

EverGuard® System Design Guide

Information Sheet

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From North America's Largest Roofing Manufacturer™*

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EVERGUARD® EPDM

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IMPORTANT: ALWAYS REVIEW SAFETY INFORMATION ON LABEL AND MSD SHEETS

SYSTEM DESIGN GUIDE

ADHERED, BALLASTED, AND MECHANICALLY ATTACHED EVERGUARD® EPDM ROOFING SYSTEM

1.01.1 PRELIMINARY SYSTEM SELECTOR GUIDE

EverGuard® EPDM roofing Systems are suitable for many commercial and industrial roofing applications. The following chart is provided to assist in determining the applicability of specific EverGuard EPDM Roofing Systems based on various building conditions.

CHART OF EVERGUARD EPDM ROOFING SYSTEM APPLICABILITY

System	Slope	Barrel, Arch, etc.	Maximum Height	Minimum Pullout Resistance	Maximum Guarantee Term
Adhered	Unlimited	OK	250' (76.2 m)	300 lbf (136 N)	20 Years
Ballasted	Max. 2:12	NO	75' (22.8 m)	N/A	20 Years
MAS	Max. 4:12	OK	120' (36.6 m)	400 lbf (181 N)	15 Years
EverGuard MAX MAS	Max. 6:12	OK	120' (36.6 m)	400 lbf (181 N)	20 Years

Should any of the building parameters fall outside the limits stated above, contact EverGuard Contractor Services Department for special considerations.

NOTES:

1. This manual outlines the minimum requirements for a GAFMC guarantee.
2. A design professional should review the proposed system assembly for its applicability on each project.
3. Project construction must be acceptable under local building codes.
4. Structure must be capable of bearing the weight of the selected system.
5. Refer to the Wind Design Guide section of this manual for specific membrane attachment requirements.
6. Refer to Section 1.15.1 C for fastening requirements for Mechanically Attached Systems should pull-out values be less than 400 lbf (181.4 kg).

1.02.1 LIMITATIONS

- A.** The EverGuard EPDM System will not be covered by a guarantee if any of the following conditions exist:
 1. Roofs where structural conditions are insufficient to support the load of the completed roof installation and other anticipated loads as identified by the owner's engineer or architect.
 2. Installations that are considered plaza deck construction, waterproofing, pond liners, etc.
 3. Individual residences.
- B.** The EverGuard EPDM System should not be used without special consideration from the EverGuard Contractor Services Department if any of the following conditions exist:
 1. Projects that require special warranty coverage.
 2. Roofs exposed to chemical discharge.
 3. Roofs with non-linear slopes such as arches, domes, barrels, etc. or outside the limits as listed in the chart above.
 4. Roofs subject to positive pressure conditions, air infiltrating decks, canopies, overhangs or similar construction.
 5. Buildings with large openings in a wall (greater than 10% of the wall surface) that could be left open in a storm, such as aircraft hangars, distribution centers, etc.

- C. The EverGuard® EPDM system should not be used without special consideration from the EverGuard Contractor Services Department, a Design Professional, and/or local building code official if any one of the following conditions exist:
1. Geographical areas susceptible to hurricanes.
 2. Roofs located in down slope or foothills of mountain ranges.
 3. Roofs located where localized wind phenomenon may occur.
 4. Cold storage and freezer facilities.
 5. Roofs subjected to specific building code requirements or similar regulations. For approvals, contact the local building code official.
 6. Mechanically attached systems located within 5 miles of an ocean coastline or within 1,500 feet (457 m) of a Great Lake coastline.

1.03.1 JOB SITE CONSIDERATIONS

- A. The EverGuard EPDM System must be installed by an EverGuard Approved Applicator.
- B. The EverGuard EPDM System requiring a Diamond Pledge™ Roof Guarantee is inspected by an EverGuard Inspector upon completion. Projects with membrane-only warranties are not inspected.
- C. Consultation:
1. EverGuard Contractor Services Department is available for consultation with respect to all deviations from current EverGuard specifications and details.
 2. If there is any deviation from this specification without first obtaining written approval from EverGuard Contractor Services Department, it may not be possible for GAFMC to issue the desired guarantee.

1.04.1 SAFETY CONSIDERATIONS AND WARNINGS

- A. General
Installation of a roof system is a construction process. As with any construction process, safety is a key element. All applicable safety standards and good roofing practices must be followed. Fire prevention is the applicator's responsibility.
- B. Warning
APPLICATION/USE OF THESE PRODUCTS MAY RESULT IN PHYSICAL INJURY, AND MAY BE FATAL. REVIEW MSD SHEETS AND PRODUCT LABELS FOR MORE INFORMATION.
- C. General Precautions
- **READ AND UNDERSTAND GAFMC'S SPECIFICATION MANUAL** before starting application. Follow all precautions and direction.
 - Only properly trained and professionally equipped roofing contractors experienced in the installation should install these systems.
 - **FIRE PREVENTION INSPECTIONS** should be conducted periodically during installation, with a final inspection being conducted upon completion of the day's work.
 1. **SOLVENT CONTAINING ADHESIVES, CEMENTS AND COATING ARE COMBUSTIBLE AND SHOULD ALWAYS BE KEPT AWAY FROM HEAT, OPEN FLAME, OR ANY SOURCE OF IGNITION.** Empty containers must be disposed in posted toxic substance landfills in accordance with local, state and federal regulations.
 2. **THOROUGHLY TRAIN ALL PERSONNEL ON PREVENTING AND EXTINGUISHING FIRES.**
 3. **PROVIDE** in the immediate work area the appropriate number of (1) ABC-rated **FIRE EXTINGUISHERS.**
 - **WEAR PERSONAL PROTECTIVE GEAR.** Always use approved safety hardhat, goggles, heavy-duty gloves, appropriate clothing and boots.
 - **WHEN WORKING WITH SOLVENT CONTAINING ADHESIVES, CEMENTS AND COATINGS, AVOID DIRECT CONTACT AND INSURE ADEQUATE VENTILATION.** Wear appropriate protective equipment. Refer to product MSDS for additional information.

- **THOROUGHLY TRAIN ALL PERSONNEL IN FIRST AID PROCEDURES.**
- Always **COMPLY WITH ALL APPLICABLE OSHA SAFETY STANDARDS** and fire codes.
- **USE EXTREME CAUTION** when working around equipment, such as gas lines or HVAC units, which have electrical and/or gas connections,

FUMES FROM ADHESIVE SOLVENTS MAY BE DRAWN INTO THE BUILDING DURING INSTALLATION. REFER TO THE TECHNICAL INFORMATION SHEET “RECOMMENDED GUIDELINES FOR WORKING ON AN OCCUPIED BUILDING” IN THIS MANUAL FOR SPECIFIC GUIDELINES WHEN INSTALLING ADHESIVES ON AN OCCUPIED BUILDING

1.04.2 JOB SITE CONSIDERATIONS (OTHER CAUTIONS)

- A.** Do not allow asphalt, coal tar, oil base or plastic roof cements, and re-saturated roof products to come in direct contact with the waterproofing components of the EverGuard EPDM System.
- B.** Protect all components of the EverGuard EPDM system from discharges such as petroleum products, greases, oils (mineral and vegetable), and animal fats. **Refer to the Detail Section of this Manual for installation guidelines.**
- C.** Protect the EverGuard EPDM System from direct contact with continuous steam or heat sources when the in-service temperature is in excess of 180°F (82°C).
- D.** GAFMC does not review or calculate dew point analyses and, therefore, does not accept responsibility for damage due to recurrence rate or location of dew point.
- E.** Be careful about the effect of loads on the structure/decking due to the staging of materials as a part of system installation. The project designer should specify the load limitations to be observed by the EverGuard Approved Applicator.
- F.** Due to the nature of the Mechanically Attached EverGuard EPDM System, some fluttering or billowing of the membrane can be expected and may produce sound under certain conditions.
- G.** Roofs of cold storage facilities constitute a special condition. A cold storage designer should be consulted.
- H.** Provide adequate protection to the finished areas of the EverGuard Roof System from damage that may result due to the continued construction process.
- I.** Special Considerations for Re-roof or Re-cover Applications:
 - 1. The effect of existing moisture on the performance of the new system may be significant depending upon the components selected. Therefore, a moisture survey should be conducted to determine the moisture content of the existing roof system components. All components of the existing system that would be detrimental to the new EverGuard® System must be removed prior to its installation.
 - 2. Confirm the structural integrity of the existing deck and specify repair or replacement as required.
 - 3. When re-roofing over existing roof systems, refer to section 1.06.1 for additional information or contact EverGuard Contractor Services Department for special requirements.
 - 4. Limitations on flashing heights may be encountered. Existing building features (i.e., door or window locations) may not allow for sufficient clearance to provide proper termination above the potential water level. Detailed consideration of this condition is critical to the integrity of the roofing system. Contact the EverGuard Contractor Services Department for assistance.

5. Confirm compatibility of new components with existing materials that are left in place.
6. If existing nailers are reused, confirm the structural integrity of the nailer and nailer attachment.

1.05.1 PRODUCT CONSIDERATIONS

Membrane Gauge	Maximum Guarantee Term	
	5-15 Years	20 Years
.045" (1.14mm) Non-Reinforced	Yes	No
.060" (1.52mm) Non-Reinforced	Yes	Yes(Adhered only)
.045" (1.14mm) Reinforced	Yes	Yes
.060" (1.52mm) Reinforced	Yes	Yes

1.06.1 SUBSTRATE CONSIDERATIONS

- A. Generally the substrate to which the EverGuard Roofing System is installed must be structurally sound, smooth, flat, clean, dry, free of sharp fins, or foreign materials that could damage the material.
- B. Responsibility for providing surfaces suitable to receive the EverGuard EPDM System is typically assigned to the General Contractor. Prior to the onset of work, the surface of roof sections (defined by expansion joints, walls, etc.) must be accepted by the EverGuard Approved Contractor.
- C. It is the Design Professional's responsibility to determine the need for a thermal barrier that meets local building code requirements.
- D. The Building Owner or Owner's Design Professional is responsible for ensuring that all wet insulation and wet substrate has been removed in a re-roofing application. The best diagnostic technique for locating wet areas is by taking and evaluating a series of roof cores. Three techniques are currently available to evaluate the roof by indirect means: nuclear moisture detection, infrared thermography and electric capacitance. Results of these studies must still be correlated with roof cores. These techniques provide measurements of factors that can be associated with the presence of moisture.
- E. The following is a chart of substrate requirements for the EverGuard EPDM Systems:

**CHARTS OF ACCEPTABLE SUBSTRATES
NEW CONSTRUCTION OR TEAR-OFF APPLICATIONS**

Type of Substrate	Guarantee Term	Adhered Systems	Ballasted	Mechanically Attached
Steel - min. Gauge (0.76 mm)	20 Years	Insulation required	Insulation required	Insulation required
Structural Concrete or Precast min. 3000 psi (20684 kPa)	20 Years	Insulation required (1)	Insulation required	Insulation required
Plywood or Oriented Strand Board min. 1/2" (12.7 mm) (2)	1/2" 15 Years 5/8" 20 Years	Insulation required (3)	Insulation required	Insulation or EverGuard® Polymat(3)
Wood Planking - min. 3/4" (19.1 mm)	20 Years	Insulation required	Insulation required	Insulation required
Poured or Pre-cast Gypsum and Cementitious Wood min. 2" (51 mm)	20 Years	Insulation required	Insulation required	Insulation required
Lightweight Concrete Decks and Fills (4)	20 Years	Refer to lightweight chart Section 1.06.1.7	Refer to lightweight chart Section 1.06.1.7	Refer to lightweight chart Section 1.06.1.7

RECOVER APPLICATIONS

Type of Substrate	Adhered Systems	Ballasted	Mechanically Attached
Existing Smooth Surface Built-Up, SBS, or APP(7)	Insulation required	Insulation required	Insulation or EverGuard Polymat required
Coal Tar Pitch or Gravel Surfaced Built-Up or SBS Roofs (5,6,7)	Insulation required	Insulation required	Insulation required
Mineral Surface Built-Up or SBS Roofs (7)	Insulation required	Insulation required	Insulation or EverGuard Polymat required
Sprayed In-Place Urethane	Complete tear-off required	Complete tear-off required	Complete tear-off required
Existing roofs over phenolic insulation (8)	Roof system and insulation must be removed	Roof system and insulation must be removed	Roof system and insulation must be removed
Existing Single-Ply Systems (7)	Insulation required	Insulation required	Insulation required
Metal Roofs	Refer to Metal Building Recover Specification	Not Acceptable	Not Acceptable

All deck requirements as noted will pertain to new construction, tear-off and recover applications. For a list of acceptable insulations, refer to section 1.12.1.

- NOTES:**
1. If the concrete has been finished to provide a substrate that is clean, dry, smooth, free of sharp edges, fins, loose or foreign materials, oil, grease and other materials which may damage the membrane, and is structurally sound, the EverGuard EPDM Membrane may be fully adhered directly to poured-in-place structural concrete.
 2. Fire-treated plywood may be used only if it has **not** been treated with ammonium phosphates.
 3. The Adhered and Mechanically Attached Systems may be installed directly to a plywood or oriented strand board deck when:
 - a. The surface is clean, dry, smooth, free of sharp edges, fins, loose splinters or foreign materials that may damage the membrane.
 - b. The deck is secured using threaded fasteners and insulation plates that provide a smooth profile, meeting FM 4470. NOTE: Nails are not permitted.

4. An acceptable EverGuard® insulation and vapor retarder must be installed. Refer to section 1.06.1.7 of this specification for specific requirements. EverGuard Mechanically Attached Systems may be installed directly to the lightweight concrete or over an EverGuard Polymat provided that the deck is clean, smooth, free of sharp edges, fins, loose or foreign materials, oil, grease, and other materials which may damage the membrane.
5. COAL TAR WARNING: Flow of existing coal tar into the building may occur when new fasteners penetrate an existing coal tar pitch membrane.
6. The removal of loose gravel may be required to meet local building code requirements or for structural consideration. If loose gravel is removed, some method of leveling may be required to provide a suitable substrate for insulation.
7. Existing roof systems (re-cover or tear-off) over lightweight concrete require special installation requirements. Existing insulated roof systems over lightweight insulating decks and fills must be removed. After removal of the existing roof system to the lightweight concrete deck, the installation requirements for the new EverGuard EPDM system shall be as outlined in the "Roof Decks" Section of the specification.
8. When phenolic insulation is removed, a visual inspection of the deck condition and other components is required and all deteriorated components must be replaced as necessary.

ROOF DECKS

GAFMC does not manufacture or install structural roof decks. Acceptance of the deck for application of the roof system is the responsibility of the architect and/or designer. Acceptance of a roof deck by GAFMC as satisfactory to receive roof materials only refers to the top deck surface

The minimum roof deck requirements which follow are provided as supplementary guides for the roof designer and erector; new or unusual decks not included in this manual must be approved in writing by an EverGuard Contractor Services Manager in order to be eligible for a roofing system to receive a GAFMC guarantee.

1.06.1.1 Steel, min. 22 gauge (0.76 mm)

Steel decks must be a minimum uncoated thickness of 22 gauge (0.76 mm) and require the installation of EnergyGuard™ insulation(s) prior to the application of the EPDM membrane. Insulation may be installed in either a single or multi-layer assembly using EverGuard Insulation Plates and Fasteners. A combination of plates and fasteners for the bottom layer, and hot asphalt or EverGuard-accepted insulation adhesive for the top layer(s) may also be used. Refer to the "Insulation Attachment" and the "Technical Information Section" of this manual for additional information. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

1.06.1.2 Poured-In-Place Structural Concrete, min. 3,000 psi (20,684 kPa)

Poured-in-place structural concrete decks use large amounts of water for pouring, which may remain as moisture within the deck even though the surface appears dry. Concrete decks may also retain moisture after precipitation. Moisture retained in the deck may have detrimental effects on the insulation and membrane system, such as poor adhesion of the roof components and blistering of the finished membrane system.

Perform a deck dryness test to determine readiness. This test must be performed prior to application of asphalt primer. The NRCA (National Roofing Contractors Association) recommends two methods, one involving a pane of glass and the other using hot asphalt. Following is a summary of both tests:

1.06.1.2.1 Procedure using the Glass Method

- A. During midday sun, place a pane of glass about 12" X 12" (30 X 30 mm) on the concrete deck. Seal the edges of the glass to the deck using caulking or tape.
- B. Allow the glass to remain in place for two hours. If condensation appears on the bottom of the glass, the deck is not dry enough to roof.

1.06.1.2.2 Procedure using the Hot Asphalt Method

Pour a pint of bitumen [approximately 400 °F (206 °C)] on the deck. If the bitumen foams, the deck is not dry enough to roof. If no foaming occurs, after the bitumen has dried, attempt to peel the bitumen from the deck. If the bitumen peels, the deck is not dry enough to roof even if foaming was not present during the initial pouring.

Deck testing must take place not only at job start-up but also after any precipitation using one of the above methods.

Insulation may be attached using EverGuard® Insulation Plates and Fasteners, a full mopping of ASTM D 312, Type III or Type IV hot asphalt, or a EverGuard-accepted insulation adhesive. When using asphalt (or asphalt-based adhesives) for attachment, the deck must be completely and uniformly primed by applying Matrix™ 307 asphalt primer at the rate of 1 gallon per 100 square feet and allowed to dry prior to installation of insulation. Maximum insulation board size for asphalt attachment is 4' X 4' (1.2 m X 1.2 m). Other insulation adhesives may require priming of the deck per the manufacturer's requirements. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.3 Pre-Cast Concrete Plank

Pre-cast concrete plank decks require the application of an accepted EverGuard insulation prior to the installation of the EPDM membrane. Insulation may be attached using a full mopping of ASTM D 312, Type III or IV hot asphalt or an EverGuard-accepted insulation adhesive. When using asphalt (or asphalt-based adhesives) for attachment, the deck must be completely and uniformly primed by applying Matrix™ 307 asphalt primer at the rate of 1 gallon per 100 square feet and allowed to dry prior to installation of insulation. Maximum insulation board size for asphalt attachment is 4' X 4' (1.2 m X 1.2 m). Other insulation adhesives may require priming of the deck per the manufacturer's requirements. Insulation may not be mechanically attached directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.4 Plywood, Oriented Strand Board or Waferboard, min 1/2" (12.7 mm), Wood Plank, min. 3/4" (19 mm)

Wood decks are typically exterior grade plywood, wood plank or oriented strand board (OSB). Wood decks must be a minimum of 1/2" thick. Fire-treated wood may be used as long as it has not been treated with ammonium phosphates. However, certification from the manufacturer is recommended, stating that structural damage will not occur to the deck or fasteners.

Wood decks must be a minimum of 1/2" (12.7 mm) and require the installation of EverGuard insulation prior to the application of the EPDM membrane. Insulation may be installed in either a single or multi-layer assembly using EverGuard Insulation Plates and Fasteners. A combination of plates and fasteners for the bottom layer, and hot asphalt or EverGuard-accepted insulation adhesive for the top layer(s) may also be used. Refer to the "Insulation Attachment" and the "Technical Information Section" of this manual for additional information. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.5 Gypsum Decks, min. 2" (51 mm)

Poured gypsum decks are typically poured over a formboard that is supported by a bulb tee support system. The minimum acceptable thickness of poured gypsum is 2" (51 mm), not including the formboard. Gypsum planks are typically tongue and groove, poured in the factory, and then shipped to the jobsite. The minimum acceptable thickness of gypsum planks is 2" (51 mm).

Gypsum decks require the installation of EverGuard® Insulation prior to the application of the EPDM membrane. Insulation may be installed in either a single or multi-layer assembly using EverGuard Insulation Plates and Fasteners. A combination of plates and fasteners for the bottom layer, and hot asphalt or EverGuard-accepted insulation adhesive for the top layer(s), may also be used. Refer to the "Insulation Attachment" and the "Technical Information Section" of this manual for additional information. As an option, insulation may be attached to GAF Base Sheets using Type III or Type IV hot asphalt or EverGuard-accepted insulation adhesive. The base sheet must be attached to the deck as shown in to Figure 1 shown below. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

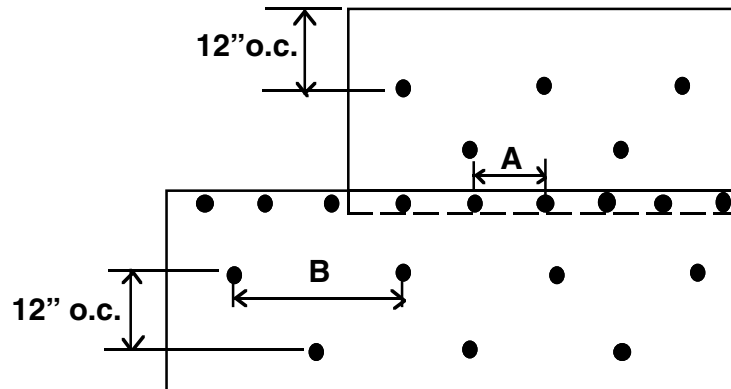


Figure 1
Attachment of Base Sheet

Area	EverGuard Insul. Plate & Fastener		*Nail Type Fastener (min. 1" Head)	
	A	B	A	B
Field	18" (457 mm)	36" (914 mm)	9" (229 mm)	18" (457 mm)
Perimeter	12" (305 mm)	24" (610 mm)	9" (229 mm)	12" (305 mm)
Corners	9" (229 mm)	18" (457 mm)	6" (153 mm)	9" (229 mm)

* Not Acceptable for 20 year guarantee, e.g. split shank nail or two piece tube nail, for gypsum decks.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.6 Cementitious Wood Fiber, min. 2" (51 mm)

Cementitious wood fiber panels are typically constructed from a cement binder that is mixed with treated wood fibers, then molded and cut into flat panels. Most cementitious wood fiber decks are used in applications that require sound absorption and an exposed ceiling. CAUTION: Like other pre-cast panel type decks, joints between the panels exist that may allow for bitumen drippage and also provide a means for fumes to enter the building. Where deck panels vary in height more than 1/4" (6.35 mm), they must be grouted according to the manufacturer's specifications.

Cementitious wood fiber decks require the installation of EverGuard® insulation(s) prior to the application of the EPDM membrane. Insulation may be installed in either a single or multi-layer assembly using EverGuard Insulation Plates and Fasteners. A combination of plates and fasteners for the bottom layer, and hot asphalt or EverGuard-accepted insulation adhesive for the top layer(s), may also be used. Refer to the “Insulation Attachment” and the “Technical Information Section” of this manual for additional information. As an option, insulation may be attached to GAF Base Sheets using Type III or Type IV hot asphalt or EverGuard-accepted insulation adhesive. The base sheet must be attached to the deck as shown in Figure 1 shown above. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.7 Lightweight Insulating Concrete Decks and Cellular Concrete

Lightweight concrete is classified as insulating or cellular. Insulating concrete is a mixture of Portland cement, water, and either vermiculite or perlite aggregate. No stone aggregate is used in a lightweight insulating concrete mix, thereby reducing the density while increasing the thermal resistance of the deck. Lightweight insulating concrete decks can use significant amount of water (up to 95% of the weight of the mix), which require the pour to be over a slotted steel deck only. Lightweight insulating concrete that is poured over non-venting decks will not allow water from the pour or roof leaks to escape. Under these conditions, not only may the insulating concrete be structurally unsound, the substrate over which it was poured may be unsound as well.

Cellular concrete is also a mixture of Portland cement but uses no aggregate. Chemicals or air-entraining agents are used to cause “foaming,” thus creating bubbles that replace the aggregate while maintaining thermal resistance. This, in addition to using approximately 75% less water than insulating concrete, allows the installation of cellular concrete over existing roof systems and concrete decks by most deck manufacturers. Although these decks contain a substantially less amount of moisture than lightweight insulating concretes, moisture can be absorbed into the deck from precipitation. After precipitation occurs, assure that the deck is allowed to sufficiently dry before roofing.

VAPOR RETARDER OPTIONS FOR NEW CONSTRUCTION, RE-COVER OR TEAR-OFF OVER LIGHTWEIGHT CONCRETE ROOF DECKS

Insulation System	Roof Type		
	Ballasted	Fully Adhered	Mechanically Attached
EnergyGuard™ ISO	1,2,3	1,2,3	1,2,3
EnergyGuard™ Wood Fiber	2,3	2,3	2,3
EnergyGuard™ Wood Fiber Composite	2,3	2,3	2,3
EnergyGuard™ Perlite Composite	2,3	2,3	2,3
EnergyGuard™ NailBase	6	1,2,3	1,2,3
BMCA 3/8" Dens Deck	6	5	5
EnergyGuard™ Extruded Polystyrene	4	6	6
EnergyGuard™ Expanded Polystyrene	4	6	6

Vapor Retarder Options:

1. Six (6) mil polyethylene sheeting taped at laps and to penetrations.
2. Mopped Type IV or VI Ply Sheet over a nailed Venting Base Sheet.

3. Existing dry and sound uninsulated built-up roof system (all splits and blisters repaired).
4. No vapor retarder is required.
5. No vapor retarder is required if the lightweight concrete is over a vented steel deck. If the deck is not vented steel, a vapor retarder (see 1-3 above) must be used.
6. Not acceptable for this system.

See Figure 1 (on page 8) for base sheet attachment requirements.

1.06.1.8 Considerations for Re-roofing

The success of a roof installation over an existing roof system depends largely on the condition of the substrate and deck. If the deck has deteriorated, it may not be structurally sound enough to support the new installation or storage of materials or provide sufficient fastener pull-out resistance. For installations where insulation or the membrane system is applied over an existing roof in hot asphalt, the performance of the new roof depends largely on the attachment of the existing roof. When re-roofing, evaluate the condition of the deck and how the existing roof is attached. Pull-out tests should always be considered to help determine the integrity of a deck, along with under deck inspections. Roof systems that have been leaking for some time or decks which may absorb and hold moisture are those which are most suspect.

1.06.1.8.1 Coated Smooth Surface Built-Up, SBS or APP (smooth or mineral surface) Roofs

Smooth surface built-up, APP or SBS roofs that have been coated require the installation of an acceptable insulation. Insulation may be installed in either a single or multi-layer assembly. The initial layer must be mechanically fastened using EverGuard® Insulation Plates and Fasteners (appropriate for the deck type and guarantee term). Additional layers of insulation may be mechanically attached using a common fastener with the first layer of insulation or individually attached with hot asphalt or EverGuard-accepted insulation adhesive. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.8.2 Non-Coated Smooth Surface Built-Up Roofs

An EverGuard® Mechanically Attached or Fully Adhered EPDM system may be installed directly over smooth surfaced built-up roofs providing that:

- The existing roof has not been coated
- There are no areas of loose or excessive alligatoring or loose plies
- All roof cement is removed
- There are no cracks in the existing surface greater than 1/4" (6.3 mm)
- The existing asphalt is Type III or IV

When installing insulation, it can be attached to a non-coated smooth surface built-up roof in either a single or multi-layer assembly. The initial layer can be mechanically fastened using EverGuard Insulation Plates and Fasteners (appropriate for the deck type and guarantee term), a full mopping of ASTM D 312 Type III, or Type IV hot asphalt or an EverGuard-accepted insulation adhesive. When using asphalt (or asphalt-based adhesives) for the attachment, the existing roof membrane must be completely and uniformly primed by

applying Matrix™ 307 asphalt primer at the rate of 1 gallon per 100 square feet and allowed to dry prior to installation of insulation. Maximum insulation board size for asphalt attachment is 4' X 4' (1.2 m X 1.2 m). Other insulation adhesives may require priming of the existing roof membrane per the manufacturer's requirements. Additional layers of insulation may be mechanically attached using a common fastener with the first layer of insulation or individually attached with hot asphalt or an EverGuard®-accepted insulation adhesive. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.8.3 Mineral Surfaced Built-Up or SBS (mineral surfaced) Roofs

Insulation can be installed to a mineral surfaced built-up or SBS roof in either a single or multi-layer assembly. The initial layer can be mechanically fastened using EverGuard Insulation Plates and Fasteners (appropriate for the deck type and guarantee term), a full mopping of ASTM D 312, Type III or Type IV hot asphalt or an EverGuard-accepted insulation adhesive. When using asphalt (or asphalt-based adhesives) for attachment, the existing roof membrane must be completely and uniformly primed by applying Matrix™ 307 asphalt primer at the rate of 1 gallon per 100 square feet and allowed to dry prior to installation of insulation. Maximum insulation board size for asphalt attachment is 4' X 4' (1.2 m X 1.2 m). Other insulation adhesives may require priming of the existing roof membrane per the manufacturer's requirements. Additional layers of insulation may be mechanically attached using a common fastener with the first layer of insulation or individually attached with hot asphalt or EverGuard-accepted insulation adhesive. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.8.4 Asphalt, Coal Tar Pitch, or SBS Gravel Surface Built-Up Roofs

Gravel surface roof systems must have loose gravel removed, the high spots removed and depressions filled. EverGuard insulation must be installed prior to the application of the EPDM membrane. Insulation can be installed to a gravel-surfaced roof in either a single or multi-layer assembly. The initial layer must be mechanically fastened using EverGuard Insulation Plates and Fasteners (appropriate for the deck type and guarantee term). Additional layers of insulation may be mechanically attached using a common fastener with the first layer of insulation or individually attached with hot asphalt or an EverGuard-accepted insulation adhesive.

As an option for asphalt and SBS systems only, the insulation may be installed in asphalt or an EverGuard-accepted insulation adhesive. For this option, all gravel must be completely removed and the roof must be cleaned of all dust, dirt, and debris, using spudding equipment. The existing roof must be completely and uniformly primed by applying Matrix™ 307 asphalt primer at a rate of 1 gallon per 100 square feet. Other insulation adhesives may require priming of the existing roof membrane per the manufacturer's requirements. Do not mechanically attach insulation directly beneath the waterproofing membrane of a ballasted system.

(CAUTION: Flow of existing coal tar or low softening point asphalt into the building may occur when new fasteners penetrate the existing roof assembly and deck.)

Refer to Section 1.14.1 Insulation Attachment for specific attachment information.

1.06.1.8.5 Sprayed-In-Place Urethane Roofs

Sprayed-in-place urethane roofs are not acceptable substrates for the EverGuard® EPDM system. All components must be completely removed prior to the installation of the EverGuard roof system.

1.07.1 THERMAL BARRIER

Provide a thermal barrier, if necessary, to meet local building code requirements.

1.08.1 ROOF DRAINAGE

- A. Ponding water is defined as water that does not drain or dissipate from the roof surface more than forty-eight (48) hours after precipitation ends. Ponding can also result from HVAC and other rooftop equipment.
- B. Proper and adequate drainage of the roof surface is required to assure the long-term performance of the roofing system. A minimum roof slope of 1/4" (6.4 mm) per foot is recommended, but less is acceptable providing positive drainage is attained.

Note: When installing an EverGuard EPDM system for a 20-year guarantee, a minimum roof slope of 1/8" (3.2 mm) per foot is required.

1.09.1 WOOD NAILERS

- A. For new construction projects, wood nailers must be kiln-dried (Southern Pine, Douglas Fir) structural grade #2 or better. For re-cover projects and new construction projects where a poured-in-place deck will be used, wood nailers must be pressure treated for rot resistance (e.g., "Wolmanized" or Osomose K-33"), #2 or better lumber. Do not use asphaltic or creosote-treated lumber. Lumber treated with other wood preservatives such as Pentachlorophenol, Copper Naphthenate or Copper 8-quinolinolate, will adversely affect the EPDM membrane when in direct contact and are, therefore, unacceptable.
- B. Wood nailers are required at the following locations:
 - 1. All roof edges.
 - 2. Metal penetration pockets. Exception: Where the flange of the penetration pocket is less than 12" (304.8 mm) on all sides, the wood nailer may be deleted when:
 - a. Flanges are secured directly to the deck, or
 - b. Flanges are fastened 6" o.c. (152.4 mm) with a minimum of 8 fasteners (2 fasteners per flange side), and EverGuard EPDM All Purpose Sealant is installed over all fastener heads.
 - 3. At all other locations as required by EverGuard Details.
- C. Wood nailers must totally support all sheet metal flanges, except where the flange of a penetration pocket is less than 12" (304.8 mm) long.
- D. The project designer must specify a wood nailer attachment system that will resist a minimum force of 200 lb per foot (2.9 N/m) in any direction. EverGuard Fasteners are required for all re-roofing applications. For further clarification, refer to Factory Mutual Loss Prevention Data Sheet 1-49.

1.10.1 MOISTURE CONTROL

- A. To control moisture, a vapor retarder may be necessary to protect certain roofing components when high interior humidity is present.
- B. The need for a vapor retarder, as well as the type, placement and location of a vapor retarder, should be determined by an Architect or Engineer. Below are examples of job conditions that may require the use of a vapor retarder.
 - 1. Projects where outside average January temperatures below 40 °F (4.44 °C) are expected and where average winter interior relative humidity of 45% or greater is anticipated.

2. Building usage with high humidity interiors such as:
 - a. Indoor swimming pools
 - b. Textile manufacturing operations
 - c. Food and paper plants and other wet-process industrial plants
3. Construction elements that may release moisture after the roof is installed such as:
 - a. Interior concrete and masonry
 - b. Cementitious roof fills
 - c. Plaster finishes
 - d. Fuel-burning heaters

Refer to the NRCA *Roofing and Waterproofing Manual* for recommendations on vapor retarders. Water vapor migrates from areas of higher vapor pressure to areas of lower pressure, attempting to reach equilibrium. During the cold portion of the year over much of the United States, water vapor flows upward into the roof assembly from the warm, more humid interior of a building toward the colder, drier exterior. Water vapor pressure depends on two variables: temperature and relative humidity. Vapor pressure increases exponentially with increasing temperature, but only linearly with increasing relative humidity. Cold climates are characterized by low exterior moisture vapor pressure during winter periods. For example, when the outside temperature drops to 0 °F (-18 °C), regardless of the outside relative humidity, the moisture vapor pressure is very low.

The colder the climate, the lower the outside vapor pressure and the greater the vapor pressure differential for a given interior temperature and relative humidity. During cold weather, the outside water vapor pressure is generally lower than the interior water vapor pressure; thus, the water vapor flow from the interior is upward, into or through the roof assembly. Therefore, in moderate and cold climates, when a roof membrane is placed on top of the insulation, a vapor retarder (located near the interior) may be necessary to minimize migration of moisture into the roof assembly during cold weather.

Water vapor, which can be detrimental to the long-term integrity of a roof assembly, generally comes from two basic sources: construction-generated moisture and interior moisture sources.

To control moisture within a building, there are three basic items to consider:

- Ventilation – of the interior (occupied space), or the roof cavity (if one exists), or a combination of both.
- Insulation – how much insulation is needed and where it should be located.
- Moisture protection layer(s); either a vapor retarder or appropriate absorption or drying layer(s).

1.10.1.1 Construction-Generated Moisture

Construction processes can release large quantities of water vapor. The combustion process of an oil or propane-fired heater used for temporary heat during construction produces water as a by-product of burning; approximately one gallon (4 liters) of water will be produced for each gallon (4 liters) of heating oil burned.

Generally, protection of the roof assembly is accomplished with ventilation or with the inclusion of a vapor retarder. If adequate ventilation is not possible, a vapor retarder may be required to protect the roof system from migration of construction-generated water vapor even though a vapor retarder would not otherwise be required.

1.10.1.2 Interior Moisture Source

Water vapor can be generated from interior sources such as swimming pools, greenhouses, and laundry facilities. Occupancy-generated moisture that comes from cooking, showering and even from breathing can be significant if not properly directed or vented to the exterior of the building. With some facilities (e.g., hotels), the ventilation of interior-generated moisture is critical in order to limit problems with moisture accumulation and its potential harmful effects (e.g., mildew, mold, and their associated allergens). Engineered humidification of building interiors is done for the efficient operation of equipment sensitive to build-up static electricity (e.g., some types of computer, fabrication, and sorting equipment), and must be well designed in order to limit problems with moisture accumulation and condensation. Very high levels of interior moisture can be generated from swimming pools and many industrial processes, such as paper manufacturing plants, bakeries, fermenting plants, laundries, leather tanneries, kilns, textile mills and tobacco-processing and storage facilities.

If the building is expected to have relatively high levels of occupancy-generated moisture, then building design, including the design of the roof assembly, must adequately deal with the moisture that may be anticipated. Thus, when high indoor relative humidity levels are expected, it is critical to provide moisture control since the potential for condensation and its harmful effects greatly increases. In most climates where high levels of interior moisture are anticipated, the designer may need to calculate expected dew-point locations, and if needed, correctly design and specify a vapor retarder to be appropriately located with the roof assembly. The dew-point temperature should fall within the cross-sectional configuration of the insulation layer and be on the cold side the vapor retarder.

1.10.1.3 Ventilation

Ventilation is a system for exchanging air in a particular area, space or cavity. Ventilation of low-slope roof assemblies is typically initiated to control moisture and reduce heat build-up. Exchanging the air in an area or space is commonly referred to as venting, and venting is usually accomplished by drawing off or exhausting moisture-laden air, while introducing fresh outside, or conditioned drier air.

1.10.1.4 Vapor Retarders

NOTE: This section on vapor retarders is for information purposes only and should not be considered all-inclusive. Determining the need and location of the vapor retarder is for the design professional. The vapor retarder is not considered part of the EverGuard Roof System and is not covered by the Diamond Pledge™ Roof Guarantee.

A vapor retarder inhibits the flow of moisture vapor. Vapor retarders are typically composed of a material or materials laminated together intended to retard moisture vapor flow. Many materials that are used as vapor retarders in building construction do retard vapor migration, but do not totally prevent or stop moisture migration. Where imperfections exist in the installed vapor retarder, such as where the material is cut around penetrations, where the material may have torn or at seams that are not completely sealed, air leaks transport moisture vapor into the roof system. Therefore, most flexible membrane materials are actually vapor retarders because the chances of the finished installation being capable of halting all moisture vapors from migrating into the roof system are limited.

The vapor retarder must be placed in the appropriate location and sealed in order to be most beneficial and not detrimental to the roof assembly. If the vapor retarder is not properly planned or correctly sealed, it can trap moisture, which can then promote decay or deterioration of the roof deck and the adjacent structural members.

Any material's effectiveness to retard water vapor flow into a roof system and to prevent condensation depends on:

- The material's vapor permeance or perm rating
- The design of the material or system
- The integrity of seals at laps, perimeters, and around penetrations

- Its integrity after installation
- The material's location within the insulated roof assembly.

Within the typical low-slope roof assembly, the vapor retarder is usually located at or near the surface that is exposed to the higher water vapor pressure. Therefore, for most domestic building construction with heated interiors, this means placing the vapor retarder near the winter-warm side of the insulation.

On cold storage or freezer facilities, details must be selected to achieve an air seal, preventing outside air from infiltrating and condensing within the roofing assembly. Since the roofing membrane typically becomes the "vapor retarder", the outside temperature and humidity will usually be higher than the interior temperature and humidity, creating inward vapor drive. Cold storage facilities pose unique moisture migration issues, and therefore a professional engineer experienced in cold storage facilities should always be consulted.

Vapor retarders are used in many roof assembly configurations because water vapor poses several complications for roof assembly construction, its integrity and longevity:

- Internal condensation (condensation that occurs within the roof assembly) can reduce the thermal resistance of most types of insulation. If the insulation absorbs moisture, it becomes a better conductor of heat and its efficiency as an insulator is reduced. (NOTE: For reference purposes, the thermal conductivity of liquid water is about 20 times that of air. The thermal conductivity of ice is about 80 times that of air.)
- Accumulated moisture can contribute to the degradation of roofing materials, insulation products, most roof deck materials and structural members.
- Moisture that is trapped within voids (for example, at the point where the roof membrane and the insulation may not be adhered) can evaporate under solar heat, and the resulting vapor pressure can work to further separate the materials.
- Freezing of entrapped moisture can cause delamination of joined components in a roof system.

Vapor retarders are rated for permeance by a perm rating, established by ASTM Standard E 96, Test Methods for Water Vapor Transmission of Materials. A rating of 1 perm indicates the passage of 1 grain of water vapor (e.g., 1 pound (0.5 kg) of water vapor = 7,000 grains) through 1 square foot (0.09 sq. m) of material in 1 hour, for each inch of mercury pressure differential (e.g., 1 inch (25 mm) of mercury = 0.491 pounds per square inch) that exists between the two sides of the material. The unit of measure for permeance is:

PERMEANCE = GRAINS OF WATER VAPOR / SQUARE FOOT HOUR / INCH OF MERCURY

Generally, a vapor retarder should have a perm rating below 0.5 perms to be considered effective in most low-slope assemblies.

1.10.1.5 Vapor Retarder Materials

Generally, the materials used to construct vapor retarders may be classified into two categories:

- A. Bituminous vapor retarder membranes.
- B. Non-bituminous vapor retarder membranes.

1.10.1.5.1 Bituminous Vapor Retarders

Bituminous membrane vapor retarders are the most commonly used type of vapor retarders. A typical modern bituminous vapor retarder membrane is composed of two plies of Type IV fiberglass ply sheet applied in conjunction with two or three moppings of hot steep

asphalt depending upon the deck type and application procedure specified. Such a vapor retarder provides a perm rating that approaches zero.

1.10.1.5.2 Non-Bituminous Vapor Retarders

Included in the non-bituminous category of vapor retarders are:

- A.** Plastic sheets or films.
- B.** Kraft paper and aluminum foil combinations.

1.10.1.5.3 Plastic Film Vapor Retarders

Typically, plastic sheet vapor retarders are made of polyvinyl chloride (PVC) or a type of fire resistant, non-flammable thermoplastic sheet. Some plastic film vapor retarders are polyethylene. Often, these types of vapor retarders are installed loose-laid or adhered using a compatible adhesive. Generally, permeability of these plastic film vapor retarders ranges from approximately 0.06 to 0.50 perms. Seams should be sealed or taped, as should all cuts and holes around penetrations.

1.10.1.5.4 Kraft Paper Laminates and Aluminum Foil Combinations

Kraft paper laminates and aluminum foils are used to form vapor retarders. Some of these types of vapor retarders are not used as commonly as they once were. However, they can be designed and installed to be effective vapor retarders. Refer to material manufacturers' installation guidelines for attachment.

1.11.1 ROOF EXPANSION JOINTS

- A.** Roof expansion joints should be located as necessary to accommodate movement caused by thermal expansion and building structural movement.
- B.** The need for expansion joints, as well as the type, placement and location of expansion joints, should be determined by an Architect or Engineer. Roof expansion joints should be considered if any of the following circumstances exist:
 - 1. Where expansion or contraction joints are provided in the building structural system.
 - 2. Where structural framing elements such as joists, rafters, purlins or steel decking change direction.
 - 3. Where different types of roof deck, such as concrete and steel, abut each other.
 - 4. Where additions are connected to existing buildings.
 - 5. At junctions where interior heating conditions change, such as a heated space abutting an unheated space.
 - 6. Where movement between vertical walls and the roof deck is anticipated.
 - 7. Every 200' of building length.

1.12.1 INSULATION

- A.** The selection of insulation type, thickness, and configuration is the responsibility of the architect, engineer, or owner. GAFMC reserves the right to accept or reject any roof insulation as an acceptable substrate for GAFMC by roof systems.

EnergyGuard® brand insulation is required under fully-adhered systems. GAFMC will accept other insulations under ballasted and mechanically attached systems on a job-by-job basis. The following chart shows the types and minimum thickness of EnergyGuard insulation acceptable for use as an immediate substrate for EverGuard® EPDM Roofing Systems. Only EnergyGuard brand insulation can be included in a Diamond Pledge™ Roof Guarantee.

CHART OF ACCEPTABLE INSULATIONS

System	Guarantee Term	EnergyGuard™ ISO (flat or tapered)	EnergyGuard™ Composite	EnergyGuard™ NailBase	EnergyGuard™ Woodfiber	BMCA DensDeck
Adhered	5-15 years	1.0" (25.4 mm) (2)	1.5" (38.1 mm) (1)	1.5" (38.1 mm)	1/2" (12.7 mm)	3/8" (9.5 mm)
Adhered	20 years	1.5" (38.1 mm) (2)	1.5" (38.1 mm) (1)	1.5" (38.1 mm)	N/A	3/8" (9.5 mm)
Ballasted	5-15 years	1.0" (25.4 mm)	1.5" (38.1 mm)	N/A	1/2" (12.7 mm)	N/A
Ballasted	20 years	1.5" (38.1 mm)	1.5" (38.1 mm)	N/A	N/A	N/A
MAS/BITS	5-15 years	1.0" (25.4 mm)	1.5" (38.1 mm) (1)	1.5" (38.1 mm)	1/2" (12.7 mm)	3/8" (9.5 mm)

- Notes:**
- When using EnergyGuard Perlite Composite insulation, install perlite side down to the deck for Mechanically Attached and Fully Adhered systems.
 - Tapered insulation thickness may be below the 1" (25.4 mm) minimum thickness. In areas where this occurs, the insulation must be fastened at a rate of 1 fastener and plate per 1 square foot (0.11 sq. m). If possible, install the tapered insulation first, followed by the flat stock.
 - The above chart indicates the minimum thickness for fully supported insulation. Consult EnergyGuard Product Data Sheets for maximum flute spanability.
 - Refer to specific EverGuard® EPDM Technical Information Sheets for installation and fastening requirements. When a composite of two insulation layers is installed, the fastening pattern required for the top board thickness must be used.
 - Insulation thickness requirements may vary for code compliance. Consult EverGuard Contractor Services Department or the local code official.

Note: When installing an EverGuard Mechanically Attached System for a 20-year guarantee over an air-infiltrating deck (steel, plywood or wood plank, pre-cast concrete, gypsum or Tectum), a minimum 6 mil polyethylene air barrier must be installed below the insulation layer(s). All joints in the air barrier must be taped and all edges at the perimeter and penetrations must be sealed to prevent air infiltration. Refer to the System Guarantee Summary at the end of this Design Guide.

1.13.1 FASTENER CONSIDERATIONS

- A. GAFMC has developed a comprehensive offering of roofing fasteners for a variety of roofing substrates.
- B. The following is a chart of the available fasteners for EverGuard Roof Systems and the substrate penetration requirements based on the fastener.

CHART OF ACCEPTABLE EVERGUARD FASTENERS

Deck Type	All Purpose (AP's)	Drive Pins	Heavy Duty (HD's)	Polymer Fasteners	Concrete Drives	Min. Penetration
Steel min 22 ga (0.76mm)	YES	NO	YES	NO	NO	3/4" (19mm) (AP's or HD's)
Structural Concrete min. 3000psi (20,684kPa)	NO	NO	YES	NO	YES	1 1/4" (31.7MM)-Concrete Drives 1" (25.4mm)-HD's
Plywood or OSB min. 1/2" (12.7mm)	YES	NO	YES	NO	NO	1" (25.4mm) into or through deck
Wood Plank min, 3/4" (19mm)	YES	NO	YES	NO	NO	1" (25.4mm) into or through deck
Gypsum min. 2" (51mm)	NO	NO	NO	YES	NO	1 1/2" (38.1mm)
Cementitious Wood Fiber min. 2" (51mm)	NO	NO	NO	YES	NO	1 1/2" (38.1mm) into deck
Lightweight Concrete (over steel deck)	NO	NO	YES	NO	NO	3/4" (19mm) through steel deck
Lightweight Concrete (over concrete deck)	NO	NO	YES	NO	YES	1" (31.7mm)-Concrete Drives 1" (25.4mm)-HD's into Structural Concrete
Vertical Concrete & Masonry	NO	YES	YES	NO	YES	1" (25.4mm)

- C. For fasteners to be used with other substrates, contact EverGuard® Contractor Services.
- D. All base tie-ins and membrane terminations must be attached to substrates that will provide a minimum of 200 lbf (89 kN) pull-out capacity.
- E. Pull-out Tests:
 1. Due to the variety of physical conditions that can affect pull-out resistance, GAFMC recommends that on-site tests be conducted by an independent testing laboratory, the manufacturer's representative or the roofing contractor, to determine actual pull-out values. The following deck types are those which may not provide sufficient pull-out resistance:
 - a. Steel decks thinner than 22 gauge (0.76 mm).
 - b. Concrete less than 3000 psi (20,684 kPa).
 - c. Plywood or oriented strand board less than 1/2" (12.7 mm) thickness.
 - d. Wood plank less than 3/4" (19mm) thickness.
 - e. All poured or pre-cast gypsum, cementitious wood fiber and lightweight concrete decks.
 - f. Existing masonry or brick.
 - g. Any other substrate that does not have a published pull-out capacity greater than the minimum required for the applicable roof system.
 2. The sections of the substrate where integrity is most in question should be used for testing. Test areas must include corners and perimeters. The minimum number of pull-out tests required is as follows:

Roof Size	Number of Pull-Out Tests
Less Than 10,000 sf	6
10,000 sf - 50,000 sf	10
50,000 sf - 100,000 sf	20
Over 100,000 sf	1 per 5,000 sf

3. When new construction or other conditions prevent preliminary on-site pull-out tests, the fastener manufacturer must supply estimated pull-out values for design and bid purposes. On-site verification of the pull-out capacity must be confirmed prior to system installation. (Consider requesting a unit price bid for potential increased fastening requirement.)
4. When tested pull-out values do not meet the minimum EverGuard EPDM requirements, additional attachment may be necessary. Contact EverGuard Contractor Services for additional information.

1.14.1 INSULATION ATTACHMENT

- A. Mechanical Attachment:
 1. The insulation must be installed in accordance with the fastening rate and pattern as shown on the specific Technical Information Sheet for the applicable system.
 2. Fastening rates and patterns may vary for code compliance. Contact local code or insurance official before contacting EverGuard Contractor Services Department.
 3. Insulation must be fastened with applicable EverGuard fasteners and insulation plates.
 4. The top layer of insulation must be loose-laid or adhesive-attached with ballasted systems. Mechanical attachment of the insulation layer directly beneath the membrane is not acceptable for a ballasted system.

Note: When installing an EverGuard® EPDM Reinforced Mechanically Attached System for a 20-year guarantee, insulation fastening must be as follows:

1.5" to 2" (38.1 to 50.8 mm)	per 4' x 8' (1.2 – 2.4 m) insulation board
Field:	12 HD fasteners and plates
Perimeter:	18 HD fasteners and plates
Corners:	21 HD fasteners and plates
2" (38.1 mm) and greater	per 4' x 8' (1.2 – 2.4 m) insulation board
Field:	8 HD fasteners and plates
Perimeter:	12 HD fasteners and plates
Corners:	14 HD fasteners and plates

B. Asphalt Attachment:

1. Hot steep asphalt (ASTM D 312 Type III or Type IV) may be used to attach insulation beneath a Ballasted, Fully Adhered or Mechanically Attached roof system.
2. When using hot asphalt for attachment:
 - a. The insulation must be no larger than 4' X 4' (1.2 m X 1.2 m)
 - b. Stagger all insulation joints from adjoining boards.
3. The following substrates may be used with asphalt attachment of insulation:
 - a. Poured-in-Place or pre-cast structural concrete decks which have been primed at a rate of 1 gallon per 100 square feet with an Matrix™ 307 asphalt primer.
 - b. Mechanically attached base sheets that have been fastened in accordance with GAFMC requirements.
 - c. Existing smooth or gravel surface built-up roof systems and granule surface cap sheets which have been prepared as follows:
 - i. Verify that the attachment of the existing roof system is acceptable. If existing insulation is not mechanically fastened, contains fasteners that may be corroded or loose, or the attachment may not be sufficient, consideration should be given to re-attaching the roof system prior to installing the new insulation.
 - ii. Remove all loose gravel by vacuuming and power brooming. After loose gravel has been removed, spud the remaining gravel smooth to provide a level surface.
 - iii. Prime the surface using an Matrix™ 307 asphalt primer.
4. Assure compliance with all building codes when using hot asphalt.
5. Assure that all health and safety measures are followed when installing hot asphalt to protect the installers as well as occupants of the building.

C. Adhesive Attachment:

1. Insulation adhesives must be accepted by EverGuard Contractor Services **prior** to project bidding.
2. Because roof insulation adhesives vary by manufacturer, the substrates to which an adhesive is applied must be approved by the adhesive manufacturer.
3. Should an adhesive be chosen for attaching insulation, EverGuard Contractor Services requires a pre-job submittal from the manufacturer approving the application, and specific instructions that apply to the project.
4. Adhesion and wind coverage warranty must be supplied by the adhesive manufacturer on each project prior to GAFMC issuing a guarantee.
5. Assure compliance with all building codes when using insulation adhesives.
6. **Assure that all safety measures are followed when installing insulation adhesives to protect the installer as well as the occupants of the building.**

Note: Products not supplied by GAFMC are not covered under the GAFMC guarantee.

1.15.1 MEMBRANE SECUREMENT OPTIONS

The following outlines the various securement options for each individual system type. Compliance with all installation criteria is required to obtain a GAFMC guarantee. Additional attachment requirements may be necessary to comply with Factory Mutual requirements or the local building code.

A. Adhered Systems:

EverGuard® EPDM membrane must be bonded to the approved substrate with EverGuard EPDM Bonding Adhesive or EverGuard EPDM LVOC Water-Based Bonding Adhesive.

B. Ballasted Systems:

1. General

- a. All ballast should be of adequate size and weight to provide proper protection against wind uplift. The project designer is responsible for the ballast design and selection on a specific building. Refer to local building codes, the ANSI/SPRI “Wind Design Standard for Ballasted Single-Ply Roofing Systems RP-4” or Factory Mutual Technical Advisory Bulletin 1-29 for information regarding ballast requirements on loose laid single-ply roofing systems.
- b. The weight of ballast must be considered when determining the structure’s ability to support the load of the completed roof installation and other expected loads. GAFMC takes no responsibility for making this structural analysis. A professional engineer or registered architect should make this determination prior to the job start.
- c. Install ballast materials on a daily basis.
- d. Do not stockpile ballast materials.

2. Stone Ballast:

- a. Stone ballast should be smooth, water worn gravel with rounded edges and corners, relatively free of fractures, loam, sand, or other foreign substances and contain no more than 4% fines.
- b. Unless otherwise designed, the minimum ballast coverage required by GAFMC for guarantee coverage is 10 lb/sq. ft (48.8 kg/sq. m) using nominal 3/4” to 1-1/2” (19.0 mm to 38.1 mm) diameter stone meeting ASTM D 448 size #4 using ASTM C-136 method of testing. Note: This rate will not provide adequate membrane coverage if stone larger than #4 is used. See chart below for minimum coverage requirements for larger ballast gradations.

3. Concrete Pavers:

- Acceptable smooth trowel finished concrete pavers may be used, and should be applied at a rate of not less than 15 lb/sq. ft (73.1 kg/sq. m). Maximum space between pavers should be 1/2” (13 mm).
- a. Interlocking paving stones weighing a minimum of 10 lb per square foot (48.8 kg/sq. m), which have proven performance for wind and weather resistance, may be used. This system should have a minimum performance warranty from the paver manufacturer equal in length to the GAFMC guarantee.
 - b. EverGuard Polymat or an additional layer of EverGuard EPDM Membrane must be installed between the membrane and all pavers. The EverGuard Polymat must be completely covered with pavers in order to prevent ultraviolet degradation of the mat. Concrete pavers must meet the following minimum requirements:

Test Criteria	ASTM Test	Minimum Requirements
Weight Tolerance	C140	± 0.75%
Compressive Strength	C140 Modified	2500 ps (17.2 MPa) min.
Flexure	C140 Modified	350 lbf (1.6kN) min.
Freeze/Thaw Resistance	C67 Modified	50 cycles
Water Absorption	C140	>105 pcf (1681 kg/cu. meter) density max. 13 pcf (208 kg/cu. meter) >105 pcf (1681 kg/cu. meter) density max. 18 pcf (288 kg/cu. meter)

4. Crushed Stone Ballast:
- a. Crushed stone ballast should be durable, free of excessive fractures, loam, sand or other foreign substance, meeting the following physical testing requirements.
 - Specific Gravity: Minimum 2.40 Mg/cu.m (ASTM C 127 test method)
 - Impact Resistance: Maximum 40% weight loss (ASTM C 535 and C 131 test methods)
 - Soundness: (ASTM C 88 test method)
 - Maximum 12% weight loss (with sodium sulfate)
 - Maximum 18% weight loss (with magnesium sulfate)
 - b. Unless otherwise designed, the minimum ballast coverage required by GAFMC for guarantee is 10 lb per sq. ft (48.8 kg/sq. m) using nominal 3/4" to 1-1/2" (19 mm to 38 mm) diameter stone.

CHART OF MINIMUM COVERAGE REQUIREMENTS FOR VARIOUS BALLAST GRADATIONS

ASTM Size No.	Nominal Size	Minimum Acceptable Coverage
4 (GAFMC Minimum)	3/4" (19 mm) to 1-1/2" (38 mm)	10 lb/sq ft (48 kg/sq m)
357	3/4" (19 mm) to 2" (51 mm)	10 lb/sq ft (48 kg/sq m)
3	1" (26 mm) to 2" (51 mm)	10 lb/sq ft (48 kg/sq m)
24	3/4" (19 mm) to 2-1/2" (63 mm)	11 lb/sq ft (54 kg/sq m)
2	1-1/2" (38 mm) to 2-1/2" (63 mm)	13 lb/sq ft (63 kg/sq m)
1	1-1/2" (38 mm) to 3-1/2" (89 mm)	16 lb/sq ft (78 kg/sq m)

Note: When applied at the minimum acceptable coverage rate, larger sizes of ballast will not provide full coverage of the roofing membrane, which may be desired for aesthetic purposes. In addition, EverGuard® Polymat is required when crushed stone ballast is used and must be completely covered with ballast to prevent ultraviolet degradation of the mat.

- C. Mechanically Attached Systems:**
1. EverGuard EPDM Batten Bars in conjunction with EverGuard Fasteners must be used to attach the EverGuard EPDM membrane.
 2. Fastener Spacing Requirements:
Where the deck system will not provide an average minimum fastener pull-out resistance of 400 lb (1.8 kN), GAFMC has designed a system of alternate fastener spacing to be used based on fastener pull-out capacity, as follows:

Min. Pull-out Value	Fastener Spacing Field	Fastener Spacing For Perimeter
1) 400 lbf or greater	12" o.c.	12" o.c.
2) 300 lbf to 399 lbf	12"-6"-12" o.c.	12"-6"-12" o.c.
3) 200 lbf to 299 lbf	6" o.c.	6" o.c.
4) less than 200 lbf	This system is not applicable	

Min. Pull-out Value	Fastener Spacing Field	Fastener Spacing For Perimeter
1) 1.8 kN or greater	305 mm o.c.	305 mm o.c.
2) 1.3 kN to 1.8 kN	305-152-305 mm o.c.	305-152-305 mm o.c.
3) 0.9 kN to 1.3 kN	152 mm o.c.	152 mm o.c.
4) less than 0.9 kN	This system is not applicable	

Note: When installing EverGuard® EPDM Reinforced Mechanically Attached Systems for a 20-year guarantee, all perimeter membrane securement must utilize EverGuard EPDM Batten Bars installed through the membrane. EverGuard EPDM 6" Reinforced Tape Strip cannot be used for additional intermediate perimeter attachment. Panels less than or equal to 7'6" (2.3 m) in width must be fastened at 12"(304 mm) o.c. Panels greater than 7'6" (2.3 m) in width must be fastened at 6" (152.4 mm) o.c.

NOTES:

1. For retrofit of metal buildings, refer to the Metal Building Recover Specification which is included in this manual.
2. The fastener spacing in the above tables assumes that decking is dry and free of any deterioration. Pull-out testing should be completed by the Licensed Applicator on all re-roof projects regardless of deck type to confirm pull-out resistance.
3. For decks other than those listed above, contact EverGuard Contractor Services.
4. Perimeter Attachment Selection:
 - a. The Mechanically Attached EverGuard EPDM System perimeter area must be mechanically attached in accordance with EverGuard EPDM Wind Design Guide.
 - b. As an alternate to mechanical attachment, the perimeter area may be fully adhered:
 - i. The area to be fully adhered must cover the same area as if the perimeters were mechanically attached.
 - ii. The roof substrate of the perimeter area must be prepared in accordance with the substrate requirements for the EverGuard EPDM Adhered System.
 - iii. The adhered perimeter area must be separated from the field of the roof by a continuous row of EverGuard EPDM Batten Bars.

1.16.1 MEMBRANE LAP SPLICING

Guarantee Term	Ballasted	Adhered	MAS (Unreinforced)	MAS (Reinforced)
5-15 Years	3" (76 mm) or 7" (178 mm)	3" (76 mm) or 7" (178 mm) BITS	3" (76 mm) MAS 7" (178 mm) BITS for side laps; 3" (76 mm) BITS for end laps	7" (178 mm) side laps; 3" (76mm) for end laps
20 Years	7" (178 mm) without Flashing Tape or 3" (76 mm) with EverGuard 5" Flashing Tape	7" (178 mm) without Flashing Tape or 3" (76 mm) with EverGuard 5" Flashing Tape	Not Available	7" (178 mm) with an EverGuard 5" Flashing Tape on side laps; 7" (178 mm) or 3" (76 mm) with an EverGuard 5" Flashing Tape on end laps

All seams must be completed using EverGuard EPDM Seam Tape.

1.17.1 FLASHINGS

Refer to the system application and detail sections.

1.17.1.1 PENETRATIONS (Pipes, Conduits, Etc.)

- A. Pipe Flashings:**
1. Whenever possible, all round rigid pipe penetrations ranging in size from 1" (25.4 mm) outside diameter to 6 1/2" (165 mm) outside diameter should be flashed with EverGuard EPDM Universal Pipe Boot. If it is not possible to fit an EverGuard

EPDM Universal Pipe Boot onto the pipe due to site conditions, the pipe should be covered with a field-fabricated flashing in accordance with EverGuard® EPDM Details.

2. Do not install pre-molded and field-fabricated flashing around flexible pipes or conduits.

B. Penetration Pockets:

1. The following types of penetrations require the installation of a penetration pocket:
 - a. Rigid pipes with an outside diameter less than 1" (25.4 mm).
 - b. Clusters of pipes.
 - c. Unusual shapes, e.g., structural beams, channels or angles.
2. A minimum clearance of 1" (25.4 mm) between penetrations, pipes, conduits, etc. and on all sides of the penetration pocket, is required to assure adequate space for the application of EverGuard EPDM Pourable Sealer around each penetration.

C. Flexible penetration (electrical and braided cable, etc.):

Flexible penetration must be installed in a sheet metal gooseneck.

1.17.1.2 CURBS AND TERMINATIONS

- A. Where possible, provide a minimum design height of at least 8" (203.2 mm) for all flashing terminations (except penetration pockets and EverGuard EPDM Universal Pipe Boots). Minimum flashing height should be no lower than the potential water level that could be reached as a result of a deluging rain. Wherever a vertical termination height is 5" (127 mm) or less, a termination detail using an EverGuard Termination Bar, that is subsequently counterflashed, is required. Do not flash over existing through-wall flashings, weep holes or overflow scuppers.
- B. Terminations must be made directly to a sound, rigid, vertical substrate. For retrofit conditions, existing loose flashing materials must be removed, or overlaid with 5/8" exterior grade plywood. Terminations are not acceptable to gypsum or wooden substrates.
- C. When using a surface-mounted termination (i.e., termination bar, surface-mounted counterflashing), ensure a consistent seal at the wall interface. The surface above the termination must be watertight.
- D. Gypsum board must be moisture resistant exterior grade with laminated fiberglass facers. Base tie-ins must be made into the deck because gypsum does not provide the required minimum average fastener pull-out resistance of 200 lbf (0.9 kN).
- E. Stucco, cobblestone, textured masonry, corrugated metal panes or any uneven surface are not suitable substrates to receive flashing. Such surfaces must be prepared to provide an acceptable substrate by attaching minimum 5/8" (15.8 mm) exterior grade or pressure treated plywood. Attach as required for structural integrity.

1.17.1.3 FLASHING REQUIREMENTS FOR A 20-YEAR GUARANTEE.

Refer to 20-Year details section.

1.18.1 WALKWAYS

- A. Walkways help protect the membrane from damage due to necessary rooftop service traffic. EverGuard EPDM Walkway Pads or pavers over a protection layer of membrane must be used. The owner is responsible for maintaining walkways in specific areas:
 1. At all access points (ladders, hatches, doorways, etc.) to the roof.
 2. As a walkway system on roofs subjected to traffic more frequently than once per month.
 3. If protection of the insulation system is required, additional measures must be specified (i.e., concrete pavers, pre-fabricated walkways).

Special Requirements for Ballasted Systems

Walkways within 10' (3.04 m) of the edge of the roof must be concrete pavers over an additional layer of membrane.

1.19.1 TOPCOAT® COATING

Topcoat Coating may be applied to further protect the EverGuard® membrane or flashing surfaces from the effects of weathering or for aesthetic reasons. It is not required for issuance of or covered under the GAFMC Diamond Pledge™ Roof Guarantee. The owner should be advised that, during the roof membrane service life, periodic re-application of the coating may be required to maintain its aesthetic value. Re-application of Topcoat should be performed by an EverGuard Approved Applicator. Refer to the appropriate application specification for specific instructions on its application.

1.20.1 SHEET METAL WORK

- A. EverGuard EPDM comes with a complete line of edge metal systems. Sheet metal work not supplied by GAFMC is not included in the GAFMC Diamond Pledge™ Roof Guarantee.
- B. Counterflashings, copings, and other perimeter or penetration metal work must be properly fastened and sealed by the roofing contractor or others. It is the owner's responsibility to maintain non-GAFMC sheet metal in a watertight condition.
- C. All sheet metal work not supplied by GAFMC should be fabricated and installed in accordance with the recommendations of the Sheet Metal and Air Conditioning Contractors' National Association. (SMACNA). Refer to the following SMACNA publications: "SMACNA Architectural Manual: and "HVAC Duct Construction Standards, Metal and Flexible Manual." NOTE: Some specific roofing details in EverGuard EPDM Technical Specifications may exceed SMACNA recommendations. For such details, the EverGuard EPDM requirements must be used.
- D. Make these specifications and details available to the sheet metal fabricator/contractor. Metal work not in conformance with EverGuard EPDM specifications and details or which compromises the integrity of the system may jeopardize the guarantee for the entire project.

1.21.1 GUARANTEE

- A. GAFMC offers roof guarantees for a fee for all roofing system specifications published in this manual when installed by a GAFMC EverGuard Approved Applicator in accordance with the terms and conditions set forth in this manual, and the procedures for obtaining a guarantee are followed. All GAFMC insulation, fasteners, pre-flashed details, expansion joint covers, asphalt, cements, coatings and other EverGuard accessories as job appropriate are required for guarantees unless otherwise approved in writing by the Regional Contractor Services Manager **prior** to installation.

All guaranteed roofing systems must be flashed in accordance with the GAFMC flashing requirements and details included in this manual.

- B. EverGuard EPDM System tie-ins to other roofing systems and repairs to other roofing systems where GAFMC materials are used are not guaranteed by GAFMC.
- C. Failure of a flashing terminated to an intermediate element (e.g., metal flashing, insulation, surface treatment, etc.), which itself could fail and admit moisture beneath the membrane, is beyond the limits of the GAFMC guarantee.
- D. GAFMC will be the sole judge as to whether or not a roofing guarantee will be issued to cover any proposed or completed roof. The issuance of a guarantee and/or the continued liability thereunder is partly contingent upon payment of established charges.
- E. GAFMC has no obligation to issue a roofing guarantee on any roof. Any inspection prior to issuance is solely for the benefit of GAFMC. In the event that a roof system does not conform to GAFMC standards and a guarantee is not issued, no portion of the guarantee fee is refundable.
- F. GAFMC will not accept Pre-Installation Forms which indicate that the owner

- or architect has the option to accept or reject the guarantee upon completion of the roof.
- G. Specifications not listed in this manual may also be eligible for GAFMC guarantees. For further information on guarantee requirements and for approval of modifications to published specifications, consult with EverGuard Contractor Services at 800-766-3411.
 - H. GAFMC is not responsible for consequential damages in case of roof system failure. GAFMC has no control over a building's contents, type, quantity, positioning or protection.
 - I. A GAFMC guarantee cannot be withdrawn once it has been issued, although it may be cancelled subsequently by GAFMC for violation of its terms and conditions.
 - J. It is the owner's responsibility to expose the membrane in the event that guarantee service is required when access is impaired. Such impairment includes, but is not limited to:
 1. Design features, such as window washer systems, which require the installation of traffic surface units in excess of 80 lb (36.3 kg) per unit.
 2. Any equipment, ornamentation, building service units and other rooftop surfacing materials that are not defined as part of the membrane assembly.
 3. Intricately placed or multicolored ballast configurations.
 4. Individual pavers utilized as ballast, which weigh more than 80 lb (36.3 kg) per unit, unless otherwise required by EverGuard® Contractor Services for wind uplift resistance.
 5. Interlocking paver systems that utilize mechanical clips, strapping, adhesive, etc.
 6. Rooftop equipment that does not provide GAFMC with reasonable access to the membrane.
 7. Severely ponded water, snow and other unrelated materials.

K. Exceptions

A guarantee will not be issued to cover less than the entire roof area of a single building. GAFMC will not issue a guarantee for any materials covering a deck or surface not specifically listed in this manual unless GAFMC has approved such conditions, in writing, **prior** to application of the roofing material.

A GAFMC roofing guarantee will not be issued for the following without prior written approval from the EverGuard Regional Contractor Services Manager:

- over any surface not covered in this manual
- over a cold storage building unless a ventilated plenum isolates the cold storage area from the roofing system and substrate
- on storage silos and heated tanks, or domed structures
- on structures having conduit or piping between the roof deck and roofing membrane, unless the conduit or piping is installed in channels below the deck surface
- on roofs that omit or have an inadequate number and spacing of expansion joints or curbs
- when deck material change direction, different kinds of deck material abut each other or the building changes direction without an expansion joint
- on systems constructed with insulation not approved by GAFMC
- on any structure where there is limited or no access to the roof or EverGuard membranes
- on a roof designed for or used as a water-insulated or spray roof
- on promenade or parking roofs
- on waterproofing applications
- for any structure where high humidity conditions exist such as, but not limited to, breweries, creameries, laundries, textile mills, pulp and paper plants, swimming pools, shower rooms, and canneries
- when roofing over an existing roof system that contains moisture, that is not fully adhered to the substrate or roof deck, and/or provides an improperly prepared surface
- on plywood decks without continuous solid end blocking
- on roofs containing sprayed in place polyurethane foam
- any usual condition not specifically approved by GAFMC

1.21.2 GAFMC CERTIFIED CONTRACTOR PROGRAM

GAFMC does not install roofing systems. GAFMC does not own roofing companies, or have any interest in companies installing roofing systems. Accordingly, GAFMC shall not be responsible for any roofing contractor's workmanship except as specifically covered under the terms and conditions of the GAFMC roofing guarantee.

The term "GAFMC EverGuard Approved Applicator" only identifies a contractor eligible to apply for a GAFMC roofing guarantee and is **not** intended to convey any other meaning. GAFMC EverGuard Approved Applicators are **not** employees, agents, or representatives of GAFMC.

GAFMC will issue a Roofing System Guarantee only for EverGuard roofs applied by EverGuard Approved Applicators. The responsibility for proper application of the roof lies with the EverGuard Approved Applicators alone. It is the responsibility of the building owner and his designated representatives, as the employer of the EverGuard Approved Applicator, to enforce the compliance with specifications and good workmanship practices and such enforcement is not an obligation of GAFMC.

1.21.3 INSPECTION

GAFMC will inspect only those roofs where a guarantee is to be issued or where special inspection services have been agreed to be purchased prior to the start of the roof construction, and the current charge for the guarantee or inspection services has been paid. If an inspection is requested and the job is not ready or the owner's representative is not available, an extra billing will be made at consultation fee rates.

GAFMC reserves the right to waive inspection of guaranteed roofs when, in its opinion, inspection is not necessary. In such cases, the owner or designer may request a special inspection for which an additional charge may be made.

Any inspections made by GAFMC are for its **own use only** and do not constitute a waiver of any of the terms and conditions of the guarantee.

Should a GAFMC inspector observe conditions on the job site which do not conform to the requirements of this specifications manual, or standard good roofing practices, such conditions will be brought to the attention of the roofing contractor and the owner's representative for corrective action. GAFMC, in its sole discretion, has the right to require corrective action as it deems necessary to conform to the requirements of this specifications manual and the requirements for the issuance of the GAFMC roofing system guarantee.

The following pages are a summary of the 20-Year Diamond Pledge™ Guarantee requirements previously outlined in this Design Guide.

System:	Ballasted
Warranty:	20-Year Diamond Pledge™ Roof Guarantee
Construction:	New, Recover or Tear-off
Decks:	Consult the EverGuard® EPDM Application and Specifications Manual for specific deck requirements.
Membrane:	EverGuard EPDM .060
Insulation:	1.5" minimum EnergyGuard™ ISO
Panel:	EverGuard EPDM any width
Seam Construction:	
Side Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape
End Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape
Base Tie-Ins:	EverGuard EPDM 6" Reinforced Tape Strip Required for All Base Tie-Ins
Details:	Consult the EverGuard EPDM Application and Specifications Manual for specific detail enhancements.

System:	Adhered	
Warranty:	20-Year Diamond Pledge™ Roof Guarantee	
Construction:	New, Recover or Tear-off	
Decks:	Consult the EverGuard® EPDM Application and Specifications Manual for specific deck requirements.	
Insulation:	1.5" minimum EnergyGuard™ ISO	2.0" minimum EnergyGuard ISO
Fasteners:	EverGuard Heavy Duty	EverGuard Heavy Duty
Fastening Rate:		
Field:	12 per 4'x8' board	8 per 4'x8' board
Perimeter:	18 per 4'x8' board	12 per 4'x8' board
Corner:	21 per 4'x8' board	14 per 4'x8' board
Membrane:	EverGuard EPDM .060 or .090 EverGuard EPDM Reinforced .045 or .060	
Panel:	EverGuard EPDM any width EverGuard EPDM Reinforced any width	
Seam Construction:		
Side Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape	
End Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape	
Base Tie-Ins:	EverGuard EPDM 6" Reinforced Tape Strip Required for All Base Tie-Ins	
Details:	Consult the EverGuard EPDM Application and Specifications Manual for specific detail enhancements.	

System:	BITS	
Warranty:	20-Year Diamond Pledge™ Roof Guarantee	
Construction:	New, Recover or Tear-off	
Decks:	Consult the EverGuard® EPDM Application and Specifications Manual for specific deck requirements.	
Air Barrier Requirements:	(When Required by Deck Construction) 6 mil. poly with sealed seams installed below the insulation	
Insulation:	1.5" minimum EnergyGuard™ ISO	2.0" minimum EnergyGuard ISO
Fasteners:	EverGuard Heavy Duty	EverGuard Heavy Duty
Fastening Rate:		
Field:	12 per 4'x8' board	8 per 4'x8' board
Perimeter:	18 per 4'x8' board	12 per 4'x8' board
Corner:	21 per 4'x8' board	14 per 4'x8' board
Membrane:	EverGuard .045 or .060	
Panel:	7'6" EverGuard EPDM Reinforced	10' EverGuard EPDM Reinforced
Fasteners:	EverGuard Heavy Duty	EverGuard Heavy Duty
Fastener Spacing:	12 o.c. max.	6" o.c. max.
Batten:	Metal or Polymer	
Seam Construction:		
Side Lap:	7" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape	
End Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape	
Base Tie-Ins:	EverGuard EPDM Reinforced Tape Strip Required for All Base Tie-Ins	
Perimeter Attachment:	Fully Adhered, Batten Bar or Batten "T"s 6" EverGuard EPDM Batten Cover plus 9" EverGuard EPDM Flashing Tape (RTS strip is not acceptable for intermediate perimeter attachment)	
Details:	Consult the EverGuard Application and Specifications Manual for specific detail enhancements.	

System:	MAS	
Warranty:	20-Year Diamond Pledge™ Roof Guarantee	
Construction:	New, Recover or Tear-off	
Decks:	Consult the EverGuard® Application and Specifications Manual for specific deck requirements.	
Air Barrier Requirements:	(When Required by Deck Construction) 6 mil. poly with sealed seams installed below the insulation	
Insulation:	1.5" minimum EnergyGuard™ ISO	2.0" minimum EnergyGuard ISO
Fasteners:	EverGuard Heavy Duty	EverGuard Heavy Duty
Fastening Rate:		
Field:	12 per 4'x8' board	8 per 4'x8' board
Perimeter:	18 per 4'x8' board	12 per 4'x8' board
Corner:	21 per 4'x8' board	14 per 4'x8' board
Membrane:	EverGuard EPDM .045 or .060 Reinforced	
Panel:	7'6" EverGuard EPDM Reinforced	10' EverGuard EPDM Reinforced
Fasteners:	EverGuard Heavy Duty	EverGuard Heavy Duty
Batten		
Fastener Spacing:	12 o.c. max.	6" o.c. max.
Batten:	Metal or Polymer	
Batten Cover:	6" EverGuard EPDM Batten Cover plus 9" EverGuard EPDM Flashing Tape	
Seam Construction:		
Side Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard EPDM Seam Tape plus 5" EverGuard EPDM Flashing Tape	
End Lap:	7" EverGuard EPDM Seam Tape or 3" EverGuard Seam Tape plus 5" EverGuard Flashing Tape	
Base Tie-Ins:	EverGuard EPDM Required for All Base Tie-Ins	
Perimeter Attachment:	Fully Adhered, Batten Bar or Batten "T"s 6" EverGuard EPDM Batten Cover plus 9" EverGuard Flashing Tape (RTS strip is not acceptable for intermediate perimeter attachment)	
Details:	Consult the EverGuard Application and Specifications Manual for specific detail enhancements.	

END OF SECTION