Inspect completed roof sections on a daily basis. It is the contractor's responsibility to probe all heat-welded seams and perform an adequate number of seam cuts to ascertain seam consistency.
- B. Immediately correct all defects, irregularities, and deficiencies identified during inspections.
- C. Remedial work shall be performed with like materials and in a manner consistent with the balance of the roofing installation so as to minimize the number of repair patches.
- D. Excessive patchwork will require replacement of the entire affected membrane section, from lap to lap.

### 3.15 Cleaning

- A. Remove bonding adhesive, bituminous markings and other contaminants from finished surfaces. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this or other sections, consult manufacturer of surfaces for cleaning advice and conform to those instructions.
- B. Cut out and remove any sheet membrane contaminated with solvent based adhesive, bituminous markings, and other contaminants from finished surface. Repair sheet damage by first cleaning the area with an all-purpose cleaner, then rinse off soapy residue. Reactivate membrane using the appropriate EverGuard cleaner, wiping with a damp (not saturated) rag. Complete repair by installing a patch of like material to specific system requirements.

### 3.16 Maintenance

- A. Upon completion of the roofing system, provisions should be made to establish a semi-yearly inspection and maintenance program in accordance with standard good roofing practice and GAF guarantee requirements.
- B. Repair cuts, punctures and other membrane damage by cleaning membrane with the appropriate EverGuard® TPO or PVC Cleaner, followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2" beyond the damaged area.
- C. Any damage to adhered membrane areas or at locations of mechanical attachment shall be repaired so that the repaired area remains fully adhered or mechanically attached.