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Welcome

Thank you for consulting the 2009 *Edition of the EverGuard® TPO/PVC Application and Specifications Manual*. Updates to this year's Specification Manual were fairly extensive, most notably the addition of a number of new TPO and PVC accessories to help make your job easier. Please see pages 21 and 31 for the enhanced accessories line-up for 2009, and don't hesitate to contact GAF Contractor Services for more information.

For more than 100 years, we have been an innovative, quality-driven manufacturer and supplier of roofing materials for residential, commercial, and industrial buildings. Our ability to integrate new materials and technologies with our established manufacturing and distribution capabilities has kept GAF Materials Corporation (GAF) at the forefront of roofing.

This manual contains the following sections:

- Welcome
- Master Design Tables
- Product Performance
- Guarantee Program
- Roof Design
- Mechanically Attached Roofing Systems
- Fully Adhered Roofing Systems
- Ballast Applied Roofing Systems
- TriPosite XL™ Roofing Systems
- Freedom™ Roofing Systems
- Roofing Details

- Quality You Can Trust Since 1886… from North America's Largest Roofing Manufacturer. No one offers a wider range of reliable, proven, cost-effective roofing solutions;
    - EverGuard® TPO, Freedom™ TPO, and PVC Heat-weldable Single Ply Roofing Systems
    - RUBEROID® SBS and APP Modified Bitumen Roofing Systems
    - GAFGLAS® Fiberglass Built-up Roofing Systems
    - TOPCOAT® Liquid-Applied Membrane Roofing Systems
    - The Timberline® Prestique® Series of laminates; premium designer shingle line, including Camelot®, Grand Slate™, Country Mansion®, Grand Canyon™, Grand Sequoia®, Slateline® and Capstone®.
    - Marquis® WeatherMax®, Sentinel®, Royal Sovereign®, as well as Timberline® Prestique® Cool Color Series, Timberline® Prestique® Grandé and Timberline® ArmorShield™ II shingles

- We offer an extensive line of accessory products for our roof systems, including EnergyGuard™ insulations; DRILL-TEC™ fasteners; Metalastic® Expansion joint covers; and ventilation products.
- Every GAF roofing product benefits from the substantial resources available only from a multi-billion dollar corporation dedicated to roofing. Our 25 plants mean manufacturing expertise. Our extensive R&D organization means a constant focus on product and process improvement. Our 200 sales and technical personnel mean that GAF is there, in person, to provide you with the service and information you need. GAF is a team of 3,500 people dedicated to your roofing satisfaction.
- Our Technical Helpline is a technical assistance service that allows you to contact us directly and speak with a technical representative about specifications, applications, code approvals, and product information. The Helpline number is 1-800-ROOF-411 (1-800-766-3411).
- Visit www.gaf.com for additional information such as Material Safety Data Sheets from your best and safest choice!

TPO MASTER DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF

Deck	Membrane Attachment					Membrane Type			
	MA	Fully Adhered			Ballast	Smooth	Fleece (FB)	Self Adhering (HW RS)	
		Adhesive	Self Adhering	Hot					
Steel	X					X			
							X		
		X				X			
							X[6]		
			X					X	
				X			X		
					X	X			
							X		
Wood	X					X			
							X		
		X				X			
							X[6]		
			X					X	
				X			X		
					X	X			
							X		
Structural Concrete & Gypsum	X					X			
							X		
		X				X			
							X[6]		
			X					X	
				X			X		
					X	X			
							X		
Lightweight Insulating Concrete	X					X			
							X		
		X				X			
							X[6]		
			X					X	
				X			X		
					X	X			
							X		
Cementitious Wood Fiber	X					X			
							X		
		X				X			
							X[6]		
			X					X	
				X			X		
					X	X			
							X		

1. No hot attachment of polymat, XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet.

	Insulation/Substrate								Insulation/Substrate Attachment			
	Iso	Gypsum Board[5]	Wood fiber/ Perlite	EPS/ XEPS	Fanfold	3/6 oz Polymat	FR 50/10	none	Mech. Attached	Adhesive	Hot[1]	Loose
	X	X	X	X					X	X		
	X	X	X	X					X	X		
	X	X	X[4]	X[2]					X	X		
	X	X	X[4]	X[2]					X	X		
	X	X	X[4]	X[7]					X	X		
	X	X	X	X[7]					X	X		
	X	X	X	X								X
	X	X	X	X								X
	X	X	X	X	X[8]	X	X		X	X	X[3]	
	X	X	X	X	X[8]		X	X	X	X	X[3]	
	X	X	X[4]	X[2]				X	X	X	X[3]	
	X	X	X[4]	X[2]				X	X	X	X[3]	
	X	X	X[4]	X[7]				X	X	X	X[3]	
	X	X	X					X[3]	X	X	X[3]	
	X	X	X	X		X	X					X
	X	X	X	X				X				X
	X	X	X	X	X[8]	X			X	X	X	
	X	X	X	X	X[8]			X	X	X	X	
	X	X	X[4]	X[2]					X	X	X	
	X	X	X[4]	X[2]				X	X	X	X	
	X	X	X[4]	X[7]				X	X	X	X	
	X	X	X					X	X	X	X	
	X	X	X	X		X						X
	X	X	X	X				X				X
	X	X	X	X	X[8]	X			X	X	X[3]	
	X	X	X	X	X[8]			X	X	X	X[3]	
	X	X	X[4]	X[2]					X	X	X[3]	
	X	X	X[4]	X[2]				X[6]	X	X	X[3]	
	X	X	X[4]	X[7]					X	X	X[3]	
	X	X	X	X[7]				X[3]	X	X	X[3]	
	X	X	X	X		X						X
	X	X	X	X				X				X
	X	X	X	X	X[8]	X			X	X	X[3]	
	X	X	X	X	X[8]			X	X	X	X[3]	
	X	X	X[4]	X[2]					X	X	X[3]	
	X	X	X[4]	X[2]				X	X	X	X[3]	
	X	X	X[4]	X[7]					X	X	X[3]	
	X	X	X	X[7]				X[3]	X	X	X[3]	
	X	X	X	X		X						X
	X	X	X	X				X				X

4. Wood fiber insulation only.
5. Glass mat facer required for fully adhered/self adhered membranes.
6. Attachment of membrane must be with water-based adhesive.
7. Overlay board required.
8. Fanfold to be used only as an overlay board.

TPO MASTER DESIGN TABLE - RECOVER

Existing Roofing System Type	Membrane Attachment					Membrane Type			
	MA	Fully Adhered			Ballast	Smooth	Fleece (FB)	Self Adhering (HW RS)	
		Adhesive	Self Adhering	Hot					
Smooth BUR/MB	X					X			
							X		
		X				X			
							X[10]		
			X					X	
				X			X		
						X			
					X		X		
Single Ply Membrane	X					X			
							X		
		X				X			
							X[10]		
			X					X	
				X			X		
						X			
					X		X		
Granule Surfaced BUR/MB	X					X			
							X		
		X				X			
							X[10]		
			X					X	
				X			X		
						X			
					X		X		
Gravel Surfaced BUR/MB	X					X			
							X		
		X				X			
							X[10]		
			X					X	
				X			X		
						X			
					X[8]		X		
Standing Seam Metal[4]	X					X			
							X		
		X				X			
							X[10]		
			X					X	
				X			X		
						X			
					X		X		

1. No hot attachment of polymat, XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems.
4. EPS and XEPS is the only material allowed as flute fill with overlay board required.
5. Wood fiber insulation only.

	Insulation/Substrate								Insulation/Substrate Attachment			
	Iso	Gypsum Board[6]	Wood fiber/ Perlite[3]	EPS/ XEPS[2]	Fanfold[2]	3/6 oz Polymat	FR 50/10	none	Mech. Attached	Adhesive	Hot[1]	Loose
	X	X	X	X	X[9]	X	X		X	X	X	
	X	X	X	X	X[9]			X	X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X[7]					X	X	X	
	X	X	X	X[7]				X	X	X	X	
	X	X	X	X		X	X					X
	X	X	X	X				X				X
	X	X	X	X	X[9]	X	X		X			
	X	X	X	X	X[9]			X	X			
	X	X	X[5]	X					X			
	X	X	X[5]	X					X			
	X	X	X[5]	X[7]					X			
	X	X	X	X[7]					X			
	X	X	X	X		X	X					X
	X	X	X	X				X				X
	X	X	X	X	X[9]	X			X	X	X	
	X	X	X	X	X[9]			X	X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X[7]					X	X	X	
	X	X	X	X[7]				X	X	X	X	
	X	X	X	X		X						X
	X	X	X	X				X				X
	X	X	X	X	X[9]				X	X	X	
	X	X	X	X	X[9]				X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X					X	X	X	
	X	X	X[5]	X[7]					X	X	X	
	X	X	X	X[7]					X	X	X	
	X	X	X	X								X
	X	X	X	X								X
	X	X	X	X					X			
	X	X	X	X					X			
	X	X	X[5]	X					X			
	X	X	X[5]	X					X			
	X	X	X[5]	X[7]					X			
	X	X	X	X[7]					X			

6. Glass mat facer required for fully adhered/self adhered membranes.
7. Overlay board required.
8. Recover over coal tar pitch roofs is not allowed.
9. Fanfold to be used only as an overlay board.
10. Attach membrane with water-based adhesive.

PVC MASTER DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF

Deck	Membrane Attachment			Ballast	Membrane Type		
	MA	Fully Adhered			Smooth	Fleece	
		Adhesive	Hot				
Steel	X				X		
						X	
		X			X		
						X[10]	
			X			X	
				X	X		
						X	
Wood	X				X		
						X	
		X			X		
						X[10]	
			X			X	
				X	X		
						X	
Structural Concrete & Gypsum	X				X		
						X	
		X			X		
						X[10]	
			X			X	
				X	X		
						X	
Lightweight Insulating Concrete	X				X		
						X	
		X			X		
						X[10]	
			X			X	
				X	X		
						X	
Cementitious Wood Fiber	X				X		
						X	
		X			X		
						X[10]	
			X			X	
				X	X		
						X	

1. No hot attachment of polymat, XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet.
4. EPS and XEPS in combination with a 3 oz. polymat separator.
5. Glass mat facer required for fully adhered membrane attachment.

	Insulation/Substrate								Insulation/Substrate Attachment			
	Iso	Gypsum Board[5]	Wood fiber/ Perlite	EPS/ XEPS[2]	Fanfold[2]	3/6 oz Polymat	FR 50/10	none	Mech. Fast.	Adhesive	Hot[1]	Loose
	X	X	X	X[4]		X[4]			X	X		
	X	X	X	X					X	X		
	X	X	X[8]						X	X		
	X	X	X[8]	X					X	X		
	X	X	X	X[7]					X	X		
	X	X	X	X[4]		X[4]						X
	X	X	X	X								X
	X	X	X	X[4]	X[9]	X	X		X	X	X[3]	
	X	X	X	X	X[9]		X	X	X	X	X[3]	
	X	X	X[8]					X	X	X	X[3]	
	X	X	X[8]	X				X	X	X	X[3]	
	X	X	X					X[3]	X	X	X[3]	
	X	X	X	X[4]		X						X
	X	X	X	X				X				X
	X	X	X	X[4]	X[9]	X			X	X	X	
	X	X	X	X	X[9]			X	X	X	X	
	X	X	X[8]						X	X	X	
	X	X	X[8]	X				X	X	X	X	
	X	X	X					X	X	X	X	
	X	X	X	X[4]		X						X
	X	X	X	X				X				X
	X	X	X	X[4]	X[9]	X			X	X	X[3]	
	X	X	X	X	X[9]			X	X	X	X[3]	
	X	X	X[8]						X	X	X[3]	
	X	X	X[8]	X				X[6]	X	X	X[3]	
	X	X	X	X[7]				X[3]	X	X	X[3]	
	X	X	X	X[4]		X						X
	X	X	X	X				X				X
	X	X	X	X[4]	X[9]	X			X	X	X[3]	
	X	X	X	X	X[9]			X	X	X	X[3]	
	X	X	X[8]						X	X	X[3]	
	X	X	X[8]	X				X	X	X	X[3]	
	X	X	X	X[7]				X[3]	X	X	X[3]	
	X	X	X	X[4]		X						X
	X	X	X	X				X				X

6. Membrane attachment with water-based adhesive only.
7. Overlay board required.
8. Wood fiber insulation only.
9. Fanfold to be used only as an overlay board. Must not come in direct contact with PVC.
10. Attach membrane with water-based adhesive.

PVC MASTER DESIGN TABLE - RECOVER

Existing Roofing System type	Membrane Attachment			Ballast	Membrane Type		
	MA	Fully Adhered			Smooth	Fleece	
		Adhesive	Hot				
Smooth BUR/MB	X				X		
						X	
		X			X		
						X[11]	
			X			X	
				X	X		
						X	
Single Ply Membrane	X				X		
						X	
		X			X		
						X[11]	
			X			X	
				X	X		
						X	
Granule Surfaced BUR/MB	X				X		
						X	
		X			X		
						X[11]	
			X			X	
				X	X		
						X	
Gravel Surfaced BUR/MB	X				X		
						X	
		X			X		
						X[11]	
			X			X	
				X[9]	X		
						X	
Standing Seam Metal[3]	X				X		
						X	
		X			X		
						X[11]	
			X			X	

1. No hot attachment of polymat, XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. XEPS only as flute fill material with overlay board.
4. EPS and XEPS in combination with a 3 oz. polymat separator.
5. Glass mat facer required for fully adhered membrane attachment.

	Insulation/Substrate								Insulation/Substrate Attachment			
	Iso	Gypsum Board[5]	Wood fiber/ Perlite[6]	EPS/ XEPS[2]	Fanfold[2]	3/6 oz Polymat	FR 50/10	none	Mech. Fast.	Adhesive	Hot[1]	Loose
	X	X	X	X[4]	X[10]	X	X		X	X	X	
	X	X	X	X	X[10]			X	X	X	X	
	X	X	X[8]						X	X	X	
	X	X	X[8]	X					X	X	X	
	X	X	X	X[7]				X	X	X	X	
	X	X	X	X[4]		X	X					X
	X	X	X	X				X				X
	X	X	X	X[4]	X[10]	X	X		X			
	X	X	X	X	X[10]			X	X			
	X	X	X[8]						X			
	X	X	X[8]	X					X			
	X	X	X	X[7]					X			
	X	X	X	X[4]		X	X					X
	X	X	X	X				X				X
	X	X	X	X[4]	X[10]	X			X	X	X	
	X	X	X	X	X[10]			X	X	X	X	
	X	X	X[8]						X	X	X	
	X	X	X[8]	X					X	X	X	
	X	X	X	X[7]				X	X	X	X	
	X	X	X	X[4]		X						X
	X	X	X	X				X				X
	X	X	X	X[4]	X[10]	X[4]			X	X	X	
	X	X	X	X	X[10]				X	X	X	
	X	X	X[8]						X	X	X	
	X	X	X[8]	X					X	X	X	
	X	X	X	X[7]					X	X	X	
	X	X	X	X[4]		X						X
	X	X	X	X								X
	X	X	X	X[4]		X[4]			X			
	X	X	X	X					X			
	X	X	X[8]						X			
	X	X	X[8]	X					X			
	X	X	X	X[7]					X			

6. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems
7. Overlay board required.
8. Wood fiber insulation only.
9. Recover over coal tar pitch roofs is not allowed.
10. Fanfold to be used only as an overlay board. Must not come in direct contact with PVC.
11. Attach membrane with water-based adhesive.

Product Performance

Provides product test data, chemical resistance, sizes, weights, packaging, and shipping information for materials included in EverGuard® roofing systems.

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- Product Data Sheets

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14 TPO 60 mil Membrane
15 TPO 80 mil Membrane
16 TPO 45 mil Fleece-Back Membrane
17 TPO 60 mil Fleece-Back Membrane
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19 Freedom™ TPO with RapidSeam™
20 Freedom™ TPO HW
21 TPO Accessories
24 Color TPO Membrane
26 PVC 50 mil Membrane
27 PVC 60 mil Membrane
28 PVC 80 mil Membrane
29 PVC 60 mil Fleece-Back Membrane
30 PVC 80 mil Fleece-Back Membrane
31 PVC Accessories
33 Base and Ply Sheets
35 Air and Vapor Barriers
36 Separation Sheets
37 EnergyGuard™ Ultra PolyIso
39 EnergyGuard™ PolyIso
40 EnergyGuard™ Tapered PolyIso
42 EnergyGuard™ Composite Board PolyIso
43 EnergyGuard™ Perlite Recover Board
44 EnergyGuard™ High Density Fiberboard
45 EnergyGuard™ Perlite
46 DRILL-TEC™ Fasteners and Plates
48 Adhesives & Primers
49 Sealants
50 PVC Chemical Resistance Guide
51 PVC Chemical Resistance Charts
55 TPO Chemical Resistance Guide
56 TPO Chemical Resistance Charts
60 Guarantee Program

Product Data Sheet
EverGuard® TPO
45 mil Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® TPO 45 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide premium performance at a very cost-effective price. Strong, flexible, durable EverGuard® TPO 45 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied.

Compared to typical single-ply EPDM and PVC membranes, GAF EverGuard® TPO 45 mil roofing membrane provides the benefits of low installed cost, heat welded seams, white reflective color.*

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.045"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	290 lbf x 270 lbf
Factory Seam Strength	ASTM D-751	66 lbf	100 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	124 lbf x 140 lbf
Puncture Resistance	FTM 101C Method 2031	Not Established	290 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.070 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3.0% max.	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	390 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Tan, Gray, Regal Red, Regal Blue, Hartford Green	10' x 100' (1,000 sq.ft.)	256 lbs.	5' x 100' (500 sq.ft.)	128 lbs.
	8' x 100' (800 sq.ft.)	204.8 lbs.	4' x 100' (400 sq.ft.)	102.4 lbs.

Note: Membrane rolls shipped horizontally on pallets.

Storage: Store rolls on their sides on pallets or shelving in a dry area

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® TPO
60 mil Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® TPO 60 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® TPO 60 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® TPO 60 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.060"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	330 lbf x 310 lbf
Factory Seam Strength	ASTM D-751	66 lbf	120 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	70 lbf x 150 lbf
Puncture Resistance	FTM 101C Method 2031	Not Established	380 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.01 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3.0% (top coating only)	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	430 psi
Ozone Resistance	ASTM D-1149	Pass No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Tan, Gray, Regal Red, Regal Blue, Hartford Green	10' x 100' (1,000 sq.ft.)	322 lbs.	5' x 100' (500 sq.ft.)	162 lbs.
	8' x 100' (800 sq.ft.)	257.6 lbs.	4' x 100' (400 sq.ft.)	128.8 lbs.

Note: Membrane rolls shipped horizontally on pallets.

Storage: Store rolls on their sides on pallets or shelving in a dry area

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® TPO
80 mil Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® TPO 80 mil thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® TPO 80 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Fully Adhered, and Ballast Applied.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® TPO 80 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, no liquid plasticizing, and high tear/puncture resistance.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.080"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	360 lbf x 340 lbf
Seam Strength	ASTM D-751	66 lbf	140 lbf (membrane failure).
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	60 lbf x 150 lbf
Puncture Resistance	FTM 101C Method 2031	Not Established	>380 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.01 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3%	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	>430 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size	Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation				
	Colors	**Full Roll Size**	**Full Roll Weight**	**Half Roll Size**	**Half Roll Weight**
	White, Tan, Gray, Regal Red, Regal Blue, Hartford Green	10' x 100' (1,000 sq.ft.)	420 lbs.	5' x 100' (500 sq.ft.)	210 lbs.
	Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded				
Storage	Store rolls on their sides on pallets or shelving in a dry area				
Safety Warning	Membrane rolls are heavy. Position and install by at least two people.				

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® TPO
45 mil Fleece-Back Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® 45 mil Fleece-Back (FB) thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® 45 mil FB membrane is suitable for use in Mechanically Attached, Ballasted, Fully Adhered and TriPosite XL single-ply systems and the polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® 45 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical membrane only product performance, and is subject to normal manufacturing tolerances.			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.045"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	430 lbf x 360 lbf
Seam Strength	ASTM D-751	66 lbf	100 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	90 lbf x 120 lbf
Puncture Resistance	FTM 101 Method 2031	Not Established	>290 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.070 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.2%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3%	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	390 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Tan, Gray	10' x 100' (1,000 sq.ft.)	284 lbs.	5' x 100' (500 sq.ft.)	142 lbs.

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.

Storage: Store rolls on their sides on pallets or shelving in a dry area.

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® TPO
60 mil Fleece-Back Membrane

Title 24 * Compliant

Description

GAF EverGuard® 60 mil Fleece-Back FB thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® 60 mil FB membrane is suitable for use in Mechanically Attached and Fully Adhered single-ply systems. The polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® 60 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color*, and no liquid plasticizers.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical membrane only product performance, and is subject to normal manufacturing tolerances			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.060"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	450 lbf x 400 lbf
Seam Strength	ASTM D-751	66 lbf	120 (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	70 lbf x 170 lbf
Puncture Resistance	FTM 101 Method 2031	Not Established	>380 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.01 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3%	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	430 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Tan, Gray	10' x 100' (1,000 sq.ft.)	350 lbs.	5' x 100' (500 sq.ft.)	175 lbs.

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded

Storage: Store rolls on their sides on pallets or shelving in a dry area

Installation Tips: Membrane rolls are heavy. Position and install by at least two people.

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® TPO
80 mil Fleece-Back Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® 80 mil Fleece-Back (FB) thermoplastic polyolefin single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® 80 mil membrane is suitable for use in Mechanically Attached and Fully Adhered single-ply systems. The polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® 80 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and no liquid plasticizers.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Complaint, ENERGY STAR Listed, ASTM D6878.

Physical Properties	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical membrane only product performance, and is subject to normal manufacturing tolerance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.080"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	450 lbf x 400 lbf
Seam Strength	ASTM D-751	66 lbf	140 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	70 lbf x 170 lbf
Puncture Resistance	FTM 101 Method 2031	Not Established	>380 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.01 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3%	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	430 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Tan, Gray	10' x 50' (500 sq.ft.)	232 lbs.	5' x 50' (250 sq.ft.)	116 lbs.

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded

Storage: Store rolls on their sides on pallets or shelving in a dry area

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White, Energy Tan and Energy Gray Membrane Only

Product Data Sheet
EverGuard® Freedom™ TPO with RapidSeam™

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

EverGuard® Freedom™ TPO with RapidSeam™ technology is a fully self-adhered membrane available in 2 versatile colors: ENERGY STAR® qualified white and earth tone tan. Freedom™ membranes combine EverGuard®'s proven TPO technology with an added engineered adhesive preapplied to the bottom of the sheet for quick, hassle-free installation. Freedom™ SA membrane with RapidSeam™ includes a surface adhesive seaming technology so unique, it's patent pending. Freedom™ membranes are especially suited for schools and hospitals, high-rises and limited access buildings, and coastal locations and areas subject to extreme wind conditions. RapidSeam™ advantages include installation up to 50 times faster than taped seams and over three times faster than adhesive applications; it eliminates the need for 95% of chemical seam preparation solutions; there are no open flames or hot asphalt on your roof; and the factory-applied adhesive eliminates guesswork or uncertainty by the installer, resulting in uniform application.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties Test	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Data for 045
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.045"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	290 lbf x 270 lbf
Factory Seam Strength	ASTM D-751	66 lbf	100 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	124 lbf x 140 lbf
Puncture Resistance	FTM 101C Method 2031	Not Established	290 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.070 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3.0% max.	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	390 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight			Half Roll Size	Half Roll Weight		
		45	60	80		45	60	80
White,								
Tan &	10' x 50'	151	192	220	5' x 50'	74	101	120
Gray	10' x 100'	303	333	440	'5' x 100'	148	192	230

Storage

Note: Membrane rolls shipped horizontally on pallets.

Store on pallets in a clean, dry area at temperatures below 100°F; protect adhesive side from exposure to direct sunlight; and use care when handling the adhesive side of material. The adhesive is aggressive and will stick to skin.

Safety Warning

Membrane rolls are heavy. Position and install by at least two people.

* White Membrane Only

Product Data Sheet EverGuard® Freedom™ TPO HW

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

EverGuard® Freedom™ TPO HW is a self-adhered membrane with a heat weldable seam available in 45 mil and 60 mil thickness in 2 versatile colors: ENERGY STAR® qualified white and earth tone tan. Freedom™ membranes combine EverGuard®'s proven TPO technology with an added engineered adhesive preapplied to the bottom of the sheet for quick, hassle-free installation. Freedom™ HW membrane includes a traditional 3" heat weldable seam. Freedom™ membranes are especially suited for schools and hospitals, high-rises and limited access buildings, and coastal locations and areas subject to extreme wind conditions. Advantages include no open flames or hot asphalt on your roof and the factory-applied adhesive eliminates guesswork or uncertainty by the installer, resulting in uniform application.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D6878.

Physical Properties Test	ASTM Test Method	ASTM 6878 Minimum	EverGuard® Typical Data for 045
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.039" (min.)	0.045"
Breaking Strength	ASTM D-751 Grab Method	220 lbf/in.	290 lbf x 270 lbf
Factory Seam Strength	ASTM D-751	66 lbf	100 lbf (membrane failure)
Elongation at Break	ASTM D-751	15%	30%
Heat Aging	ASTM D-573	90% Retention of Breaking Strength and Elongation at Break	100%
Tear Strength	ASTM D-751 8" x 8" Sample	55 lbf	124 lbf x 140 lbf
Puncture Resistance	FTM 101C Method 2031	Not Established	290 lbs.
Cold Brittleness	ASTM D-2137	-40 C	-40 C
Permeance	ASTM E-96	Not Established	0.070 Perms
Dimensional Change	ASTM D-1204 @158 F, 6 hrs.	+/- 1%	0.4%
Water Absorption	ASTM D-471 @158 F, 1 week	+/- 3.0% max.	0.7%
Hydrostatic Resistance	ASTM D-751Method D	Not Established	390 psi
Ozone Resistance	ASTM D-1149	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.76
Emissivity (white)	ASTM C1371	N/A	0.90

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight			Half Roll Size	Half Roll Weight		
		45	60	80		45	60	80
White, Tan & Gray	10' x 50'	150	190	230	5' x 50'	74	101	120
	10' x 100'	301	365	450	5' x 100'	148	192	230

Storage

Note: Membrane rolls shipped horizontally on pallets.

Store on pallets in a clean, dry area at temperatures below 100°F; protect adhesive side from exposure to direct sunlight; and use care when handling the adhesive side of material. The adhesive is aggressive and will stick to skin.

Safety Warning

Membrane rolls are heavy. Position and install by at least two people.

* White Membrane Only

Product Data Sheet EverGuard® TPO Accessories

Description

The GAF EverGuard® TPO single-ply roofing system includes an extensive line of EverGuard® TPO flashing accessories for use with EverGuard® TPO roofing systems. EverGuard® flashing accessories are heat welded to the EverGuard® roofing membrane. They are easy to install and provide secure protection from roof edge to parapet to penetration to wall. The following EverGuard® TPO flashing accessories are available in standard colors of white, gray and tan unless otherwise noted.

Product	Description	Benefit/Application	Quantity/Size	Weight
Preformed Vent Boots	• 75 mil molded membrane	• One standard size accommodates most common pipes and conduits • Supplied with stainless steel clamping rings	• Fits 1" - 6" diameter pipes • 6 Vent Boots per carton	9 lbs/carton
Preformed Corners	• 60 mil thick molded membrane	• Universal style corner accommodates both inside and outside corners of base and curb flashings	• 4 x 4" with 6" flange • 20 Corners per carton	6 lbs/carton
UN-55 Detailing Membrane	• 55 mil thick unreinforced membrane • White, Tan, Gray, Regal Red, Regal Blue, Hartford Green (Energy Tan in the West)	• Alternative flashing/reinforcement material for penetrations and corners • Required wherever preformed vent boots cannot be used	• 24" x 50' roll	28 lbs/roll
TPO 45 mil Utility Flashing Strip	• 45 mil thick reinforced membrane • White, Tan, Gray, Regal Red, Regal Blue, Hartford Green (Energy Tan in the West)	• Use for stripping in coated metal flanges	• 8" x 100' roll	18 lbs/roll
Coated Metal Sheets	• 24 gauge steel with a 25 mil thick membrane film • White, Tan, Gray, Regal Red, Regal Blue, Hartford Green (Energy Tan in the West)	• TPO membrane is laminated to galvanized sheet metal • Cuts and forms like standard sheet metal • Field and flashing TPO membrane heat welds directly to coated metal • For metal gravel stop and drip edges, metal base and curb flashing, sealant pans and scupper sleeves	• 4" x 10' sheets • 10 or 30 sheets per pallet	47 lbs/sheet
UN-55 T-Joint Cover Patches	• 55 mil thick unreinforced membrane	• Conforming membrane seal for use over T-Joints in 60 and 80 mil membrane applications	• 100 patches per box	9 lbs
Cut Edge Sealant	• Solvent-based liquid sealant • Clear	• Sealant provided in squeeze-bottle for use sealing all cut reinforced edges	• 1 pint bottle • 12 bottles/carton • 100 lineal feet per pint @ 1/8" diameter bead	24 lbs/carton
Walkway Rolls	• 125 mil extruded and embossed TPO • Gray Only	• Herringbone traction surfacing in gray color • Available in rolls • Heat welds directly to membrane or installed with seam tape	• 30" x 50'	118 lbs/roll
TPO Cover Tape	• 30 mil TPO membrane laminated to white butyl tape	• For use in stripping in primed galvanized edge metal • For use in 10 & 15 year guarantees only	• 6" x 100' roll • 2 rolls/carton	50 lbs/carton

Notes: 1. Mass and dimensions stated are nominal unless otherwise indicated.
2. Store accessory flashing materials in original carton, rolls, or sheets on pallets or shelving in a dry area.
3. Accessory stocks should be rotated in a first-in, first-out manner.

Product Data Sheet
EverGuard® TPO
Accessories

Product	Description	Benefit/Application	Quantity/Size	Weight
Preformed Split Pipe Boots	• Boots are fabricated from 45 mil thick reinforced TPO membranes	• Three standard sizes are split to accommodate most common pipes and conduits	• 6 Boots/carton Stock Sizes 1"-2", 3"-5", 6"-8" Special order Size 9" - 11"	• 7.5 lbs/carton 7.5 lbs/carton 11 lbs/carton 11 lbs/carton
RTA (Roof Transition Anchor) Strip	• 6" x 100' 45 mil reinforced TPO membrane with pressure sensitive adhesive • White only	• To be installed on horizontal surfaces Using plates and fasteners as a base attachment in fully adhered and Freedom™ systems	• 6" x 100' rolls 2 rolls/carton	• 34 lbs/carton
Corner Curb Wraps	• Corners are fabricated from 45 mil thick rein-forced TPO membrane	• Four Standard sizes to flash curbs that are 24", 36", 48" and 60" in size. • Four corners are required to flash the curb.	• 4 Curb Wraps/carton. Stock Sizes are: 13.5", 19.5", 25.5", 31.5" • Special order sizes: 7.5", 37.5"	• 5.6 lbs/carton 7.4 lbs/carton 10.7 lbs/carton 12.5 lbs/carton
Preformed Expansion Joint Covers	• 60 mil thick reinforced TPO membrane • White only	• 5 standard sizes to accommodate most applications • Two convenient styles available to accommodate both Roof-to-Roof and Roof-to-Wall applications.	• Sizes are 4", 6", 8", 10", 12" Bellows • 50 foot rolls	• Ranges from 50-65 lbs.
EverGuard® SA TPO Standing Seam Profile	• 1-1/2 " wide x 1-1/4" high x 10' in length profile with pressure sensitive adhesive and release liner • White, Tan, Gray, Regal Red, Regal Blue, Hartford Green	• Applied over TPO roofing systems to simulate standing seam metal roof. • Factory applied adhesive and release liner for easy installation on primed surfaces. • Butt end aligned with dowels provided with the profiles	• 10' lengths 30 profiles/carton with connecting dowels	• 47 lbs./carton
Freedom™ 5'-0" Dual HW (Heat Weld) Flashing	• 45 mil and 60 mil reinforced membranes	• Eliminates wasted membrane because of the two HW edges. • 6" HW edge allows for more flexibility and easier installation	• 5' x 50'	• 76 lbs
EverGuard® TPO Fluted Corner	• 8" diameter nominal 50 mil non-reinforced TPO membrane	• For use in flashing outside corners of base and curb flashings	• 20 corners/carton	• 3 lbs/carton
Square Tube Wraps	• Square tube wraps are fabricated from 45 mil thick reinforced TPO membrane	• Fast efficient alternative to field fabrication • Tube wraps are split with a designed overlap so they can be wrapped around square or rectangular tubing and ensure a solid weld • Available in three standard sizes	• 6 Tube Wraps per carton Three Sizes 4" x 4", 4" x 6", 6" x 6"	• 6-7 lbs/carton
Inside Corners	• Inside Corners are formed using unreinforced membrane to a nominal 50 mil thickness	• Manufactured to accommodate inside corners of base and curb flashings • Designed for ease of welding in tight areas	• 20 Corners per carton 6" x 6" x 5 1/4"	• 3.5 lbs/carton
Pourable Sealer Pocket	• Pourable Sealer Pocket is molded with TPO compound to a nominal 70 mil thickness • White Only	• Provides a structural foundation for application of EverGuard® Pourable Sealant with primer or a non-shrinking grout • Lower cost than coated metal fabricated pockets • Ideal for waterproofing irregular shaped roof penetrations	• 6 Pockets per carton 9" x 6" x 4" oval with 3" base flange	• 6.5 lbs/carton

Product Data Sheet
EverGuard® TPO
Accessories

Product	Description	Benefit/Application	Quantity/Size	Weight
Drain	• Spun Aluminum drain preflashed with 55 mil unreinforced TPO membrane • White Only	• For use in waterproofing low slope roof drains • Fast efficient alternative to field fabrication	• 3 Drains per carton 10 sizes available: 1 1/2" to 6" in half inch increments	• 3.25 – 3.70 lbs/carton
Scupper	• Manufactured out of TPO Coated Metal and 55 mil unreinforced membrane • White Only	• For use in waterproofing wall scuppers • Eliminates unnecessary flashing to waterproof the wall opening	• 2 Scuppers per carton 4" x 6" x 12", 8" x 10" x 12"	• 5-9 lbs/carton
Vent	• Manufactured out of reinforced 45 mil TPO membrane and galvanized steel • White only	• For use in venting low slope mechanically attached roofs • Limited to one-way flow to avoid moisture buildup within the roofing structure and material	• 2 Vents per carton	• 12 lbs/carton
TPO Color Membranes	• Manufactured from 45, 60 and 80 mil reinforced membrane in Regal Blue, Hartford Green and Regal Red	• Great for roofs that are accessible or visible to building occupants. • Custom colors can complement traditional shingle installations. • A low cost alternative to metal roofing when used with color matching standing seam profiles.	• 5' x 100' and 10' x 100 roll sizes. • Detail membranes in 24" x 50" rolls. • Flashing membranes in 8" by 100' rolls.	• Various by membrane type, length/width and thickness
Topcoat Surface Seal SB	• Liquid-applied, seamless rubber membrane used to retrofit most low-slope roof surfaces.	• Protects and restores aged TPO and other roof membranes/surfaces. • Forms a strong, flexible seal that will not become brittle. • Can be applied as low as 32°F	• 5 gallon pails 55 gallon containers Bulk totes	• Weight per Gallon: 10.1 ± 0.5 lbs.

Product Data Sheet
EverGuard® Color TPO Membrane

Description

The GAF EverGuard® Color TPO single-ply roofing system includes an extensive choice of colors as well as several matching EverGuard® TPO flashing accessories. Flashing accessories are heat welded to the roofing membrane. They are easy to install and provide secure protection from roof edge to parapet to penetration to wall. Detail membrane, Flashing Strip and Coated metal are available in colors noted on this page and product details can be found on pages 21-23.

Product	Mil	Roll Size	5' Roll Weight	10' Roll Weight
Colonial Red	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Terra Cotta	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Electric Blue	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Moss Green	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Ivy Green	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Patina Green	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Tropical Green	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Teal	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Dark Bronze	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Dark Brown	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Desert Tan	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Goldenrod	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Smoke Grey	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Slate Grey	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs
Custom Colors	45 60 80	5' x 100' 10' x 100'	128 lbs 162 lbs 210 lbs	256 lbs 322 lbs 420 lbs

Notes: 1. These pre-formulated colors have a min. order size of 800 sq. and requires 4-6 weeks lead time.
2. Custom color TPO have a mn. order size of 800 sq. and requires 6-8 weeks lead time. A custom color process form can be found at www.GAF.com or with your local TM.

NOTES

Product Data Sheet
EverGuard® PVC
50 mil Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov *

Description

GAF EverGuard® PVC 50 mil thermoplastic single-ply membrane systems have been engineered to provide premium performance at a very cost-effective price. Strong, flexible, durable EverGuard® PVC 50 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Ballast Applied, Fully Adhered.

Compared to typical single-ply EPDM, PVC and TPO membranes, GAF EverGuard® PVC 50 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams and white reflective color.

Applicable Standards

UL Listed, FM Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D4434, Type III

Physical Properties	ASTM Test Method	ASTM D-4434 Standard Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.045"	0.050"
Breaking Strength	ASTM D-751 Grab Method	200 lbf/in.	310 lbf x 270 lbf
Seam Strength	ASTM D-751	75% of Breaking Strength	>95% (membrane failure)
Elongation at Break	ASTM D-751	15%	35% x 35%
Heat Aging	ASTM D-3045	90% Retention of Breaking Strength and Elongation at Break	>90% (no significant change)
Tear Strength	ASTM D-751 8" x 8" Sample	45 lbf	70 lbf x 80 lbf
Low Temperature Bend	ASTM D-2136	-40 F	-40 F
Permeance	ASTM E-96	Not Established	0.003 Perms
Dimensional Change	ASTM D-1204 @212 F, 1 hr.	0.5% (max.)	0.4%
Water Absorption	ASTM D-750 @158 F, 1 week	+/-3% (max.)	0.06%
Accelerated Weathering	ASTM G-53 UV-B, 8 hr. @70 C condensate. 4 hr. @50 C 5,000 hrs. exposure	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.87
Emissivity (white)	ASTM C1371	N/A	0.95

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Gray & Tan	81" x 100' (675 sq.ft.)	222 lbs.	40.5" x 100' (337 sq.ft.)	110 lbs.

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.

Storage: Store rolls on their sides on pallets or shelving in a dry area.

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White Membrane Only

Product Data Sheet
EverGuard® PVC
60 mil Membrane

Title 24 * Compliant

*

Description

GAF EverGuard® PVC 60 mil thermoplastic single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible, EverGuard® PVC 60 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Ballast Applied, Fully Adhered.

Compared to typical single-ply EPDM, PVC and TPO membranes, GAF EverGuard® PVC 60 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color and tear/puncture resistance.

Applicable Standards

UL Listed, FM Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D4434, Type III

Physical Properties	ASTM Test Method	ASTM D-4434 Standard Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.045"	0.060"
Breaking Strength	ASTM D-751 Grab Method	200 lbf/in.	320 lbf x 280 lbf
Seam Strength	ASTM D-751	75% of Breaking Strength	>95% (membrane failure)
Elongation at Break	ASTM D-751	15%	35% x 35%
Heat Aging	ASTM D-3045	90% Retention of Breaking Strength and Elongation at Break	>90% (no significant change)
Tear Strength	ASTM D-751 8" x 8" Sample	45 lbf	70 lbf x 80 lbf
Low Temperature Bend	ASTM D-2136	-40 F	-40 F
Permeance	ASTM E-96	Not Established	0.003 Perms
Dimensional Change	ASTM D-1204 @212 F, 1 hr.	0.5% (max.)	0.4%
Water Absorption	ASTM D-750 @158 F, 1 week	+/-3% (max.)	0.06%
Accelerated Weathering	ASTM G-53 UV-B, 8 hr. @70 C condensate. 4 hr. @50 C 5,000 hrs. exposure	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.87
Emissivity (white)	ASTM C1371	N/A	0.95

Product Data

Roll Size	Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation				
	Colors	**Full Roll Size**	**Full Roll Weight**	**Half Roll Size**	**Half Roll Weight**
	White, Gray & Tan	76" x 90' (540 sq.ft.)	207 lbs.	40.5" x 80' (270 sq.ft.)	103 lbs.
	Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.				
Storage	Store rolls on their sides on pallets or shelving in a dry area.				
Safety Warning	Membrane rolls are heavy. Position and install by at least two people.				

* White Membrane Only

Product Data Sheet EverGuard® PVC 80 mil Membrane

Title 24 * Compliant

LEARN MORE AT energystar.gov

Description

GAF EverGuard® PVC 80 mil thermoplastic single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® PVC 80 mil membrane is suitable for use in all types of single-ply systems: Mechanically Attached, Ballast Applied, Fully Adhered.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® 80 mil roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, and tear/puncture resistance.

Applicable Standards

UL Listed, FM Approved, CRRC Listed, Title 24 Compliant, ENERGY STAR® Listed, ASTM D4434, Type III

Physical Properties	ASTM Test Method	ASTM D-4434 Standard	EverGuard® Typical Test Minimum Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.045"	0.080"
Breaking Strength	ASTM D-751 Grab Method	200 lbf/in.	350 lbf x 320 lbf
Seam Strength	ASTM D-751	75% of Breaking Strength	>95% (membrane failure)
Elongation at Break	ASTM D-751	15%	35% x 35%
Heat Aging	ASTM D-3045	90% Retention of Breaking Strength and Elongation at Break	>90% (no significant change)
Tear Strength	ASTM D-751 8" x 8" Sample	45 lbf	70 lbf x 80 lbf
Low Temperature Bend	ASTM D-2136	-40 F	-40 F
Permeance	ASTM E-96	Not Established	0.003 Perms
Dimensional Change	ASTM D-1204 @212 F, 1 hr.	0.5% (max.)	0.4%
Water Absorption	ASTM D-750 @158 F, 1 week	+/-3% (max.)	0.06%
Accelerated Weathering	ASTM G-53 UV-B, 8 hr. @70 C condensate. 4 hr. @50 C 5,000 hrs. exposure	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.87
Emissivity (white)	ASTM C1371	N/A	0.95

Product Data

Roll Size

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation

Colors	Full Roll Size	Full Roll Weight	Half Roll Size	Half Roll Weight
White, Gray & Tan	76" x 60' (438 sq.ft.)	243 lbs.	40.5" x 65' (219 sq.ft.)	118 lbs.

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.

Storage: Store rolls on their sides on pallets or shelving in a dry area.

Safety Warning: Membrane rolls are heavy. Position and install by at least two people.

* White Membrane Only

Product Data Sheet
EverGuard® PVC
60 mil Fleece-Back Membrane

Title 24 * Compliant * LEARN MORE AT energystar.gov

Description

GAF EverGuard® PVC 60 mil Fleece-Back (FB) thermoplastic PVC copolymer single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® PVC 60 mil FB membrane is suitable for use in Fully Adhered and TriPosite XL™ single-ply systems, and the polyester fleece backing allows direct membrane application to rough substrate surfaces such as structural concrete and cementitious wood fiber.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® PVC 60 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, no liquid plasticizers, and tear/puncture resistance.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, Title 24 Compliant, ENERGY STAR® Listed, ASTM D-4434, Type III.

Physical Properties	ASTM Test Method	ASTM D-4434 Standard Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.045"	0.060" (not incl. fleece backing)
Breaking Strength	ASTM D-751 Grab Method	200 lbf/in.	480 lbf x 390 lbf
Seam Strength	ASTM D-751	75% of Breaking Strength	>95% (membrane failure)
Elongation at Break	ASTM D-751	15%	40% x 35%
Heat Aging	ASTM D-3045	90% Retention of Breaking Strength and Elongation at Break	>95% (no significant change)
Tear Strength	ASTM D-751 8" x 8" Sample	45 lbf	101 lbf x 136 lbf
Low Temperature Bend	ASTM D-2136	-40˚F	-40˚F
Permeance	ASTM E-96	Not Established	0.003 Perms
Dimensional Change	ASTM D-1204 @212˚F, 1 hr.	0.5% (max.)	0.15%
Water Absorption	ASTM D-750 @158˚F, 1 week	+/-3% (max.)	0.7% (w/o fleece backing)
Ozone Resistance	ASTM D-1149	Not Established	No visible deterioration @ 7 x magnification
Accelerated Weathering	ASTM G-53 UV-B, 8 hr. @70˚C condensate. 4 hr. @50˚C	No visible deterioration @ 7 x magnification 5,000 hrs. exposure	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.85
Emissivity (white)	ASTM C1371	N/A	0.86

Product Data

Roll Size	Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation				
	Colors	**Full Roll Size**	**Full Roll Weight**	**Half Roll Size**	**Half Roll Weight**
	White, Gray & Tan	76" x 75' (475 sq.ft.)	258 lbs.	N/A	N/A
	Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.				
Storage	Store rolls on their sides on pallets or shelving in a dry area.				
Safety Warning	Membrane rolls are heavy. Position and install by at least two people.				

* White Membrane Only

Product Data Sheet
EverGuard® PVC
80 mil Fleece-Back Membrane

Title 24 * Compliant * LEARN MORE AT energystar.gov

Description

GAF EverGuard® PVC 80 mil Fleece-Back (FB) thermoplastic PVC copolymer single-ply membrane systems have been engineered to provide superior long-term performance and enhanced durability. Strong, flexible EverGuard® PVC 80 mil FB membrane is suitable for use in Fully Adhered and TriPosite XL™ single-ply systems.

Compared to other heavy-duty single-ply EPDM, PVC and TPO membranes, GAF EverGuard® PVC 80 mil FB roofing membrane provides the benefits of all three materials in a single membrane: low installed cost, heat welded seams, white reflective color, no liquid plasticizers and tear/puncture resistance.

Applicable Standards

UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved, Title 24 Compliant, ENERGY STAR® Listed, ASTM D-4434, Type III.

Physical Properties	ASTM Test Method	ASTM D-4434 Standard Minimum	EverGuard® Typical Test Data
1. Certain data is provided in MD (machine direction) x CMD (cross machine direction) format. 2. Data is based upon typical product performance, and is subject to normal manufacturing tolerance and variance			
Nominal Thickness	ASTM D-751	0.045"	0.080" (not incl. fleece backing)
Breaking Strength	ASTM D-751 Grab Method	200 lbf/in.	519 lbf x 482 lbf
Seam Strength	ASTM D-751	75% of Breaking Strength	>95% (membrane failure)
Elongation at Break	ASTM D-751	15%	40% x 40%
Heat Aging	ASTM D-3045	90% Retention of Breaking Strength and Elongation at Break	>95% (no significant change)
Tear Strength	ASTM D-751 8" x 8" Sample	45 lbf	66 lbf x 112 lbf
Low Temperature Bend	ASTM D-2136	-40 F	-40 F
Permeance	ASTM E-96	Not Established	0.003 Perms
Dimensional Change	ASTM D-1204 @212 F, 1 hr.	0.5% (max.)	0.10%
Water Absorption	ASTM D-750 @158 F, 1 week	+/-3% (max.)	0.60% (w/o fleece backing)
Ozone Resistance	ASTM D-1149	Not Established	No visible deterioration @ 7 x magnification
Accelerated Weathering	ASTM G-53 UV-B, 8 hr. @70 C condensate. 4 hr. @50 C 5,000 hrs. exposure	No visible deterioration @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white)	ASTM C1549	N/A	0.85
Emissivity (white)	ASTM C1371	N/A	0.86

Product Data

Roll Size	Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and variation				
	Colors	**Full Roll Size**	**Full Roll Weight**	**Half Roll Size**	**Half Roll Weight**
	White, Gray & Tan	76" x 60' (380 sq.ft.)	225 lbs.	N/A	N/A
	Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style and banded.				
Storage	Store rolls on their sides on pallets or shelving in a dry area.				
Safety Warning	Membrane rolls are heavy. Position and install by at least two people.				

* White Membrane Only

Product Data Sheet EverGuard® PVC Accessories

Description

The GAF EverGuard® PVC single-ply roofing system includes an extensive line of EverGuard® PVC flashing accessories for use with EverGuard® PVC roofing systems. EverGuard® flashing accessories are heat welded to the EverGuard® roofing membrane. They are easy to install and provide secure protection from roof edge to parapet to penetration to wall. The following EverGuard® PVC flashing accessories are available in standard colors of white and gray:

Product	Description	Benefit/Application	Quantity/Size	Weight
Prefabricated Expansion Joint Covers	.060" thick reinforced membrane with foam supported bellows	• Two standard sizes to accommodate most common joint widths • 50' continuous length minimizes joints • Universal style suitable for both field and wall expansion joints • Factory-fabricated terminations and transitions available	**Small** • 4" bellows for 1-2" joints • 50' continuous roll **Large** • 6" bellows for 2-3" joints • 50' continuous roll	**Small:** 60 lbs/roll **Large:** 75 lbs/roll
Walkway Rolls	1/8" thick (125 mil) extruded and embossed PVC	• Herringbone traction surfacing in gray color • Available in both pads and rolls • Heat welds directly to membrane	**Pads** • 30" x 36"; 30 pads/carton **Rolls** • 30" x 50'	8 lbs/pad or 118 lbs/roll
Preformed Pipe Boot	Molded PVC un-reinforced membrane	• Three standard sizes to accommodate most common pipes and conduit	6 Boots/Carton 1"-4" 3"-7" 7"-12"	4 lbs/carton 4.5 lbs/carton 5 lbs/carton
Preformed Inside Corner	Molded PVC un-reinforced membrane	• For use in flashing inside corners of base and curb flashings	2-3/4" x 3.5" with 6' flange 20 corners/carton	1.8 lbs/carton
Preformed Outside Corner	Molded PVC un-reinforced membrane	• For use in flashing outside corners of base and curb flashings	8" diameter 20 corners/carton	2.4 lbs/carton
Coated Metal Sheets	24 gauge steel with .040" thick membrane film	• PVC un-reinforced membrane is laminated to galvanized sheet metal • Cuts and forms like standard sheet metal. • Field and flashing membranes heat weld directly to coated metal • For metal gravel stops, and drip edges; metal base and curb flashings; sealant pans and scupper sleeves	4' x 10' sheets, 10 sheets/pallet 30 sheets/pallet (White Only)	520 lbs/pallet, 1560 lbs/pallet
UN-80 T-Joint Cover Patches	.080" thick un-reinforced membrane: white/gray and white/tan	• Conforming membrane seal over t-joints in 80 mil membrane applications	6-3/4" diameter 100 patches/carton	9.3 lbs/carton
UN -80 24" Detailing Membrane	.080" thick un-reinforced membrane: white/gray and white/tan	• Alternative flashing material for penetrations and corners • Required wherever preformed vent boots can not be used	24" x 50' roll	42 lbs/roll
UN -80 12" Flashing Membrane	.080" thick un-reinforced membrane: white/gray and white/tan	• Alternative flashing material for penetrations and corners • Required wherever preformed vent boots can not be used	12" x 50' roll	21 lbs/roll

Storage

Store accessory flashing materials in original cartons, rolls or sheets on pallets or shelving, in a dry area.

Product Data Sheet
EverGuard® PVC
Accessories

Product	Description	Benefit/Application	Quantity/Size	Weight
UN-80 6" Detailing Strip	.080" thick un-reinforced membrane: white/gray and white/tan	• For use in stripping in PVC coated metal	• 6" x 150' roll	40 lbs/roll
Cut Edge Sealant	Semi-clear liquid thermoplastic sealant	• For sealing the cut edges of reinforced PVC membrane.	• 12 pint bottles/carton • (4) 1 gallon cans/carton	• 14 lbs/carton • 38 lbs/carton
Preformed Pitch Pocket	Molded rigid PVC pocket, 6-1/2" in diameter by 3-3/4" high	• Split prefabricated PVC pitch pocket for easy installation around single or multiple pipes	• 12 pockets/carton (White Only)	24 lbs/carton

Product Data Sheet
EverGuard®
Base and Ply Sheets

Description

GAF EverGuard® single-ply roofing systems include a full line of GAFGLAS® asphalt fiberglass base and ply sheets. GAF base and ply sheets are always included as part of a TriPosite XL™ system. In addition, GAF base sheets can also be installed in conjunction with EverGuard® fleece-backed membrane as a venting base sheet recover/separation layer. The following base and ply sheets are available:

Product	Description	Benefit/Application	Quantity/Size	Applicable Standards
GAFGLAS® Stratavent® Eliminator™ Perforated Venting Base Sheet	Perforated heavy-duty asphalt coated fiber-glass base sheet with mineral surfacing on underside	• Dry-applied venting base sheet over isocyanurate insulation, smooth surfaced asphalt built-up/modified bitumen roofing, and prepared mineral-surfaced asphalt or SBS cap sheets • Perforations allow hot asphalt attachment of EverGuard® fleece-backed membrane through base sheet to underlying substrate • 1 roll provides 1.25 square coverage	• 39" x 40 2/3' • 75 lbs.	ASTM D4897, Type II UL Type G2 FM Approved Dade County Product Approval
GAFGLAS Stratavent Eliminator Nailable Venting Base Sheet	Non-perforated heavy-duty asphalt coated fiberglass base sheet with mineral surfacing on underside	• Mechanically attached venting base sheet installed directly over nailable decks of all types, and as separation sheet over smooth or mineral surfaced existing roof surfaces • Allows hot asphalt attachment of EverGuard® fleece-backed membrane directly to base sheet • 1 roll provides 1.25 square coverage	• 39" x 40 2/3' • 75 lbs.	ASTM D4897, Type II UL Type G2 FM Approved Dade County Product Approval
GAFGLAS FlexPly® 6 Premium Ply Sheet	Premium asphalt coated fiberglass Type VI ply sheet	• Ply sheet installed as 2-ply or 3-ply assembly beneath fleece-backed membrane in TriPosite XL™ system • Ply sheet installed as 1-ply or 2-ply vapor retarder assembly • 1 roll provides 5 square coverage	• 39" x 162' • 44 lbs.	ASTM D2178, Type VI UL Type G1 FM Approved Dade County Product Approval
GAFGLAS Ply 4	Asphalt coated fiberglass Type IV ply sheet	• Ply sheet installed as 2-ply or 3-ply assembly beneath fleece-backed membrane in TriPosite XL™ system • Ply sheet installed as 1-ply or 2-ply vapor retarder assembly • Meets or exceeds ASTM D2178, Type IV • 1 roll provides 5 square coverage	• 39" x 162' • 40 lbs.	ASTM D2178, Type IV UL Type G1 FM Approved Dade County Product Approval
GAFGLAS #75 Base Sheet	Premium roofing base sheet	• Allows hot asphalt attachment of EverGuard® fleece-backed membrane directly to base sheet • Allows mechanical attachment of base sheet to all types of nailable decks • Meets or exceeds ASTM D4601, Type II • 1 roll provides 3 square coverage	• 39" x 97.5' • 75 lbs.	ASTM D4601, Type II UL Type G2 FM Approved Dade County Product Approval
GAFGLAS #80 Ultima Base Sheet	High performance roofing base sheet	• Allows hot asphalt attachment of EverGuard® fleece-backed membrane directly to base sheet • Allows mechanical attachment of base sheet to all types of nailable decks • Meets or exceeds ASTM D4601, Type II • 1 roll provides 2 square coverage	• 39" x 65' • 75 lbs.	ASTM D4601, Type II UL Type G2 FM Approved Dade County Product Approval
Ruberoid® 20 Base Sheet	SBS modified premium base sheet	• Base sheet installed as 2-ply assembly beneath fleece-backed membrane in TriPosite XL™ system • Base sheet installed as a 1 ply vapor retarder assembly • Meets or exceeds ASTM D6163, Type I • 1 roll provides 1.5 square coverage	• 39" x 49' • 95 lbs.	ASTM D6163, Type I Grade S UL Listed FM Approved Dade County Product Approval
StormSafe™ Base Sheet	A non-breathable nail-able underlayment with a beige-colored weather side coating with a polypropylene coating used over lightweight concrete or wood decks	• For use as a mechanically attached base under Freedom™	• Length 240' • Width 48"	Weight 68 lbs

Note: Mass and dimensions stated as nominal unless otherwise indicated.

NOTES

Product Data Sheet
EverGuard®
Air and Vapor Barrier Sheets

Description

GAF EverGuard® single-ply roofing systems include a full line of GAF air and vapor barrier sheets. GAF air and vapor barrier sheets are easy to install; loose applied sheets require little or no mechanical attachment; fully adhered sheets are adhered with asphalt-based cold adhesive. The following GAF air and vapor barrier sheets are available:

Product	Description	Benefit/Application	Quantity/Size	Weight
Lexsuco® Air/Vapor Barrier Sheet	PVC-based .010" black flexible sheet	• Air or vapor barrier sheet installed loose over deck and secured by mechanically attached insulation layer • Vapor barrier sheet adhered to deck or insulation with Lexsuco adhesive • ASTM E-96 Procedure A perm rating of 0.5 or less	6' X 300'/roll	143 lbs./roll
Lexsuco Adhesive	Solvent-based rubberized asphaltic adhesive	• Single-surface adhesive applied to deck or insulation substrate surfaces	5 gal./pail	58 lbs./pail
Permate® Vapor Barrier Sheet	Asphalt-impregnated laminated kraft sheet	• Vapor barrier sheet adhered to deck or insulation with Permate adhesive • ASTM E-96 Procedure A perm rating of 0.5 or less	96" X 405'/roll	14 lbs./roll
Permate Adhesive	Solvent-based rubberized asphaltic adhesive	• Single-surface adhesive applied to deck or insulation substrate surfaces	5 gal./pail	58 lbs./pail

Note: Product sizes, dimensions, and widths are nominal values and are subject to normal manufacturing/packaging tolerance and deviation. Store air/vapor barrier material in original rolls or pails on pallets or shelving in a dry area. Store adhesives in a 50-80°F conditioned area away from open flame or other combustion source.

Product Data Sheet
EverGuard®
Separation Sheets

Description

GAF EverGuard® single-ply roofing systems include a full line of EverGuard® separation sheets, both non-woven polyester (beige in color) and fiberglass fire-resistant (green in color) mat. EverGuard® separation sheets are easy to install; loose applied sheets require little or no mechanical attachment. They protect the EverGuard® membrane from damage, in the case of non-woven polyester sheets, and improve the overall fire resistance of roof assemblies, in the case of fiberglass sheets. The following EverGuard® non-woven polyester sheets and fiberglass sheets are available:

Product	Description	Benefit/Application	Quantity/Size	Weight
Polymat Separation Layer 3 oz.	Non-woven polyester UV-stabilized mat, 3 oz/sq. yd.	• Separation sheet installed beneath mechanically attached and ballast applied membranes to protect from smooth surfaced substrates • Separation sheet installed over ballast applied membranes to protect from sharp edges of crushed or reused stone ballast, and beneath lightweight interlocking concrete pavers	10' X 492'	80 lbs./roll
Polymat Cushioning Layer 6 oz.	Non-woven polyester UV-stabilized mat, 6 oz/sq. yd.	• Separation sheet installed beneath mechanically attached or ballast applied membranes to protect from granule surfaced, rough and irregular surfaced substrates • Separation sheet installed over ballast applied membranes beneath standard non-interlocking concrete pavers	10' X 328'/roll	79 lbs./pail
VersaShield™ Underlayment	Non-asphaltic fiberglass based underlayment	• A unique patented underlayment that provides moisture resistance and excellent protection against flame spread and penetration.	• 42" x 100'	52.5 lbs./roll

Note: Store separation materials in original rolls on pallets or shelving in a dry area. Mass and dimensions stated are nominal unless otherwise indicated.

Product Data Sheet EnergyGuard™ Ultra PolyIso Insulation

Description

EnergyGuard™ Ultra roof insulation consists of UltraShield™ coated glass-fiber mat facer laminated to a closed-cell polyisocyanurate foam core. EnergyGuard™ Ultra uses EPA accepted blowing agents and
qualifies under the Federal Procurement Regulation of Recycled Material. EnergyGuard™ Ultra insulation provides outstanding thermal performance on commercial roofing application. It is designed to be used with all GAF and EverGuard® roofing systems, including ballasted, fully adhered or mechanically attached single ply, modified bitumen, and built-up roofing systems. Available in 4' x 4' or 4' x 8' board sizes, and in thicknesses ranging from 1" to 4.0".

Advantages

- Excellent thermal performance
- Provides high performance substrate for cold applied modified bitumen applications.
- Closed cell structure provides enhanced water and vapor resistance.
- Excellent dimensional stability.
- FMRC Approved –– Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Research Approval Guide*.
- Safe –– Uses EPA accepted blowing agents.
- Lightweight –– Lighter than most other insulating products offering comparable thermal resistance; as much as five times lighter in weight than many other materials with the same R-value.
- Low water permeability –– lower overall perm rating than many conventional insulation boards.
- High moisture resistance and no capillarity; is stable and maintains its physical and insulating characteristics.
- Easier handling and faster to install –– Because of light weight, this material is easier to handle on the job site and installs faster. Easier cutting in the field provides the installer with simplified fabricating on the roof deck. Minimizes on-the-job damage.

Uses

- EnergyGuard™ Ultra Roof Insulation is designed for use over structural roof decks where "R" values of 6.0 or higher are required, along with comprehensive UL and FMRC approvals.
- When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
- Refer to the membrane manufacturer's current application and specifications manual for proper installation procedures.

Traffic/Storage/Potential Fire Hazard

- EnergyGuard™ Ultra Roof Insulation is a non-structural, non-load bearing material. It is not designed for direct traffic usage unless adequately protected.
- EnergyGuard™ Ultra Roof Insulation should be stored dry and protected from the elements. No more insulation should be installed than can be completely covered with roofing on the same day.
- As unprotected polyisocyanurate will burn, **fire safety precautions should be observed** wherever insulation products are used.
- Direct torching of modified bitumen roofing to EnergyGuard™ Ultra Roof insulation will present a **fire hazard**. A properly installed fiber glass base sheet MUST be used over the insulation.

Code Compliance

- Listed by Underwriters Laboratories for use as part of a Class A, B or C Roof Covering. See UL Inc. *Roofing Materials and Systems Directory* for details.
- Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Research Approval Guide*.
- Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.
- For details, consult *Factory Mutual Loss Prevention Sheet 1-28, 1-29, 1-28R, 1-29R* and current *Approval Guide*.
- Federal Specification HH-I-1972/ASTM C1289.

Thermal and Physical Characteristics(1)

Flute Thickness* Inches	mm	LTTR** Value	Maximum Spanability Inches	mm
1.0	25.4	7.0	2 5/8	66.7
1.4	35.6	8.4	4 3/8	111.1
1.5	38.1	9.0	4 3/8	111.1
1.7	25.4	10.3	4 3/8	111.1
1.8	45.7	10.9	4 3/8	111.1
2.0	50.8	12.1	4 3/8	111.1
2.3	58.4	14.0	4 3/8	111.1
2.5	63.5	15.3	4 3/8	111.1
2.6	66.0	15.9	4 3/8	111.1
2.7	68.6	16.6	4 3/8	111.1
3.0	76.2	18.5	4 3/8	111.1
3.5	88.9	21.7	4 3/8	111.1
4.0	101.6	25.0	4 1/2	114.3

***Other thicknesses available upon request.**

**Long Term Thermal Resistance Valves provide a 15-year time weighted average in accordance with CAN/ULC S770.

(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

Typical Physical Properties

Property	Value	Test Method
Water Absorption, % by Volume— 2 hrs.	1.5 max.	ASTM C 209
Dimensional Stability Change 7 days @158°F (70°C), 90-100% RH		
Lengthwise	<2%	ASTM D 2126
Crosswise	<2%	
Compression Resistance 10% Consolidation—psi (kPa)	20 (138) nom.	ASTM D 1621
Laminar Tensile Strength—psi (kPa)	4 (28)	ASTM C 209
Moisture Vapor Transmission*	<1 perm (57.5 ng/(Pa•s•m^2))	ASTM E 96
Flame Spread *	<75	ASTM E 84
Service Temperature	-100 to 200 °F (-73 to 93 °C)	

* Foam core only.
**These numerical ratings are not intended to reflect hazards presented by these or any other material under actual fire conditions.

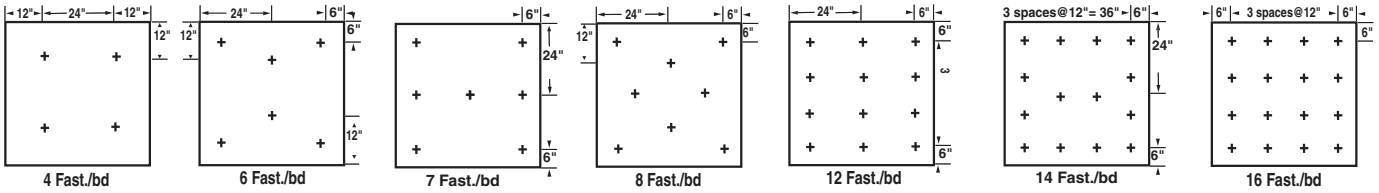
WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

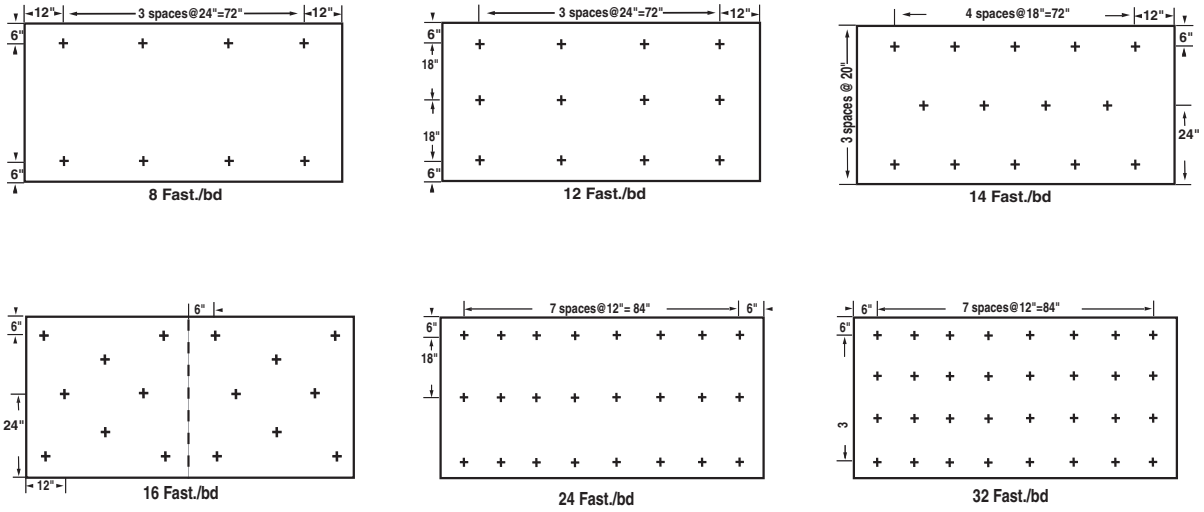
Product Data Sheet EnergyGuard™ Ultra PolyIso Insulation

Design Considerations – Suggested Insulation Fastener Patterns

4' x 4' Boards



4' x 8' Boards



Note: These patterns are for FM Approved decks utilizing appropriate FMRC Approved screws and plates.

Consult FMRC Loss Prevention Data Sheets 1-29 for specific perimeter and corner fastening details. For proper attachment, fasteners must penetrate the flange or the metal deck a minimum of 3/4 inch.

Due to ongoing testing programs and changes in FM Global (FMRC) requirements, the number of fasteners and their placement are subject to change without notice.

Product Data Sheet
EnergyGuard™
PolyIso Insulation

Description
EnergyGuard™ Roof Insulation Board is made of organic/glass facers bonded to a core of isocyanurate foam.

Advantages
- High insulation value –– Excellent "LTTR" value compared to any other FM Class I rated products of equivalent thickness.
- FM Approved –– Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Research Approvals Guide*.
- Environmentally safe –– Uses EPA accepted blowing agents.
- Light weight –– Lighter than most other insulating products offering comparable thermal resistance; as much as five times lighter in weight than many other materials with the same R-value.
- Excellent dimensional stability.
- Low water permeability –– lower overall perm rating than many conventional insulation boards.
- High moisture resistance and no capillarity; is stable and maintains its physical and insulating characteristics.
- Easier handling and faster to install –– Because it is light weight, this material is easier to handle on the job site and installs faster. Easier cutting in the field provides the installer with simplified fabricating on the roof deck. Minimizes on-the-job damage.

Uses
- EnergyGuard™ Roof Insulation is designed for use over structural roof decks where "R" values of 6.0 or higher are required, along with comprehensive UL and FMRC approvals.
- When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
- Refer to the application specifications in the current membrane manufacturer's application and specifications manual for proper installation procedures.

Traffic/Storage/Potential Fire Hazard
- EnergyGuard™ Roof Insulation is a non-structural, non-load bearing material. It is not designed for direct traffic usage unless adequately protected.
- EnergyGuard™ Roof Insulation should be stored dry and protected from the elements. No more insulation should be installed than can be completely covered with roofing on the same day.
- As unprotected polyisocyanurate will burn, **fire safety precautions should be observed** wherever insulation products are used.
- Direct torching of modified bitumen roofing to EnergyGuard™ Roof insulation will present a **fire hazard**. A properly installed fiber glass base sheet MUST be used over the insulation.

Code Compliance
- Listed by Underwriters Laboratories for use as part of a Class A, B or C Roof Covering. See UL Inc. *Roofing Materials and Systems Directory* for details.
- Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Research Approvals Guide*.
- Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.
- For details, consult *Factory Mutual Loss Prevention Sheet 1-28, 1-29, 1-28R, 1-29R* and current *Approval Guide*.
- Federal Specification HH-I-1972/ASTM C1289.

Thermal and Physical Characteristics

Flute Thickness* Inches	mm	LTTR Value**	Maximum Spanability Inches	mm
1.0	25.4	6.0	2 5/8	66.7
1.1	27.9	6.6	2 5/8	66.7
1.2	30.5	7.2	2 5/8	66.7
1.3	33.0	7.8	3 5/8	93.3
1.4	35.6	8.4	4 3/8	111.1
1.5	38.1	9.0	4 3/8	111.1
1.6	40.6	9.6	4 3/8	111.1
1.7	25.4	10.3	4 3/8	111.1
1.8	45.7	10.9	4 3/8	111.1
1.9	48.2	11.5	4 3/8	111.1
2.0	50.8	12.1	4 3/8	111.1
2.1	53.3	12.8	4 3/8	111.1
2.2	55.9	13.4	4 3/8	111.1
2.3	58.4	14.0	4 3/8	111.1
2.4	60.9	14.7	4 3/8	111.1
2.5	63.5	15.3	4 3/8	111.1
2.6	66.0	15.9	4 3/8	111.1
2.7	68.6	16.6	4 3/8	111.1
2.8	71.1	17.2	4 3/8	111.1
2.9	73.6	17.9	4 3/8	111.1
3.0	76.2	18.5	4 3/8	111.1
3.1	78.7	19.1	4 3/8	111.1
3.2	81.2	19.8	4 3/8	111.1
3.3	83.8	20.4	4 3/8	111.1
3.4	86.4	21.1	4 3/8	111.1
3.5	88.9	21.7	4 3/8	111.1
3.6	91.4	22.4	4 3/8	111.1
3.7	93.9	23.0	4 3/8	111.1
3.8	96.5	23.7	4 3/8	111.1
3.9	99.1	24.3	4 3/8	111.1
4.0	101.6	25.0	4 1/2	114.3

***Other thicknesses available upon request.**
****Long Term Thermal Resistance Valves provide a 15-year time weighted average in accordance with CAN/ULC S770.**

(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

Typical Physical Properties

Property	Value	Test Method
Water Absorption, % by Volume— 2 hrs.	1.5 max.	ASTM C 209
Dimensional Stability Change 7 days @158°F (70°C), 90-100% RH		
Lengthwise	<2%	ASTM D 2126
Crosswise	<2%	
Compression Resistance* 10% Consolidation—psi (kPa)	20 (138) nom.	ASTM D 1621
Laminar Tensile Strength—psi (kPa)	4 (28)	ASTM C 209
Moisture Vapor Transmission**	<1 perm (57.5 ng/(Pa•s•m^2)	ASTM E 96
Flame Spread ***	<75	ASTM E 84
Service Temperature	-100 to 200°F (-73 to 93°C)	

* Also available in 25 psi (172 kPa)
** Foam core only.
***These numerical ratings are not intended to reflect hazards presented by these or any other material under actual fire conditions.

WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
EnergyGuard™
Tapered PolyIso Insulation

Description
EnergyGuard™ Tapered PolyIso Foam Roof Insulation has a thermally efficient polyisocyanurate core bonded between organic/glass facers. It is readily available in the two most popular and efficient tapers, 1/8 inch per foot (1%) and 1/4 inch per foot (2%).

Advantages
- Properly designed and installed, EnergyGuard™ Tapered PolyIso Foam Insulation Systems virtually eliminate ponding water.
- High thermal efficiency.
- Easily installed with mechanical fasteners, hot asphalt or loose laid in a ballasted system.
- Low point and letter codes are designated on each board.
- Engineering design board layouts are available from your plans and field verified dimensions.

Uses
- EnergyGuard™ Tapered PolyIso Foam Roof Insulation is designed for use over structural roof decks to provide slope to drain and to provide thermally efficient insulation.
- When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
- Refer to the membrane manufacturer's current application and specifications manual for proper installation procedures.

Traffic/Storage/Potential Fire Hazard
- EnergyGuard™ Tapered PolyIso Foam Roof Insulation is a non-structural, non-load bearing board. It is not designed for direct traffic usage unless adequately protected.
- EnergyGuard™ Tapered PolyIso Insulation should be stored dry and be protected from the elements. Once properly loaded at the job site, remove factory wraps and cover with a breathable tarp.
- As an unprotected polyisocyanurate will burn, **fire safety precautions must be observed** wherever any insulation products are used.
- Direct torching of modified bitumen roofing to EnergyGuard™ Tapered PolyIso Foam Roof Insulation will present a **fire hazard**. A properly installed fiber glass base sheet MUST be used over the insulation.
- These tapered systems are designed to provide a top surface of slope. Each board is manufactured to exact thickness specifications. GAF cannot be held responsible for field conditions such as actual building dimensions and deck deflection.

Installation Suggestions for Tapered Systems
Although each tapered system is different, here are some suggested methods for installing a Tapered PolyIso Foam Roof Insulation system efficiently.

1. Verify building dimensions and drain locations with the Tapered Foam Roof Insulation Shop Drawing. Discrepancies should be reported to GAF prior to shipment.
2. Verify that the proper number of truckloads and piece quantities have been received on the job site.
3. Determine the area to be completed that day.
4. Measure the distance from the drain to the perimeter where the shop drawing indicates full 4' x 4' insulation boards. Verify that the system will meet the drain piece.
5. Start installing the tapered system utilizing full 4' x 4' boards. Work from the drain and finish the area where the shop drawing indicates field cutting.
6. When more than one layer of insulation is utilized, all vertical board joints should be staggered, preferably by 1/2 board.
7. Cover the insulation with the complete membrane system the same day.

Code Compliance
- Listed by Underwriters Laboratories for use under Class A, B, or C Roof Covering. See UL, ULC Inc. Roofing Materials and Systems Directory for details.
- Approved component of *Factory Mutual System Class I, Insulated Steel Deck Construction* when secured to the steel deck with mechanical fasteners (such as DRILL-TEC™ roof insulation fastener system).
- Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.
- For details, consult *Factory Mutual Loss Prevention Sheet 1-28, 1-29, 1-28R, 1-29R and Approval Guide*.
- Federal Specifications HH-I-1972.

WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

Tapered Board Label Designations

1/8" (1%) Slope
(Tapered 1/8" to the foot)

4'x4'	Label	LTTR
0.5" to 1.0"	AA	4.5
1.0" to 1.5"	A	7.5
1.5" to 2.0"	B	10.6
2.0" to 2.5"	C	13.7
2.5" to 3.0"	D	16.9
3.0" to 3.5"	E	20.1
3.5" to 4.0"	F	23.3

1/4" (2%) Slope
(Tapered 1/4" to the foot)

4'x4'	Label	LTTR
0.5" to 1.5"	X	6.0
1.5" to 2.5"	Y	12.1
2.5" to 3.5"	Z	18.5

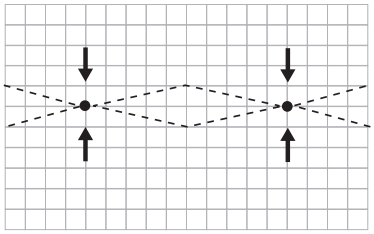
1/2" (4%) Slope
(Tapered 1/2" to the foot)

4'x4'	Label	LTTR
0.5" to 2.5"	Q	9.0

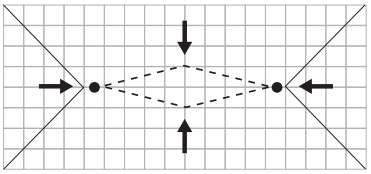
NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
EnergyGuard™
Tapered PolyIso Insulation

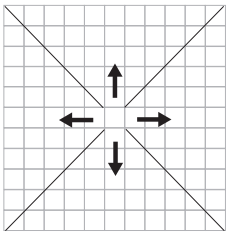
Typical Tapered Layouts



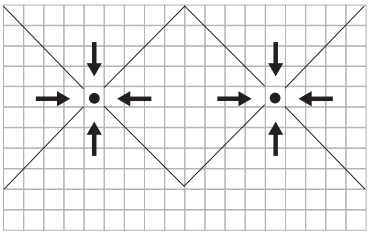
Two Way Tapered System (Crickets Optional)



Modified Two Way Tapered System with Constant Edge Thickness (Crickets Optional)

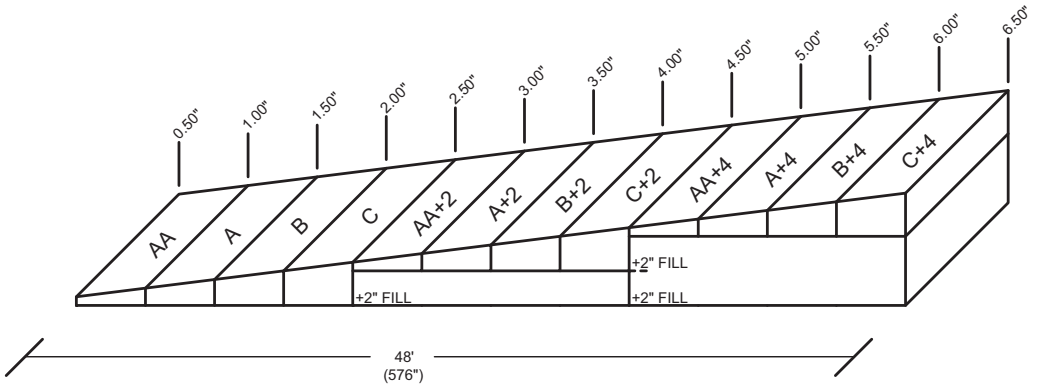


Four Way Tapered System with Perimeter Drain



Four Way Tapered System with Variable Edge Thickness

TYPICAL CROSS SECTION
1/8" SLOPE TAPERED ISO (4' x 4' PANELS)
4 PANEL SYSTEM - NOT TO SCALE



Note: Consult FM Loss Prevention Data Sheets 1-29, 1-49 for specific perimeter and corner fastening details.

Due to ongoing testing programs and changes in FM Global requirements, the number of fasteners and their placement are subject to change without notice.

Consult current FM Approvals Guide and Loss Prevention Data Sheets 1-28, 1-29 and 1-29R for approved fastener density for EnergyGuard™ Roof Insulations.

Product Data Sheet
EnergyGuard™
Composite Board Polyiso Insulation

Description

EnergyGuard™ Composite Board Roof Insulation consists of an isocyanurate foam core integrally bonded to 1/2" thick EnergyGuard™ High Density Fiberboard or EnergyGuard™ perlite on one side and a strong organic glass facer sheet on the other.

Advantages

- The excellent insulating qualities of isocyanurate foam are combined with the strong surface characteristics of high density fiberboard or perlite.
- The fiberboard or perlite side is able to receive hot mopped roof membranes that comply with NRCA bulletin #9.
- Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Approvals Guide*.
- Fast and easy to apply –– light in weight –– can be applied to metal decks with mechanical fasteners such as the FM-approved DRILL-TEC™ roof insulation fastener system.
- Bonded components –– possibility of delamination virtually eliminated.
- High resistance to compression –– not easily damaged by imposed loads, construction traffic, shipping or handling.

Uses

- EnergyGuard™ Composite Board roof insulation is designed for use over structural roof decks where "R" values of 7.4 or higher are required, along with moderate insulation thickness for roof edge detailing, and where comprehensive UL and FM approvals are
  necessary.
- When properly installed, it is suitable for use under built-up, modified bitumen and most single-ply roofing systems.
- Refer to the membrane manufacturer's current application and specifications manual for proper installation procedures.
- EnergyGuard™ Composite Board roof insulation, installed fiberboard or perlite side up, is an ideal insulation surface to receive a solid mopped, built-up or modified bitumen roof systems, and fleece-back single-ply systems.

Traffic/Storage/Potential Fire Hazard

- EnergyGuard™ Composite Board is normally installed with the fiberboard or perlite side up.
- EnergyGuard™ Composite Board roof insulation is non-structural, non-load bearing material. It is not designed for direct traffic usage unless adequately protected.
- Do NOT use EnergyGuard™ Composite Board insulation with perlite with fully adhered single ply membranes. (Use fiberboard for single ply.)
- EnergyGuard™ Composite Board roof insulation should be stored dry and protected from the elements. No more insulation should be installed than can be completely covered with roofing on the same day.
- As unprotected composite board will burn, **fire safety precautions must be observed** wherever insulation products are used.
- Direct torching of modified bitumen roofing to EnergyGuard™ Composite Board roof insulation will present a **fire hazard**. A properly installed fiber glass base MUST be used over the insulation.

Code Compliance

- Listed by Underwriters Laboratories for use as part of a Class A, B or C Roof Covering. See UL Inc. *Roofing Materials and Systems Directory* for details.
- Subject to the conditions of approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Approvals Guide*.
- Mechanical attachment of roof insulation is the most dependable method of attachment to steel decks since it minimizes lateral movement and wind blow-off.
- For details, consult *Factory Mutual Loss Prevention Sheet 1-28, 1-29, 1-28R, 1-29R and Approval Guide*.
- Federal Specifications HH-I-1972/Gen, and HH-1-1972/3

Thermal Values (1)

Thickness* in.	Thickness* mm	LTTR Values**	Weight lb/sf	Weight kg/m²
1.5	38.1	7.4	1.60	7.68
2.0	50.8	10.4	1.69	8.11
2.5	63.5	13.5	1.77	8.50
3.0	76.2	16.7	1.85	8.88
3.5	88.9	19.9	1.93	9.26
4.0	101.6	23.1	2.02	9.70

* Other thicknesses available upon request.

** Long Term Thermal Resistance Valves provide a 15 year time weighted average in accordance with CAN/ULC S770.

(1) **Note:** Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances. Values are based on 1/2" fiberboard.

Typical Physical Properties

Property	Value	Test Method
Water Absorption, % by Volume— 2 hrs. ASTM C 209	1.5 max.	
Dimensional Stability Change 7 days @158°F (70°C), 90-100% RH		
Lengthwise	<2%	ASTM D 2126
Crosswise	<2%	
Compression Resistance 10% Consolidation—psi (kPa)	20 (138) nom.	ASTM D 1621
Laminar Tensile Strength—psi (kPa)	4 (28)	ASTM C 209
Moisture Vapor Transmission*	<1 perm (57.5 ng/(Pa•s•m²)	ASTM E 96
Flame Spread **	<75	ASTM E 84
Service Temperature	-100 to 200°F (-73 to 93°C)	

*Foam core only.

**These numerical ratings are not intended to reflect hazards presented by these or any other material under actual fire conditions.

WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT. MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
EnergyGuard™
Perlite Recover Board

Description
EnergyGuard™ Perlite Recover Board is a heavy duty, **1/2" thick perlite roof insulation board** composed of expanded perlite, cellulose binders, and waterproofing agents. It is treated for surface retention of bitumen and available in 2' x 4' (0.6m x 1.2m) 4' x 4' (1.2m x 1.2m) and 4' x 8' (1.2m x 2.4m), with a nominal thickness of 1/2" (13mm).

Uses
- In reroofing as a base for a variety of membranes installed over existing roof systems.
- As a top layer in two-layer systems.
- As an overlay board where an existing roof insulation is still functioning and could retained.
- Where a tear-off would create unwarranted risks to operations or materials in the building.
- To separate a new membrane from a rough or irregular substrate.
- Properly installed, EnergyGuard™ Perlite Recover Board roof insulation is suitable for use under built-up, modified bitumen and some single ply roofing systems.

Benefits
- Economical base for reroofing.
- Lower installed cost than tear-offs.
- Dimensionally stable.
- **Environmentally friendly.** The minimum recycled content is 25% by weight.

Code Compliance
Recover Board is in compliance with:
- ASTM Standard C728.
- UL, ULC Class A construction on combustible or non-combustible roof decks. Where UL, ULC labels are required, customer must order them in advance.
- FM for fire and wind resistance. Contact the Contractor Services Department at 1-800-766-3411 for the latest approvals.
- Complies with the Environmental Protection Agency Regulation 40 CFR Part 248, "Guideline for Federal Procurement of Building Insulation Products Containing Recovered Materials," as a recycled product approved for use on any project using federal funds.

Application
Recover Board can be secured by mechanical fastening or hot asphalt. If the deck is non-nailable, strip mopping is recommended to allow for moisture pressure release. **Do NOT solid mop with asphalt for recover or retrofit applications.** Refer to the current membrane manufacturer's application and specifications manual for proper installation procedures.

Limitations
- Old roofing systems must be thoroughly dry and secured before Recover Board is applied as a part of a new roof system.
- Do NOT use Recover Board in applications where it will be directly exposed to continuous soaking temperatures in excess of 250°F.
- EnergyGuard™ Perlite Recover Board should be stored dry and be protected from the elements. Once properly loaded at the job site, remove factory wraps and cover with a breathable tarp.
- No more insulation should be applied than can be completely covered with finished roofing on the same day.
- Do NOT use under fully adhered single ply systems or with direct torch application of modified bitumen.
- If torch grade, modified bitumen roofing is to be installed over EnergyGuard™ Perlite, a fiberglass base sheet MUST first be installed.
- Do NOT mechanically attach 1/2" recover board directly to steel decks.

Thermal Values (1)

Thickness (nominal)		"C" value (Conductance)		R-Value (Resistance)	
in	mm	BTU/(hr•ft²•°F)	W/m²•°C	(hr•ft²•°F)/BTU	m²•°C/W
0.5	13	0.76	4.3	1.32	0.23

Typical Physical Properties (1)

Typical Physical Properties	Value	Test Method
Water Absorption, % by Volume — 2 hrs.	3.5 max.	ASTM C 209
Compression Resistance 5% Consolidation — psi (kPa) 10% Consolidation — psi (kPa)	 35 (241) 50 (345)	ASTM C 165
Laminar Tensile Strength — psi (kPa)	4.9 (33.8)	ASTM C 209
Flexural Strength — psi (kPa)	60 (414)	ASTM C 203
Product Density — pcf (kg/m³)	11 - 14 (176 - 224)	ASTM C 209
Linear Expansion	0.5% max.	ASTM C 209/ ASTM D 1037

(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
EnergyGuard™
High Density Fiberboard

Description
EnergyGuard™ High Density Fiberboard Roof Insulation is an insulation board of interlocking natural, long fibers, impregnated for asphalt moisture resistance and extra strength. The top face is further treated to reduce the absorption of asphalt.

Advantages
- Strong and rigid.
- Increases strength of entire roof.
- Excellent dimensional stability.
- Withstands normal deck traffic during and after construction.
- Excellent bonding to BUR felts.
- Good insulating properties.
- Resists damage due to rough handling in shipment.
- Excellent recover board.

Uses
- EnergyGuard™ High Density Fiberboard roof insulation can be used directly over structural roof decks (see chart).
- It is also widely used as a separation board over existing roofs in recover installations. In recover applications, all wet areas of the old roof must be removed. All loose and protruding gravel must also be removed.
- Properly installed, EnergyGuard™ High Density Fiberboard roof insulation is suitable as a cover board for use under most built-up, modified bitumen and most single ply roofing systems.
- Refer to the membrane manufacturer's current application and specifications manual for proper installation procedures for fiberboard roof insulation.

Limitations and Potential Fire Hazard
- EnergyGuard™ High Density Fiberboard roof insulation is a non-structural, non-load bearing material.
- EnergyGuard™ High Density Fiberboard roof insulation should be stored dry and protected from the elements. No more insulation should be installed than can be covered completely with roofing on the same day.
- As unprotected fiberboard will burn, **fire safety precautions should be observed** whenever fiberboard product is used.
- Direct torching of modified bitumen roofing to EnergyGuard™ High Density Fiberboard will present a **fire hazard**. DO NOT use under torch-applied modified systems.

Code Compliance
- Listed by UL, ULC for use under Class A, B, or C Roof Covering. See UL, ULC Inc. *Roofing Materials and Systems Directory* for details. Materials will have UL, ULC labels only when specified on order.
- Subject to the conditions of Approval as a roof insulation when installed as shown in the current edition of the *Factory Mutual Research Approvals Guide*.
- For details, consult current Factory Mutual Approvals Guide. ASTM C208,ASTM C209 and Federal Specification LLL-1-535B, Class E (Cancelled 4-18-85), CAN/ULC S706.

EnergyGuard™ High Density Fiberboard Roof Insulation

Thickness/Thermal Values/Flute Spanability

Nominal Thickness Inches	THERMAL VALUES C-Value[2]	R-Value[3]	Maximum Flute Spanability
1/2" (12 mm)	0.77	1.3	1 5/8"
1" (25 mm)	0.40	2.5	2 5/8" (66.7 mm)
1 1/2" (38 mm)	0.26	3.8	4 3/8" (111.1 mm)

(2) C = BTU/°F • ft$_2$ • h (3) R = °F • ft^2 • h/Btu

Typical Physical Properties

Property	Test Method	Value
Water Absorption	ASTM C208, C209	7% Volume Maximum
Weight/Sq. Ft., 1" (25.4 mm) Thick		1.7 lbs. Maximum
Linear Expansion	ASTM C208, C209	0.5% Maximum

(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

SAFETY WARNING: DO NOT EXPOSE TO OPEN FLAME OR EXCESSIVE HEAT, MAY BURN IF IGNITED. IF IGNITED, EXTINGUISH COMPLETELY.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
EnergyGuard™
Perlite

Description
EnergyGuard™ Perlite roof insulation is a homogenous board composed of expanded perlite particles, selected binders and cellulose fibers, which give EnergyGuard™ Perlite roof insulation its insulating efficiency. The surface is treated to reduce bitumen absorption assuring proper adhesion of roof membranes.

EnergyGuard™ Perlite roof insulation is available in 2' x 4' (0.6m x 1.2m) and 4' x 4' (1.2m x 1.2m) boards in standard thicknesses of 3/4", 1", 1 1/2", and 2" (19mm, 25mm, 38mm and 51mm). Other sizes are available on request.

Advantages
- Stable insulating properties.
- Exceptional fire resistance (Class 25).
- Excellent dimensional stability.
- Resists damage due to normal deck traffic during and after construction.
- Fast and easy to apply.
- Tough performance proven for over 30 years.
- The minimum recycled content is 25% by weight.

Uses
- EnergyGuard™ Perlite roof insulation is designed to be used directly over structural roof decks.
- It is also widely used as a separation board over existing roofs in recover installations. In recover applications, all wet areas of the old roof must be removed. All loose and protruding gravel must also be removed.
- Properly installed, EnergyGuard™ Perlite roof insulation is suitable for use under built-up, modified bitumen and some single ply roofing systems.
- Refer to the current membrane manufacturer's application and specifications manual for proper installation procedures for perlite roof insulation.

Limitations
- EnergyGuard™ Perlite roof insulation is a non-structural, non-load bearing material.
- EnergyGuard™ Perlite roof insulation should be stored dry and be protected from the elements. Once properly loaded at the job site, remove factory wraps and cover with a breathable tarp.
- No more insulation should be applied than can be completely covered with the finished roofing on the same day.
- Do NOT use under fully adhered single ply systems or with direct torch application of modified bitumen.
- If torch grade modified bitumen roofing is to be installed over EnergyGuard™ Perlite, a fiberglass base sheet MUST first be installed.

Code Compliance
- EnergyGuard™ Perlite complies with the requirements of ASTM Standard C728 (which supercedes Federal Specifications HH-I-529).
- Listed by Underwriters Laboratories for use under Class A, B or C
  Roof Covering. See UL, *ULC Roofing Materials and System Directory* for details. Materials will have UL, ULC labels only when specified on order.
- Factory Mutual rated for fire and wind resistance. For current approvals, see current Factory Mutual Approvals Guide.
- Is approved for use in UL, ULC Fire Resistance Roof-Ceiling Design (P&R-Designs). Please see the UL, ULC Roofing Materials and System Directory for the latest approvals.
- Complies with the Environmental Protection Agency Regulation 40 CFR Part 248, "Guideline for Federal Procurement of Building
  Insulation Products Containing Recovered Materials," as a recycled product approved for use on any project using federal funds.

Thermal Values(1)

Thickness in	Thickness mm	"C" value (Conductance) BTU/(hr•ft²•°F)	"C" value (Conductance) W/m²•°C	R-Value (Resistance) (hr•ft²•°F)/BTU	R-Value (Resistance) m²•°C/W
3/4"	19	0.48	2.73	2.08	.37
1	25	0.36	2.04	2.78	.49
1 1/2"	38	0.24	1.36	4.17	.74
2	51	0.18	1.02	5.56	.98

For Use Over Metal Decks
The minimum thickness of EnergyGuard™ Perlite insulation over metal decks is as follows:

	Narrow	Intermediate	Wide
Width of Rib Opening	**Up to 1" (25mm) maximum**	**Up to 1 3/4" (44mm) maximum**	**Up to 2 1/2" (64mm) maximum**
Thickness of Insulation (minimum)	3/4" (19mm)	1" (25mm)	1 1/2" (38mm)

Avoid concentrating loads on insulation. Minimum bearing on flat surface: 2" (51mm).

Technical Data (1)

Typical Physical Properties	Value	Test Method
Water Absorption, % by volume — 2 hrs.	1.5 max.	ASTM C 209
Compression Resistance 5% Consolidation — psi (kPa) 10% Consolidation — psi (kPa)	 30 (207) 40 (276)	 ASTM C 165
Laminar Tensile Strength — psi (kPa)	7 (48)	ASTM C 209
Thermal Conductance (C) BTU / (hr • ft² • °F) [nominal 1"] (W/m² • °C [nominal 25mm])	 0.36 (2.04)	 ASTM C 177 ASTM C 177
Flexural Strength — psi (kPa)	65 (448)	ASTM C 203
Product Density — pcf (kg/m³)	9 (144)	ASTM C 209
Dimensional Stability	0.5%	ASTM C 209

(1) Note: Physical and thermal properties shown are based on data obtained under controlled laboratory conditions and are subject to normal manufacturing tolerances.

NOTE: REPAIR ROOF LEAKS PROMPTLY TO AVOID ADVERSE EFFECTS, INCLUDING MOLD.

Product Data Sheet
DRILL-TEC™
Fasteners & Plates

Description

GAF EverGuard® single-ply roofing systems include a full line of DRILL-TEC™ fasteners and plates. DRILL-TEC™ fasteners and plates are required for use with EverGuard® roofing systems. All screws, anchors and plates meet the corrosion resistance requirements of FM 4470.

The following DRILL-TEC™ fasteners and plates are available:

Product	Description	Benefit/Application	Quantity/Size	Weight
SXHD Screws (#21)	Super extra heavy duty membrane screws for steel decks	• 2" – 12" lengths • .320" thread diameter • #3 Phillips head • CART-10 coating	• 500 (2" to 6") • 250 (7" to 12")	16 - 44 lbs. 26 - 35 lbs.
XHD Screws (#15)	Extra heavy duty membrane screws for steel decks	• 2" – 16" lengths • .275" thread diameter • #3 Phillips head • CART-10 coating • Special thread and point designed specifically for steel decks	• 1000 (2" to 6") • 500 (7" to 16")	20 - 56 lbs. 34 - 40 lbs.
HD Screws (#14)	Heavy duty membrane screws for wood decks	• 1-1/4" – 16" lengths • .245" thread diameter • #3 Phillips head • CART-10 coating • Suitable for steel, concrete and wood decks • Also suitable for securing termination bar to wood, steel and concrete/masonry surfaces • Pre-drilling 3/16" hole required for concrete/masonry applications	• 1000 (1-1/4" to 4") • 500 (5" to 16")	12 - 34 lbs. 21 - 36 lbs.
Standard Screws (#12)	Standard duty insulation screws for steel and wood decks	• 1-5/8" – 8" lengths • .215" thread diameter • #3 Phillips head • CART-10 coating • Most economical insulation securement • Preassembled screws and plates also available	• 1000 (all lengths)	12 - 50 lbs.
DRILL-TEC™ Spikes	Nail-type membrane/insulation fasteners for concrete	• 2" – 12" lengths • .215" shank diameter • Flat top pan head • CART-10 coating • Pre-drilling 7/32" hole required • Split-bulb design exerts pressure on walls of hole • Hammer-in application	• 500 (all lengths)	12 - 65 lbs.
DRILL-TEC™ Polymer Screws	Auger-type membrane/insulation fasteners for gypsum and cementitious wood fiber decks	• 2-1/2" – 10" lengths • .750" thread diameter • Double internal 3/8" hex drive • Locking wire barbs for back-out resistance for membrane securement • Glass-filled nylon	• 500 (2-1/2" to 7-1/2") • 250 (8" to 10")	15 - 34 lbs. 18 - 22 lbs.
SXHD Plates	Super extra heavy duty double barbed steel membrane plates	• 2-3/4" diameter, double barbs • Galvalume coating • Required for use with SXHD Screws, HD and DRILL-TEC™ Spikes for certain FM-approved assemblies.	• 500	38 lbs

Product Data Sheet
DRILL-TEC™
Fasteners & Plates

Product	Description	Benefit/Application	Quantity/Size	Weight
DRILL-TEC™ XHD Plates	Steel membrane plate not SXHD Double Barb	• 2-3/8" diameter • Galvalume coating • Suitable for use with HD Screws, XHD Screws, and DRILL-TEC™ Spikes	• 1000	54 lbs.
DRILL-TEC™ SHD Plates	Double barbed steel membrane plates	• 2-1/8" diameter • Galvalume coating • Suitable for use with HD Screws, XHD Screws, and DRILL-TEC™ Spikes	• 1000	28 lbs.
DRILL-TEC™ Insulation Plates	Standard steel insulation plates	• 3" diameter • Galvalume coating • Suitable for use with Standard Screws, HD Screws, DRILL-TEC™ Spikes.	• 1000	37 lbs.
DRILL-TEC™ Flat and Recessed Insulation	AccuTrac Flat Plate Recessed	• Stand up installation • One step installation	• 1000	37 lbs.
Masonry Anchors	Zinc alloy drive anchor for securing termination bar to masonry/concrete substrates	• 1-1/4", 1-1/2" lengths • .250" diameter • Stainless steel drive pin • Pre-drilling 1/4" hole required • Hammer-in application	• 1000	25 lbs.
Lip Termination Bar	Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener	• 10' bar length • 3/4" width • .090" cross-section • Prepunched slotted holes at 6" o.c. or 8" o.c.	50 (fifty) 10’ lengths (per tube)	75 lbs. (per tube)
DRILL-TEC™ NTB Plate	• 3" Galvalume • Special design for DRILL-TEC™ NTB Fastener	• For NTB Fastener for installing insulation	• 1000	37 lbs.
DRILL-TEC™ 3" Plastic Plate	• Insulation plate	• 3 Polypro • STD, HD, XHD	• 1000	25 lbs.
DRILL-TEC™ Lite-Deck Fastener	Auger-type steel fastener for gypsum and cementitious wood fiber decks, 2-5/8"-12"	• 2-5/8" – 12"	• 500 • 500/box • 125/box	32 - 47 lbs. 30 - 46 lbs. 26 - 34 lbs.
DRILL-TEC™ Lite-Deck Plate	3" Galvalume	• For Lite-Deck fastener	• 500/box	19 lbs.
DRILL-TEC™ RhinoBond Plates	Steel insulation plate	• 3" diameter galvalume steel coated with TPO suitable for HD, XHD & SXHD screws	• 500/box	36 lbs.
DRILL-TEC™ AccuTrac Plates Flat	Steel insulation plate flat bottom	• 3" diameter galvalume steel designed for AccuTrac insulation tool use #12SD or #14HD or #15XHD fasteners, Phillips head only	• 1000/box	43 lbs.
DRILL-TEC™ AccuTrac Plates Recessed	Steel insulation plate flat bottom	• 3" diameter galvalume steel designed for AccuTrac insulation tool use #12SD or #14HD or #15XHD fasteners, Hex head or Phillips head	• 1000/box	43 lbs.

Note: Store in original boxes/tubes on pallets or shelving in a dry area.
Mass and dimensions stated are nominal unless otherwise noted.

Product Data Sheet
EverGuard®
Adhesives & Primers

Description

EverGuard® single-ply roofing systems include a full line of EverGuard®/GAF adhesives.

Note: EverGuard®/GAF adhesives are specially formulated for use with specific EverGuard® membranes; use the correct adhesive for the application. The following EverGuard®/GAF adhesives are available:

Product	Description	Benefit/Application	Quantity/Size	Weight
EverGuard® PVC Bonding Adhesive	Solvent-based rubberized adhesive for use with PVC-based membranes	• Two-surface contact adhesive applied to both underside of membrane and substrate surface • Suitable for roofing and flashing membranes. • Compatible with isocyanurate and fiberboard insulations, and fiber glass-faced gypsum panels • Compatible with concrete, masonry, metal and wood flashing substrates	5 gallon pail	36 lbs.
EverGuard® TPO Bonding Adhesive	Solvent-based rubberized adhesive for use with TPO-based membranes	• Two-surface contact adhesive applied to both underside of smooth surfaced membrane and substrate surface • Compatible with isocyanurate and fiberboard insulations, and primed fiberglass-faced panels • Compatible with concrete, masonry, metal and wood flashing substrates	5 gallon pail	36 lbs.
EverGuard® H_20 Bonding Adhesive	Water-based rubberized adhesive for PVC-based and TPO-based membranes	• Two-surface contact adhesive applied to both underside of smooth surfaced membrane and substrate surface • Suitable for roofing and flashing membranes, including fleece-back membranes (applied to substrate only) • Compatible with isocyanurate and fiberboard, insulations, and fiber glass-faced gypsum panels • Compatible with concrete, masonry, metal and wood flashing substrates	5 gallon pail	38 lbs.
EverGuard® TPO Primer	Standard solvent-based primer	• Solvent-based primer for metal edges cover tape • Prepares TPO membrane and metal edges prior to installation of EverGuard® TPO Cover Tape • Apply Primer at an application rate of approximately 225 lineal feet per gallon.	1 gallon can 5 gallon pail	8 lbs. 40 lbs.
EverGuard® TPO Seam Cleaner	Solvent-based seam cleaner	• Use to clean exposed or contaminated seams prior to heat welding to remove any residual soap or revitalize aged membranes.	1 gallon can	7 lbs.
GAF Asphalt Primer	General purpose solvent-based asphalt primer	• Meets ASTM D-41 • Asphalt primer required prior to application of roofing asphalt • Seals and conditions surface of old smooth and mineral-surfaced built-up roofs, structural, cellular and gypsum concrete decks, and masonry wall surfaces • Do NOT use asphalt primer with Freedom® systems • One–half gallon coverage rate per square. Coverage rates vary with texture and substrate to be primed	5 gallon	37 lbs.

Note: Store adhesives and primers in original pails on pallets or shelving in a dry, 50-100°F conditioned area away from open flame or other combustion source. Mass and dimensions stated are nominal unless otherwise indicated. Do not allow to freeze.

Product Data Sheet
EverGuard®
Sealants

Description

GAF EverGuard® single-ply roofing systems include a full line of EverGuard®/GAF sealants.

Note: EverGuard®/GAF sealants are specially formulated for specific applications: be sure to use the correct sealant for the application. The following EverGuard®/GAF sealants area available:

Product	Description	Benefit/Application	Units Per Carton	Carton Weight
EverGuard® Water Block	One-part butyl-based high-viscosity sealant	• Suitable for sealing between flashing membrane and substrate surface behind exposed termination bars • Suitable for sealing between roofing membrane and drain flanges	25 10.5 oz. cartridges	13 lbs.
EverGuard® 2-Part Pourable Sealant	100% solids urethane-based two-part sealant	• Suitable for filling sealant pans at irregularly-shaped penetrations	1 kit = 1 gal Part A and 1 pint Part B 2 kits per carton	18 lbs.
EverGuard® TPO & PVC Cut Edge Sealant	Sealant used at any non-factory edge of TPO and PVC membrane	• Used to seal non-factory edges (cut edges) as a final step in reinforced membrane installation • PVC Cut Edge with PVC • TPO Cut Edge with TPO	• 12 pints/ctn. • 100 lineal feet per pint @ 1/8" diameter bead.	12 lbs.

Storage: • Store sealants in original containers on pallets or shelving in a dry area.
• Store sealants in 50-100°F conditioned area away from open flame or other combustion source.
• Do not allow to freeze.

EverGuard® PVC Chemical Resistance Guide

Chemical Resistance Guide For EverGuard® PVC Membrane Systems

It is difficult to foresee all the potential chemicals and environments to which EverGuard® PVC Roofing Membranes may be subjected. The best means to determine whether a substance is compatible with EverGuard® PVC membranes is a laboratory analysis, which can take some time to perform. This guide is designed to help reach a decision in the absence of laboratory testing.

These factors may affect the severity of a chemical in direct exposure to EverGuard® PVC Roofing membrane.

1. Higher temperatures generally have a greater effect on severity of a chemical attack on the membrane.
2. The concentration of the chemical has a direct effect on degree of compatibility. Usually, the greater the dilution, the greater the potential for compatibility.
3. Occasional exposure to the chemical is typically less severe than continuous exposure.

When roofs are covered with another substance, such as grease, oil or a pool of chemicals, the membrane will be affected in one way or another. Do NOT allow any substance to remain on the roof surface over time as it will compromise the reflectivity of the membrane and will become a haven for dirt and foreign substances to congregate.

The following key is suggested to rate the relative effects of the chemical on EverGuard® PVC Roofing membranes according to the following scale:

Rating Key:
A – Fluid has little or no effect
B – Fluid has minor to moderate effect
C – Fluid has severe effect
T – No data – likely to have minor effect
X – No data – likely to have severe effect

NOTE: The data shown are the result of laboratory tests and are intended **only** as a guide. No performance warranty is intended or implied and GAF guarantees and limited warranties do **not** cover damage due to oil, grease or chemicals.

This table is presented and accepted at user's risk. Ratings were determined by visual examination of coated fabric samples after contact with test fluid for 28 days at room temperature. When considering EverGuard® PVC roofing membranes for a specific application, it is important to study other requirements such as permeability, service temperature, concentration, size to be contained, etc. A sample of EverGuard® PVC roofing membrane should be tested in actual service before specification. When impractical, tests should be devised which simulate actual service conditions as closely as possible. The GAF Contractor Services Department should be consulted for further recommendations.

NOTE: When a concentration is not shown, the substance is pure or concentrated.

NOTE: Add grease containment devices (sand traps) to all rooftop vents that discharge grease, oils, etc., on to the roofing membrane.

EverGuard®
PVC Chemical
Resistance Chart

Chemical	% Concentration	Effect	Chemical	% Concentration	Effect
Acetic Acid	5	A	Benzoic Acid		T
Acetic Acid	10	T	Bismuth Carbonate		T
Acetic Acid	20	X	Borax Solutions		T
Acetic Acid	30		Boric Acid		T
Acetic Acid	50	C	Bromic Acid	10	T
Acetic Acid	80	X	Bromine Anhydrous		X
Acetic Acid	Glacial	C	Butyl Alcohol		T
Acetic Anhydride		X	Butyl Phenol		X
Acetone		X	Butyric Acid		T
Alkyl Alcohol		T	Calcium Bisulfate		T
Alkyl Chloride		X	Calcium Carbonate		T
Aluminum Sulfate	50	T	Calcium Chloride		T
Ammonium Carbonate		T	Calcium Hydroxide		T
Ammonium Chloride		A	Calcium Hypochlorite		A
Ammonium Fluoride	20	T	Calcium Nitrate		T
Ammonium Hydroxide	20	A	Calcium Sulfate		T
Ammonium Hydroxide	30	T	Carbon Disulfide		X
Ammonium Nitrate		T	Carbon Tetrachloride		X
Ammonium Phosphate		X	Carbonic Acid		T
Ammonium Sulfate		B	Chlorine Gas		T
Ammonium Sulfide		T	Chloracetic Acid		X
Amyl Acetate		X	Chlorobenzene		X
Amyl Alcohol		T	Chloroform		X
Amyl Chloride		X	Chlorosultonic Acid		X
Aniline		X	Chrome Alum		T
Animal Oil		A	Chromic Acid	30	B
Antimony Chloride		T	Chromium Trioxide		T
Aqua Regia		X	Citric Acid		T
ASTM Fuel A		A	Copper Chloride		T
ASTM Fuel B		B	Copper Sulfate		T
ASTM Fuel C			Corn Oil		A
ASTM Oil #1		T	Cottonseed Oil		A
ASTM Oil #2		A	Crude Oil		X
ASTM Oil #3		T	Cyclohexane		T
Asphalt		X	Cyclohexanol		T
Barium Carbonate		T	Cyclohexanone		X
Barium Hydroxide		T	Dextrin		T
Barium Sulfate		T	Dakite #31		
Benzene		C	Dibutyl Phthalate		C

EverGuard®
PVC Chemical
Resistance Chart

Chemical	% Concentration	Effect	Chemical	% Concentration	Effect
Diesel		A	Hydrochloric Acid	37	A
Diethyl Ether		X	Hydrochloric Acid	50	T
Diethyl Ketone		X	Hydrocyanic Acid		T
Diethyl Sebacate		T	Hydrofluoric Acid	5	T
Dimethylamine		X	Hydrofluoric Acid	20	X
Dioctyl Phthalate		C	Hydrofluoric Acid	50	X
Disodium Phosphate		T	Hydrofluoric Acid	75	X
Epichlorohydrin		X	Hydrofluoric Acid		X
Ethyl Acetate		C	Hydrofluosilicic Acid	30	T
Ethyl Alcohol	10	A	Hydrogen Peroxide	3	A
Ethyl Alcohol		A	Hydrogen Peroxide (5)	10	T
Ethyl Bromide		X	Hydrogen Sulfide		T
Ethyl Chloride		X	Hydroquinone		X
Ethylene Dichloride		X	Iso Octane		X
Ethylene Glycol		A	Isopropyl Alcohol	10	A
Ethylene Oxide		X	Isopropyl Alcohol		A
Ferric Chloride		T	JP-4 Jet Fuel		A
Ferric Nitrate		T	Kerosene		A
Ferrous Chloride		T	Lactic Acid		T
Ferrous Sulfate		T	Lead Acetate		T
Fluosilicic Acid		T	Linseed Oil		A
Formaldehyde	40	X	Lubricating Oils		T
Formic Acid		T	Magnesium Carbonate		T
FREON 11			Magnesium Chloride		T
FREON 12			Magnesium Hydroxide		A
FREON 113			Magnesium Nitrate		T
FREON 114			Magnesium Sulfate		T
Fuel Oil #2		T	Malic Acid		T
Fuel Oil #6		T	Mercuric Chloride		T
Furfural		X	Mercurous Nitrate		T
Gallic Acid		T	Mercury		T
Gasoline		A	Methyl Alcohol	10	A
Glucose		T	Methyl Alcohol		A
Glycerine		A	Methylene Chloride		C
Hydraulic Fluid		A	Methyl Ethyl Ketone		C
Hydrazine		X	Mineral Oil		T
Hydrobromic Acid		T	Mineral Spirits		T
Hydrochloric Acid (4)	20	A	n-Hexane		T
Hydrochloric Acid	30	A	Naphtha		T

EverGuard®
PVC Chemical
Resistance Chart

Chemical	% Concentration	Effect	Chemical	% Concentration	Effect
Naphthalene		X	Silicone Grease		T
Nitric Acid	5	A	Silver Nitrate		T
Nitric Acid	10	T	Skydrol 500B		C
Nitric Acid	30	X	Soap Solutions		A
Nitric Acid	40	X	Sodium Acetate		T
Nitric Acid	50	C	Sodium Bicarbonate		T
Nitric Acid	60	X	Sodium Bisulfite		T
Nitric Acid Red Fuming	70	X	Sodium Borate		T
Nitrobenzene		X	Sodium Carbonate		T
Oleic Acid		T	Sodium Chlorate		T
Oleum	20-25	X	Sodium Chloride		T
Oxalic Acid		T	Sodium Dichromate	20	T
Palmitic Acid		T	Sodium Dichromate		T
Perchloroethylene		C	Sodium Ferrocyanide		T
Phenol		B	Sodium Fluoride		T
Phenol Formaldehyde		T	Sodium Hydroxide	20	A
Phenylhydrazine		X	Sodium Hydroxide	25	T
Phosphoric Acid	50	B	Sodium Hydroxide	46-1/2	A
Phosphoric Acid	75	X	Sodium Hydroxide	60	A
Phosphoric Acid		X	Sodium Hypochlorite	5	A
Phosphoric Yellow		T	Sodium Hypochlorite		A
Phosphorus Pentoxide		X	Sodium Nitrate		T
Photographic Solutions			Sodium Sulfate		T
Phthalate Plasticizer		C	Sodium Sulfate		T
Pickling Solutions		X	Soybean Oil		A
Potassium Bicarbonate		T	Stanneous Chloride	15	T
Potassium Carbonate		T	Stearic Acid		A
Potassium Chromate		T	Styrene		X
Potassium Cyanide		T	Sulfuric Acid	10	A
Potassium Dichromate		T	Sulfuric Acid	40	X
Potassium Hydroxide		T	Sulfuric Acid	50	C
Potassium Nitrate		T	Sulfurous Acid		T
Potassium Perchlorate		X	Tannic Acid	10	T
Potassium Permanganate		T	Tannic Acid	50	T
Potassium Sulfate		T	Tannic Acid		T
Pydraul 312			Tartaric Acid		T
Pyridine		X	Tetrahydrofuran		X
Salt Water	25	A	Toluene		C
Sea Water		A	Transformer Oil		T

EverGuard®
PVC Chemical
Resistance Chart

Chemical	% Concentration	Effect
Triethanolamine		X
Trisodium Phosphate		T
Tung Oil		T
Turpentine		T
Urea		T
Vegetable Oil		A
Water		A
Xylene		C
Zinc Chloride		T
Zinc Sulfate		T

EverGuard® TPO Chemical Resistance Guide

Chemical Resistance Guide For EverGuard® TPO Membrane Systems

It is difficult to foresee all the potential chemicals and environments to which EverGuard® TPO Roofing Membrane may be subjected. The best means to determine whether a substance is compatible with EverGuard® TPO membrane is a laboratory analysis, which can take some time to perform. This guide is designed to help reach a decision in the absence of laboratory testing.

These factors may affect the severity of a chemical in direct exposure to EverGuard® TPO Roofing membranes:

1. Higher temperatures generally have a greater effect on severity of a chemical attack on the membrane.
2. The concentration of the chemical has a direct effect on degree of compatibility. Usually, the greater the dilution, the greater the potential for compatibility.
3. Occasional exposure to the chemical is typically less severe than continuous exposure.

When roofs are covered with another substance, such as grease, oil or a pool of chemicals, the membrane will be affected in one way or another.Do NOT allow any substance to remain on the roof surface over time as it will compromise the reflectivity of the membrane and will become a haven for dirt and foreign substances to congregate.

The following chart is suggested to rate the relative effects of the chemical on EverGuard® TPO Roofing membranes according to the following scale:

A = Negligible effect
B = Limited effect
C = Extensive Absorption
D = Extensive Attack

** May produce cracking in material under stress.
-- No data available

NOTE: When a concentration is not shown, the substance is pure or concentrated.

NOTE: The data shown are the result of laboratory tests and are intended **only** as a guide. No performance warranty is intended or implied and GAF guarantees and limited warranties do **not** cover damage due to oil, grease or chemicals.

This table is presented and accepted at user's risk. Ratings were determined by visual examination of coated fabric samples after contact with test fluid for 28 days at room temperature. When considering EverGuard® TPO roofing membrane for a specific application, it is important to study other requirements such as permeability, service temperature, concentration, size to be contained, etc. A sample of EverGuard® TPO roofing membranes should be tested in actual service before specification. When impractical, tests should be devised which simulate actual service conditions as closely as possible. The GAF Contractor Services Department should be consulted for further recommendations.

NOTE: Add grease containment devices (sand traps) to all rooftop vents that discharge grease, oils, etc., on to the roofing membrane.

Product Data Sheet 32

EverGuard® TPO Chemical Resistance Chart

Environment	Concentration %	Temperature °F (°C)		Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)			70 (21)	140 (60)
Acetic acid (glacial)	97	A	B	Barium sulfate		A	A
Acetic acid	50	A	A	Barium sulfide		A	A
Acetic acid	40	A	A	Beer		A	A
Acetic acid	10	A	A	Benzene		C	D
Acetone		A	A	Benzoic acid		A	A
Acetophenone		B	B	Benzyl alcohol		A	A
Acriflavine (2% soln in H_2O)	2	A	A	Bismuth carbonate		A	A
Acrylic emulsions		A	A	Borax		A	A
Aircraft exhaust (gas & jet fully burned)		A	A	Boric acid		A	A
Airport environment		A	A	Brine		A	A
Aluminum chloride		A	A	Bromine liquid		D	--
Aluminum fluoride		A	A	Bromine water		**C	--
Aluminum sulfate		A	A	Butyl acetate		C	C
Alums (all types)		A	A	Butyl alcohol		A	--
Ammonia gas (dry)		A	A	Calcium carbonate		A	A
Ammonia (aqueous)	30	A	--	Calcium chlorate		A	A
Ammonium carbonate		A	A	Calcium chloride	50	A	A
Ammonium chloride		A	A	Calcium hydroxide		A	A
Ammonium fluoride	20	A	A	Calcium hydrochlorite bleach	20	A	B
Ammonium hydroxide	10	A	A	Calcium nitrate		A	A
Ammonium metaphosphate		A	A	Calcium phosphate	50	A	--
Ammonium nitrate		A	A	Calcium sulfate		A	A
Ammonium persulfate		A	A	Calcium sulfite		A	A
Ammonium sulfate		A	A	Carbon dioxide (dry)		A	A
Ammonium sulfide		A	A	Carbon dioxide (wet)		A	A
Ammonium thiocyanate		A	A	Carbon disulfide		B	C
Amyl acetate		B	C	Carbon monoxide		A	A
Amyl alcohol		A	B	Carbon tetrachloride		C	C
Amyl chloride		C	C	Carbonic acid		A	A
Aniline		A	A	Caster oil		A	--
Animal fat/grease		A	B	Cetyl alcohol		A	--
Anisole		B	B	Chlorine (gas)		D	D
Antimony chloride		A	A	Chlorobenzene		C	C
Aqua regia		**C	**C	Chloroform		C	D
Aviation gasoline (80 to 110 octane)		C	D	Chlorosulfonic acid		D	D
Aviation turbine fuel		C	D	Chrome alum		A	A
Barium carbonate		A	A	Chromic/sulfuric acid		D	D
Barium chloride		A	A	Chromic acid	80	**B	--
Barium hydroxide		A	A	Chromic acid	50	**B	**B

EverGuard®
TPO Chemical
Resistance Chart

Environment	Concentration %	Temperature °F (°C)		Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)			70 (21)	140 (60)
Chromic acid	10	**B	**B	Fruit juices		A	A
Cider		A	A	Furfural		C	C
Citric acid	10	A	A	Gasoline (the higher the octane the greater the affect)		C	D
Copper chloride		A	A	Gas liquor		C	--
Copper cyanide		A	A	Gear box oil		B	C
Copper nitrate		A	A	Gelatin -Lubricating (petroleum based)		A	A
Copper fluoride		A	A	Glucose	20	A	A
Copper sulfate		A	A	Glycerin		A	A
Cottonseed oil		A	B	Glycol		A	A
Cuprous chloride		A	A	Grease		B	C
Cyclohexanol		A	B	Hexane	100	C	D
Cyclohexanone		B	C	Hydrobromic acid	50	**B	C
Decalin		C	C	Hydrochloric acid	30	A	A
Detergents	2	A	A	Hydrochloric acid	20	A	A
Developers (photographic)		A	A	Hydrochloric acid	10	A	A
Dibutyl phthalate		B	C	Hydrochloric acid	2	A	A
Dichloroethylene		C	--	50-50 Hydrochloric-Nitric Acid		**B	**D
Diethanolamine		A	A	Hydrofluoric acid	40	A	--
Diisooctyl phthalate		B	C	Hydrofluoric acid	60	**B	**C
Emulsifiers		A	A	Hydrogen peroxide	30	A	B
Ethyl acetate		B	B	Hydrogen peroxide	10	A	B
Ethyl alcohol	96	A	A	Hydrogen peroxide	3	A	A
Ethylene glycol		A	A	Hydrogen chloride gas (dry)		A	A
Ethanolamine		A	A	Hydrogen sulfide		A	A
Ethyl ether		C	--	Hydroquinone		A	A
Ethyl chloride		C	C	Inks		A	A
Ethylene dichloride		B	--	Iodine tincture		A	--
Ethylene oxide		B	--	Isopropyl alcohol		A	A
Fatty acids (C_6)		A	A	Iso-octane		C	D
Ferric chloride		A	A	Jet Fuel (kerosene based)		C	D
Ferric nitrate		A	A	Kerosene		C	D
Ferric sulfate		A	A	Ketones		A	--
Ferrous chloride		A	A	Lactic acid	20	A	A
Ferrous sulfate		A	A	Lanolin		A	A
Fluorosilicic acid		A	A	Lead acetate		A	A
Formaldehyde	40	A	A	Linseed oil		A	A
Formic acid		A	--	Lubricating oil (petroleum based)		B	C
Formic acid	10	A	A	Magenta dye (aqu. solution)	2	A	A
Fructose		A	A	Magnesium carbonate		A	A

EverGuard®
TPO Chemical
Resistance Chart

Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)
Magnesium chloride		A	A
Magnesium hydroxide		A	A
Magnesium nitrate		A	A
Magnesium sulfate		A	A
Magnesium sulfite		A	A
Meat juices		A	A
Mercuric chloride	40	A	A
Mercuric cyanide		A	A
Mercury		A	A
Mercurous nitrate		A	A
Methyl ethyl ketone		A	B
Methyl alcohol		A	A
Methylene chloride		A	--
Milk and its products		A	A
Mineral oil		B	C
Molasses		A	A
Motor oil (conventional)		B	C
Motor oil (synthetic)		B	C
Naphthalene		A	A
Nickel chloride		A	A
Nickel nitrate		A	A
Nickel sulfate		A	A
Nitric acid	Fuming	D	D
Nitric acid	70	**C	D
Nitric acid	60	**C	D
Nitric acid	10	A	D
50-50 Nitric-Hydrochloric acid		**C	D
50-50 Nitric-Sulfuric Acid		**C	D
Nitrobenzene		A	A
Oleic acid		A	B
Olive oil		A	A
Oxalic acid (aqueous)	50	A	B
Paraffin		A	B
Paraffin wax		A	A
Petrol (gasoline)		C	D
Phenol		A	A
Phosphoric acid	95	A	B
Plating solutions, brass		A	A
Plating solutions, cadmium		A	A

Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)
Plating solutions, chromium		A	A
Plating solutions, copper		A	A
Plating solutions, gold		A	A
Plating solutions, indium		A	A
Plating solutions, lead		A	A
Plating solutions, nickel		A	A
Plating solutions, rhodium		A	A
Plating solutions, silver		A	A
Plating solutions, tin		A	A
Plating solutions, zinc		A	A
Petroleum ether (B.P. 100-140°C)		C	D
Potassium bicarbonate		A	A
Potassium borate	1	A	A
Potassium bromate	10	A	A
Potassium bromide		A	A
Potassium carbonate		A	A
Potassium chlorate		A	A
Potassium chloride		A	A
Potassium chromate	40	A	A
Potassium cyanide		A	A
Potassium dichromate	40	A	A
Potassium ferri/ferrocyanide		A	A
Potassium fluoride		A	A
Potassium hydroxide	50	A	A
Potassium hydroxide	10	A	A
Potassium nitrate		A	A
Potassium perborate		A	A
Potassium perchlorate	10	A	A
Potassium permanganate	20	A	A
Potassium sulfate		A	A
Potassium sulfide		A	A
Potassium sulfite		A	A
Propyl alcohol		A	A
Pyridine		A	--
Silicone oil		A	A
Soap solution (concentrated)		A	A
Sodium acetate		A	A
Sodium bicarbonate		A	A
Sodium bisulfate		A	A

EverGuard® TPO Chemical Resistance Chart

Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)
Sodium bisulfite		A	A
Sodium borate		A	A
Sodium bromide oil solution		A	A
Sodium carbonate		A	A
Sodium chlorate		A	A
Sodium chloride		A	A
Sodium chlorite	2	A	A
Sodium chlorite	5	A	A
Sodium chlorite	10	A	A
Sodium chlorite	20	A	A
Sodium cyanide		A	A
Sodium dichromate		A	A
Sodium ferricyanide		A	A
Sodium ferricyanide		A	A
Sodium fluoride		A	A
Sodium hydroxide	50	A	A
Sodium hydroxide	10	A	A
Sodium hypochlorite	20	A	B
Sodium nitrate		A	A
Sodium nitrate		A	A
Sodium silicate		A	A
Sodium sulfate		A	A
Sodium sulfide	25	A	A
Sodium sulfite		A	A
Stannous chloride		A	A
Stannic chloride		A	A
Starch		A	A
Sulfates of calcium & magnesium		A	A
Sulfates of potassium & sodium		A	A
Sulfur		A	A
Sulfuric acid	98	**C	D
Sulfuric acid	60	B	C
Sulfuric acid	50	B	C
Sulfuric acid	10	A	A
50-50 Sulfuric-Nitric Acid		**C	D
Sugars and syrups		A	A
Sulfamic acid		A	A
Tallow		A	B
Tannic acid	10	A	A

Environment	Concentration %	Temperature °F (°C)	
		70 (21)	140 (60)
Tartaric acid		A	A
Tetrahydrofuran		C	D
Tetralin		C	C
Toluene		C	D
Transformer oil		B	C
Trichloroacetic acid	10	A	A
Trichloroethylene		C	C
Triethanolamine		A	A
Turpentine		C	C
Urea		A	A
Urine		A	A
Vaseline		A	A
Vegetable oils (general)		A	B
Vinegar		A	A
Water (distilled, soft, hard & vapor)		A	A
Wet chlorine gas		--	D
Whisky		A	A
White paraffin		A	B
White spirit		B	C
Wines		A	A
Xylene		C	D
Yeast		A	A
Zinc chloride		A	A
Zinc oxide		A	A
Zinc sulfate		A	A

Guarantee Program

General

GAF Materials Corporation (GAF) offers roof guarantees for a fee for all roofing system specifications published in this manual when installed by GAF Certified Low Slope Roofing Contractors in accordance with the terms and conditions set forth in this manual, and the procedures for obtaining a guarantee are followed. All GAF and BMCA insulation, fasteners, preflashed details, expansion joint covers, cements, coatings and accessory products as job appropriate are required for guarantees unless otherwise approved in writing by a Regional Contractor Services Manager prior to installation.

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

GAF 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 its effectiveness or the continued liability thereunder is partly contingent upon payment of GAF's guarantee fee and payment in full to the roofing contractor and materials supplier.

GAF has no obligation to issue a roofing guarantee on any roof. Any inspection prior to issuance is solely for the benefit of GAF and does not constitute a waiver of any terms or conditions in the guarantee. In the event that a roof system does not conform to GAF standards and a guarantee is not issued, no portion of the guarantee fee is refundable.

GAF will not accept Notices of Award of Contract which indicate that the owner or architect has the option to accept or reject the guarantee upon completion of the roof.

Specifications not listed in this manual may also be eligible for GAF guarantees. For further information on guarantee requirements and for approval of modifications to published specifications, consult with GAF at 800-766-3411.

GAF is not responsible for consequential damages in case of roof system failure. GAF has no control over a building's contents, type, quantity, positioning, or protection.

A GAF guarantee cannot be withdrawn once it has been issued, although it may be cancelled subsequently by GAF for violation of its terms and conditions.

Special Conditions

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

A GAF roofing system guarantee will not be issued for the following without prior written approval from the 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, 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 top deck surface
- on roofs that have an inadequate number and spacing of expansion joints or curbs

- on systems constructed with insulation not approved by GAF
- on any structure where there is limited or no access to the roof
- 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 unusual condition not specifically approved by GAF
- on any high-temperature condition that allows the roof membrane temperature to exceed 160°F.

GAF Certified Contractor Program

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

The term "GAF Certified Low Slope Roofing Contractor" only identifies a contractor eligible to apply for a GAF roofing guarantee and is not intended to convey any other meaning. GAF Certified Low Slope Roofing Contractors are not employees, agents, or representatives of GAF.

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

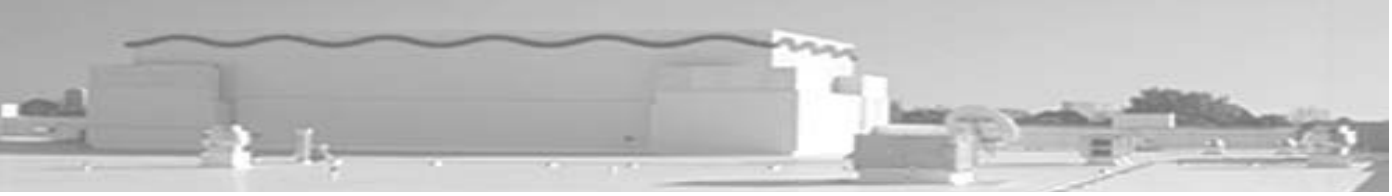
Inspection

GAF 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.

GAF 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 GAF are for its own use only and do not constitute a waiver of any of the terms and conditions of the guarantee.

Should a GAF Quality Assurance Representative 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. GAF, 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 GAF roofing system guarantee.



Roof Design

Provides a quick reference of technical recommendations for EverGuard® roofing system design.

- General
- Building Utilization
- Tear-off or Recover
- Roof Decks
- Parapet Walls
- Roof Drainage
- Expansion Joints
- Area Dividers
- Equipment Mountings
- Fire Resistance
- Wind Performance
- Energy Efficiency
- Water Vapor Transfer

Roof Design

General

Proper roofing system design and selection requires the consideration of many factors. Although our expertise is in roofing system design and materials manufacturing, and not in engineering, architecture, or specialized roof consulting, GAF does have extensive experience in the practical aspects of roofing.

Our experience suggests that careful consideration of the following will provide a fundamentally sound basis for design and selection of EverGuard® single ply roofing systems.

Building Utilization

Building utilization can have a significant impact on roofing system selection and design. The most common building utilization considerations are as follows: extremes in internal temperature/humidity, positive internal pressure, rooftop traffic/abuse, rooftop-exhausted contaminants, and the use of the roof as living space.

- **Internal Temperature/Humidity**

  Extremes in internal temperature/humidity are most often associated with cold storage/freezer buildings, swimming pool facilities, drying kilns, food processing plants, paper/pulp mills, and smelting/blast furnace facilities. What makes these building applications unusual is that the pronounced difference in vapor pressure between the building interior and the exterior can cause a pronounced vapor flow through the roof assembly. This can result in a significant build-up of condensation within the roof assembly, and severe deterioration of both the roof assembly itself and the structural deck.

  Relevant design considerations include:

  – Incorporation of vapor retarder at deck level to control vapor flow into and through roof assembly;
  – Attention to vapor-tight seal between roof and side walls/penetrations;
  – Utilization of closed-cell foam insulation and stainless steel fasteners to minimize potential for condensation-related degradation of roof system;
  – Limitation of penetrations through roof deck;
  – Avoidance of roof system attachment through vapor retarder.

- **Positive Internal Pressure**

  Positive internal pressure is most often associated with manufacturing/clean room facilities, mechanical air-handling rooms, aircraft hangars, distribution centers with multiple overhead doors, and high-rise office/residential towers. In all these instances, positive internal pressures can act on the underside of the roof system. Conditions where the positive internal pressure is constant, as in the case of clean room facilities and high-rise towers, may cause the roof system to billow up, i.e., mattress effect, and will reduce the overall uplift resistance of the roofing system. This effect is most pronounced in mechanically attached systems and can cause attachment concerns with all three system types. Conditions where the positive internal pressure is applied suddenly, as in the case of hangars and distribution centers, may cause failure of the roofing system due to pressure impact.

  Relevant design considerations include:

  – Use of air-impermeable deck construction such as poured-in-place concrete or insulating cellular concrete over steel pan;
  – Alternatively, installation of an air barrier such as PVC or PE sheeting at deck level beneath mechanically attached insulation with attachment sufficient to balance positive pressure;
  – Attention to air-tight seal between roof and side walls/penetrations.

- **Physical Abuse**

  Roofing installations that can be expected to experience a high degree of roof traffic due to equipment maintenance, vandalism or other unauthorized access, frequent hailstorms or high winds, and prolonged periods of temperature extremes or rapid fluctuations in temperature, will require a more durable roofing system. Relevant design considerations include:

  – Use of thicker membrane or multiple ply membrane, e.g. Triposite XL™;
  – Use of a higher compressive strength insulation substrate;
  – Application of a concrete paver or insulated paver overlay for extreme conditions.

- **Contamination**

  Many roofing installations are exposed to oil, grease and chemical contamination in excess of normal air-borne contaminants. These conditions are most often associated with restaurants, food processing plants, chemical and pharmaceutical plants, refineries, machining and manufacturing facilities, and airports. Most roofing materials are degraded by certain families of contaminants, and will become brittle, swell and soften, or dissolve, depending on the material formulation and contaminant type. Long-term exposure, i.e., 28-day immersion testing of roofing material and specific contaminant, remains the preferred method of determining

material resistance. Even then, unforeseen combinations of contaminants, environmental exposure effects, and variation in contaminant concentration prevent an absolute prediction in all but the most common situations. Relevant design/maintenance considerations include:

- Use of TPO or PVC membrane in most contaminated roofing environments*;
- Isolation of contaminated roof area with expectation of more frequent roof membrane replacement;
- Periodic power washing of roofing membrane with moderate pressure;
- Limitation of rooftop spillage/exhaust of contaminating materials, i.e. grease trap.

Refer to TPO and PVC Chemical Resistance Charts starting on page 46.

Tear-Off or Recover

The decision to tear-off/replace or to repair/recover an existing roofing system before installing a new roofing system is not always clear-cut.

Although not an exhaustive list, the following additional design elements typically require consideration for any reroofing project:

- Replacement of damaged roof decking or structural components;
- Improvement of roof access;
- Removal of unused rooftop equipment and associated equipment mountings;
- Remounting of rooftop equipment to allow proper roofing and flashing technique;
- Matching of architectural elements such as special perimeter metalwork;
- Repair of deteriorated parapet and penthouse walls;
- Protection of roofing membrane by means of concrete paver overlay or walkway pad system.

- **Tear-off/Replace**

Factors that support the tear-off approach include:

- Two or more existing roofs (building code restriction);
- Structural weight limitation;
- Over 25% existing roof area wet;
- Flashing height limitation;
- Need to maximize long-term performance.

The basis for any tear-off project is to provide a sound substrate for the installation of a new roofing system and minimize potential damage from tear-off activities. At a minimum, attention to the following considerations is recommended:

- Thoroughly inspect decking, flashing substrates, and wood nailers before installing new materials;
- Plan tear-off strategy so that roof drainage patterns are never blocked, and so that construction traffic is directed away from new roof areas;
- Protect new roof areas adjacent to tear-off areas from dirt, debris and damage.

- **Recover**

Factors that support the recover approach include:

- Need to minimize cost;
- Disposal restrictions;
- Difficult access to roof.

The basis for any recover project is to eliminate defects in the existing roof assembly so that their effect on the new roofing system is minimized. At a minimum, attention to the following considerations is recommended:

- Raise all perimeter flashings, penetrations and equipment to provide required flashing heights;
- Address drainage deficiencies to provide positive drainage;
- Remove and replace all wet roofing materials;
- Concentrate on thorough surface preparation.

NOTE: Coal tar pitch has oils and vapors that can be harmful to various roofing membranes and may discolor white thermoplastic membranes. Coal tar pitch can also cold flow through fastener holes into the building. For these reasons, extra care must be taken when recovering over an existing coal tar pitch roof. Typically additional insulation and a white surface help to first separate the membrane from the existing coal tar pitch roof and reduce the temperature of the finished assembly which minimizes the potential for cold flow.

Roof Decks

Most common structural roof deck types are suitable substrates for the installation of an EverGuard® roofing system.

It is the responsibility of the engineer, architect, building owner or roofing contractor to determine the fitness of a deck for a specific roofing system installation.

- **Structural Steel**
  - Min. 22 gauge (standard FM-approved steel decking is 22 ga. in thickness).
  - 24-26 gauge decks require GAF Contractor Services approval. Thinner-gauge steel decks usually require additional mechanical fasteners to achieve comparable roof

*__NOTE:__ GAF guarantees on any GAF membrane, including TPO and PVC, do not cover damage due to chemical contamination.

attachment performance.

– 18 ga., 20 ga., and 22 ga. Grade E high-strength steel decks usually require fewer mechanical fasteners to achieve comparable roof attachment performance.

- **Structural Concrete**
  - Min. 2500 psi compressive resistance
  - Min. 2" thickness (precast), min. 4" thickness (poured-in-place).
  - Cannot be wet or frozen. If the deck is determined to be wet, it must be allowed to dry.
  - For insulated decks, wood nailers of equivalent thickness to the roof insulation must be provided at perimeters and projection openings to act as an insulation stop and to provide for the nailing of the flanges of metal flashing.
  - Ridges and other irregularities require grinding to provide a smooth and even substrate surface.
  - For non-insulated decks, nailers must be flush with deck surfaces.
  - When applying insulation directly to the deck in hot asphalt, prime with asphalt/concrete primer, ASTM D41, at a rate of 1 gal/square and allow the primer to dry prior to the application of the roofing system.
  - Poured-in-place decks:
    - must be properly cured prior to application of the roofing system; twenty eight (28) days is normally required for proper curing. Check curing agents for compatibility with roofing materials. Prior to the installation of the roof assemblies, GAF recommends the evaluation of the surface moisture and deck's dryness through the use of ASTM D-4263 or hot bitumen test.
  - Pre-cast concrete decks:
    - are usually manufactured as planks or slabs and constructed of steel reinforced Portland cement and solid aggregate; often they are made with hollow cores to minimize their weight.
    - all deformed panels must be replaced.
    - joints must be filled with a masonry grout to correct imperfections between slabs and feathered to provide a slope not greater than 1/8" per foot for fully adhered insulated assemblies.
    - if the joints cannot be grouted and finished smooth, then a leveling course of lightweight insulating concrete (minimum 2" thickness) must be applied. Do not seal joints between the slabs; leave open to permit venting and drying of the roof fill from below.
  - Prestressed concrete decks:
    - GAF recommends a minimum 2" cellular lightweight concrete fill be installed over all prestressed concrete decks prior to installation of the roof system and/or insulation because variations in camber and thickness of prestressed concrete members may make securement of the roof system difficult.
    - provisions must be made for the curing or drying of the fill installed over the top of the prestressed deck members. Do not seal joints between the slabs/leave open to permit venting and drying of the roof fill from below.
- **Wood Planking**
  - Min. 1" nominal thickness
  - Tongue & groove or splined edges required.
  - All boards must have a bearing on rafters at each end and be securely fastened.
  - Lumber should be kiln dried.
  - Check compatability of preservatives or fire retardants used to treat decking with roofing materials.
  - Decking should be kept dry and roofed promptly after installation.
  - Tape and staple fastening systems may be used on wood decks when they comply with local building codes and agencies.
- **Plywood/Oriented Strandboard**
  - Min. 1/2" thickness (standard FM-approved plywood decking is fire-rated at 3/4" in thickness).
  - Tongue & groove edges or full blocking required.
  - Oriented strandboard (OSB) decks shall comply with Structural 1 rating.
  - Plywood sheathing shall be exterior grade, minimum 4 ply, not less than 15/32" thick.
  - Must be installed over joists not greater than 24" o.c.
  - Must be installed so that all four sides of each panel bear on, and are secured to, joists and cross blocking; the panels must be secured in accordance with the APA– The Engineered Wood Association recommendations. "H" clips are not acceptable.
  - Panels must be installed with a 1/8" to 1/4" gap between panels and must match vertically at joints to within 1/8".
  - Decking should be kept dry and roofed promptly after installation.
  - Tape and staple fastening systems may be used on wood decks when they comply with local building codes and agencies.
  - Deck shall be attached with approved fasteners at required spacing. Consul

t local building codes for specific requirements.

- **Gypsum Concrete**
  - Min. 2" thickness
  - Steel reinforcing mesh and permanent formboards required for poured-in-place monolithic decks.
  - Steel-reinforced edges required for precast decking units.
  - An average fastener withdrawal resistance as recommended by the fastener manufacturer must be obtained. If proper mechanical attachment cannot be achieved, please contact the GAF Technical Hotline 1-800-ROOF-411 for assistance with installation recommendations.
  - If either surface-wet or frozen, a poured gypsum deck is not suitable to receive a roof.
- **Cementitious Wood Fiber**
  - Min. 2" thickness
  - Tongue & groove panel edges required.
  - OSB or insulation composite decks for use with fully adhered systems require Contractor Services approval.
  - Should not be installed over high humidity occupancies.
  - All structural wood fiber deck panels must be anchored against uplift and lateral movement.
- **Insulating Concrete**
  - Min. 2" thickness
  - Cellular concrete decks may be installed over permanent venting steel forms.
  - Aggregate lightweight insulating concrete decks must be installed over permanent venting steel forms.
  - Insulating concrete installed over structural concrete or existing roof membrane substrates requires GAF Contractor Services approval.
  - Lightweight insulating concrete decks are required to have a minimum compressive strength of 125 psi and a density of 22 pcf. Individual deck manufacturers' standards apply when their specifications exceed these GAF minimum thickness, compressive strength, and density requirements.
  - Where the Mean January Temperature (reference current ASHRAE Fundamentals Handbook) is below 40˚F, lightweight insulating concrete decks must be poured and roofed between April 1st and October 31st; this type of deck is unacceptable in Alaska.
  - Lightweight insulating concrete should not be poured during rainy periods; deck areas which have frozen before they have cured must be removed and replaced. Check decks for moisture content and dryness, if exposed to precipitation prior to installation of roof membrane.
  - Solid metal decking and structural concrete decks are among those not acceptable to receive an aggregate based lightweight insulating concrete mix.
  - Cellular lightweight insulating concrete decks can be installed over non-slotted, galvanized metal decking designed for cellular lightweight insulating concrete or structural concrete.
  - Fully adhering an EverGuard® fleece-back membrane to insulating concrete is acceptable only when the deck has less than 15% moisture content. Contact GAF Contractor Services for additional requirements.
- **Loadmaster Decks**
  - Roof deck must be installed by a Loadmaster-approved contractor according to Loadmaster's specifications.
  - The metal deck used in the Loadmaster system must be no higher than 24 gauge.
  - The selected GAF roof system must be finished with a light-colored surface.
  - Consult GAF Contractor Services for reroofing and recovering options.
- **Mineral Panel/Steel Composite**
  - Min. 25 ga. steel decking, 15/16" deep with 1/2" thick mineral board top panel
  - Polystyrene or polyisocyanurate insulation is optional.
  - Most common brand name is Loadmaster™.
  - Requires GAF Contractor Services approval.

Parapet Walls

Most common structural wall types are suitable substrates for the installation of EverGuard® membrane flashing.

- **Brick/Block Masonry**
  - Standard-finish brick and concrete block with standard tooled mortar joints.
  - Split-face block, textured block and brick, and deeply tooled mortar joints require a cementitious parge coating or plywood facing to provide a smooth and even substrate surface.
- **Structural Concrete**

  - Steel trowel, wood float or removable form finish.
  - Ridges and other irregularities require grinding to provide a smooth and even substrate surface.
- **Stucco/EIFS**
  - Stucco finish and EIFS systems must be removed to the underlying substrate surface.
- **Plywood/Oriented Strandboard**
  - Min. 1/2" thickness (exterior-grade).
  - Tongue and groove edges or full blocking required.
  - Adhesives should only be used with untreated product.
- **Sheet Metal**
  - Min. 24 ga. steel.
  - Min. .032" aluminum.
  - Corrugated panels require overlay of 15/32" plywood/ oriented strandboard or silicone-impregnated gypsum panel.
- **Gypsum Panel (Dens-Deck®)**
  - Min. 1/2" thickness.
  - Silicone-impregnated fiberglass-faced panels.
  - Most common brand name is Dens-Deck™.
  - Underlying substrate must allow securement of flashing at prescribed spacing. Mechanical attachment to gypsum panels is not acceptable.
  - Requires Contractor Services approval.

Roof Drainage

Providing positive roof drainage is important. Standing water can result in deck deflection and possible structural damage. In addition, in the event of an opening through the roofing membrane, standing water can significantly worsen damage to the roof system, the building itself, and interior contents by providing a reservoir of water ready to gravitate through the membrane opening. Providing structural slope in the deck assembly, installing a tapered lightweight cellular concrete overlay, installing a tapered insulation system, or adding additional drains are the most common methods of achieving positive drainage.

National building codes generally require a minimum 1/4" per 12" slope to drain in order to provide positive drainage and accommodate deck irregularities. Although existing buildings may or may not be required by code to achieve this degree of roof slope, providing positive slope to drain remains an important design consideration.

In situations where roof edge conditions, window/door height above the roof surface, parapet wall height, weep hole locations, rooftop equipment mountings, or other factors prevent the installation of a full slope-to-drain system, a combination of additional drain locations, tapered saddles, and crickets to direct drainage to drain points should be considered.

Expansion Joints

The function of a structural expansion joint is to minimize the effect of stresses and movements on building components and to prevent these stresses from adversely affecting the building. The design, location and use of building structural expansion joints must be considered at the time of original building design and are the responsibility of the architect, engineer and building owner.

Expansion joints:

- Must be continuous along the break in the structure and not terminated short of the end of the roof deck.
- Should never be bridged with insulation or roofing membrane.
- Construction ties must be removed in order for expansion joints to function properly.
- Extend expansion joints at least 8” above the roof surface on curbs and use either Metalastic® flexible expansion joint covers or metal caps or covers. Alternately, a low profile expansion joint can be used; see EverGuard® details for construction.
- Design drainage flow patterns so they are not blocked by any structural expansion joints.
- Where possible, position walkways on roof access points to limit roof traffic over expansion joints; provide protective coverings for expansion joints at locations of anticipated roof traffic.
- EverGuard® Pre-Fab expansion joints covers are available.

Area Dividers

Area dividers are not considered structural expansion joints They can be installed to separate different roofing systems and can be either a curb or low profile type. Contact the GAF Technical Helpline (1-800-ROOF-411) for recommendations regarding area dividers.

Equipment Mountings

Roof Design

Proper mounting of equipment is an important consideration. In general, rooftop equipment should be mounted in such a way as to provide adequate flashing height for both new and anticipated recover roof system applications, sufficient clearance around and beneath the equipment to facilitate roof system installation, and compatibility with roofing and flashing materials so that standard flashing methods can be readily applied.

Alternately, lightweight equipment and gas/conduit lines can be installed on wood blocking or other prefabricated devices that do not penetrate the roofing system. Do NOT use this type of application for heavy equipment or where excessive movement can damage the substrate or membrane.

Fire Resistance

Resistance by the roofing system to fire applied to the exterior roof surface is important. Typically, a UL Class A or B rating is required by building code. Occasionally, depending on the use of the building, special resistance to fire applied from within the building is required. This is normally expressed in the form of hourly ratings, and usually requires the use of a specialized roof assembly.

Refer to current EverGuard® listings in the appropriate UL directory to verify roof assembly requirements for specific fire ratings.

Wind Performance

Ideally, roofing systems should be capable of resisting the forces generated by the maximum anticipated wind speed for a specific building. One widely accepted method for specifying wind performance is to require the appropriate FM 1-60, 1-90, or other rated system as appropriate for a specific building based upon location and exposure.

The following are common wind codes and approvals typically used in conjunction with EverGuard® roofing systems:

- **Factory Mutual Research Corporation**
  - Testing based on method described in Approval Standards 4450 and 4470.
  - Measures resistance to upward pressure applied to the roof system.
- **American Society of Civil Engineers 7-02 Wind Design**
  - A comprehensive analysis of wind forces acting on buildings. Requires detailed calculations to determine actual wind pressures at different regions of the roof.
  - Referenced by building codes.

Refer to Factory Mutual Loss Prevention Data Sheets 1-28 and 1-29 for specific installation guidelines.

Building Width	Building Height	Number of EverGuard® TPO 60" Half Sheets	Number of EverGuard® PVC 36" Half Sheets
<200'	0-34'	1	2
	35-100'	2	3
>200'	>100'	Install half sheets throughout the perimeter and corner region.The width of this region is defined as the least of the following two measurements: 0.1 x building width or 0.4 x building height Note: The minimum width is 4'.	
	any height		

GAF provides the following thermoplastic half sheet table to use as a guide for mechanically attached systems because wind pressures are increased in the corners of the roof, with somewhat lower increased pressures acting along the remaining roof perimeter. The remaining field area of the roof normally experiences significantly lower wind pressures than either the corner or perimeter areas.

Perimeter Half Sheet Table

The perimeter area, as defined in the above table, may be fully adhered as an alternative to using half sheets. When fully adhering the perimeter area, the number of insulation fasteners must be increased in these areas; refer to the insulation attachment section for fully adhered membranes. Refer to the sheet lay-up details in the mechanically attached system section for requirements on the installation of these half sheets. Note: When designing for wind loads, ensure that the proper building classification (closed, partially closed, or open) is used if the building has large openings (i.e., docks with large loading bays, etc.). Improper classifications can result in roof attachment failure caused by designing to lower loads than actually exist for the building in question.

Energy Efficiency

Thermal transmission standards have been established by building codes for most buildings. Roof insulation installed

above the roof deck is a practical means of achieving the necessary energy efficiencies. In addition, the use of white-colored reflective membranes can reduce the heat load on air conditioning equipment, as well as providing a moderating effect on the temperature in proximity to the building.

- **U-Value**
  - Thermal Transmittance – The number of BTU's (energy) that pass through a 1 square foot sample of a total material assembly in one hour with a temperature difference between the two surfaces of 1 degree F.
  - The U-value is the reciprocal of the Summation of all R-values for all materials in an assembly.
  - Units of Thermal Transmittance are expressed as: (BTU)/(h) (sq.ft.) (F).
  - Thermal Transmittance applies to an actual total material assembly, and as such is a quantitative physical property that can be used to represent the overall thermal performance of a system.
- **R-Value**
  - Thermal Resistance – The number of degrees difference between two surfaces (energy difference) that is required to obtain an energy flow of 1 Btu through a 1 square foot sample of a given material thickness in one hour.
  - The R-value is the reciprocal of the C-value.
  - Units of Thermal Resistance are expressed as: (F) (sq.ft.) (h) / (BTU).
  - Thermal Resistance applies to an actual thickness of a material, and as such is a quantitative physical property that can be used for determining insulation requirements.
- **Reflectance**
  - A measure of the % of solar energy that is reflected away from a surface
  - Dark materials absorb more heat from the sun and can be up to 70°F hotter than a reflective white surface given the same outside temperature and conditions such as wind speed, location, etc.
- **Emittance**
  - A measure of the infrared radiation emitted from a roof surface. Unlike reflectance, infrared emissivity may not be affected by dirt or discoloration of the surface of a material.

The following references provide useful information regarding energy efficiency:

- **ASHRAE Fundamentals Handbook**
  - Provides detailed design calculations and material energy transfer information utilized by mechanical engineers in the design of heating, ventilation and air conditioning systems.
  - Suitable for complex energy evaluation considerations such as solar heat gain, exterior shading, total building envelope, building usage, and lighting.
- **NRCA Energy Manual**
  - Provides a simplified method for determining the amount of insulation necessary to construct an energy efficient low-slope roof system.
  - Provides a simplified method for determining the energy cost savings resulting from the installation of additional roof insulation.
  - Suitable for most roofing-related energy evaluations.
- **DOE Energy Calculator**
  - Go to www.oml.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm to find the Cool Roof Calculator.
  - This tool measures the energy savings for low slope roofs with non-black roof surfaces.
- **ENERGY STAR® Reflective Roof Products**
  - Go to: www.ENERGYSTAR.gov/index.cfm?c=roof_prods.pr_roof_products for the current listing of ENERGY STAR® qualified roof products
  - Low slope roofing materials requires minimum solar reflectance of 0.65 as manufactured and 0.50 after 3 years of aging.

Water Vapor Transfer

Typical single-ply roof assemblies do not include vapor retarders as a standard assembly component. For these applications, there is a natural transfer of water vapor into the roof assembly during a portion of the year, followed by a natural transfer of water vapor out of the roof assembly during the balance of the year. Under normal conditions, this type of cyclical water vapor flow does not cause a significant deterioration of the roof insulation or reduction in insulation thermal performance.

However, for projects where there is a significant difference in vapor pressure between building interior and exterior, the volume of water vapor flow is much greater, and control of water vapor transfer into and through a roof system becomes an important consideration. Without adequate control provisions, the roof insulation can become saturated with water, with a corresponding reduction in insulation thermal performance. Structural deck damage and/or condensation into the building interior may also occur.

Vapor flow is referenced in various ways. The following is a

description of common terminologies:

- **Permeance**
  - The time rate of vapor transmission through a flat material or construction induced by vapor pressure difference between two specific surfaces, under specified temperature and humidity conditions.
  - Units of Permeance are expressed as: (gr) / (h) (sq.ft.) (in. Hg).
  - The permeance, or perm rating, of a material is a performance evaluation specific to a sample of material, and not a specific property of the material.
- **Relative Humidity**
  - Relative humidity is the ratio of the pressure of water vapor present in air to the pressure of fully saturated water vapor at the same temperature.
  - Relative Humidity is expressed as a percentage.
- **Dew Point Temperature**
  - The temperature at which air becomes saturated with saturated vapor (100 percent relative humidity) and condensation begins to form.
  - Dew Point Temperature is expressed as °F.

A number of basic considerations factor into the need and location of a vapor retarder. Determining the need and location of the vapor retarder is the responsibility of the Design Professional.

- **Temperature and Relative Humidity**
  - Vapor flows based upon a difference in vapor pressure between two locations, and flows from higher to lower pressure regions.
  - Normally, the higher the temperature, the higher the vapor pressure.
  - In determining the need for a vapor retarder for most typical conditions, the exterior winter temperature and the interior winter relative humidity are the most critical factors.
  - Temperature information is readily available from the National Weather Service.
  - Relative humidity information is typically available from the building HVAC design professional or the building operations manager. Relative humidity can also be field measured.
- **Vapor Retarder Location**
  - Vapor retarders are intended to be installed as close to the warm side of the roof assembly as possible. Normally, this places the vapor retarder directly on the structural deck or directly over a minimal layer of EnergyGuard™ insulation or fire barrier.
  - A sufficient amount of EnergyGuard™ insulation must be installed over the vapor retarder to raise the dew point location above the level of the vapor retarder.
- **Sealing At Perimeter And Penetrations**
  - Vapor retarders shall be completely sealed at all perimeter and penetration locations.
  - Sealing methods shall be selected in accordance with type of vapor retarder being installed.
  - Air leakage at perimeter and penetrations will significantly reduce the effectiveness of the vapor retarder by allowing moist air to penetrate into the roof assembly where it can condense and cause roof deterioration.
- **Building Usage**
  - Normal building usage such as offices, schools, retail, warehousing, etc. will not typically require the use of a vapor retarder except when located in the most northerly climates.
  - Building usage such as swimming pools, food processing, paper manufacturing, foundries, etc. that result in increased internal temperatures and humidity conditions will likely require the use of a vapor retarder except when located in the most southerly climates.
  - These generalizations are not intended to substitute for actual vapor flow calculations based upon specific building and climactic conditions.
- **The Case For The Use Of A Vapor Retarder**
  - A vapor retarder can protect the long term thermal resistance of insulation sandwiched between the vapor retarder and the membrane.
  - A vapor retarder provides a good safeguard against vapor migration in case a building's use changes from a "dry" use to a "wet" use.
- **The Case Against The Use Of A Vapor Retarder**
  - The vapor retarder, together with the roofing membrane, may seal within the roof system entrapped moisture that can eventually destroy the insulation, wrinkle the membrane or, in gaseous form, blister it.
  - In the event of a roof leak through the membrane, the vapor retarder will trap the water in the insulation and

Mechanically Attached Systems

Membrane attached in the lap with screws and plates.

Contents

- Design Tables
- Specification Plates
- TPO/PVC Three-Part Guide Installation Specification

TPO DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - MECHANICALLY ATTACHED

Deck	Membrane Type		Insulation/Substrate								Insulation/Substrate Attachment		
	Smooth	Fleece (FB)	ISO	Gypsum Board	Wood fiber/ Perlite[2]	EPS/XEPS	Fanfold	3/6 oz Polymat	FR 50/10	none	Mech. Attached	Adhesive	Hot[1]
Steel	x		x	x	x	x					x	x	
		x	x	x	x	x					x	x	
Wood	x		x	x	x	x	x	x	x		x	x	x[2]
		x	x	x	x	x	x		x	x	x	x	x[2]
Structural Concrete & Gypsum	x		x	x	x	x	x	x			x	x	x
		x	x	x	x	x	x			x	x	x	x
Lightweight Insulating Concrete	x		x	x	x	x	x	x			x	x	x[2]
		x	x	x	x	x	x			x	x	x	x[2]
Cementitious Wood Fiber	x		x	x	x	x	x	x			x	x	x[2]
		x	x	x	x	x	x			x	x	x	x[2]

1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Insulation can be installed in hot asphalt only when mopping to mechanically attached base sheet.
3. Fanfold to be used as an overlay board only

TPO DESIGN TABLE - RECOVER - MECHANICALLY ATTACHED

Existing Roofing System Type	Membrane Type		Insulation/Substrate								Insulation/Substrate Attachment		
	Smooth	Fleece (FB)	ISO	Gypsum Board	Wood fiber/ Perlite[2]	EPS/XEPS	Fanfold	3/6 oz Polymat	FR 50/10	none	Mech. Attached	Adhesive	Hot[1]
Smooth BUR/MB	x		x	x	x	x	x	x	x		x	x	x
		x	x	x	x	x	x			x	x	x	x
Single Ply Membrane	x		x	x	x	x	x	x	x		x		
		x	x	x	x	x	x			x	x		
Granule Surfaced BUR/MB	x		x	x	x	x	x	x			x	x	x
		x	x	x	x	x	x			x	x	x	x
Gravel Surfaced BUR/MB	x		x	x	x	x	x				x	x	x
		x	x	x	x	x	x				x	x	x
Standing Seam Metal[3]	x		x	x	x	x					x		
		x	x	x	x	x					x		

1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems
3. XEPS is the only material allowed as flute fill with overlay board required.
4. Fanfold to be used as an overlay board only

PVC DESIGN TABLE - NEW CONSTRUCTION OR TEAR OFF - MECHANICALLY ATTACHED

Deck	Membrane Type		Insulation/Substrate								Insulation/Substrate Attachment		
	Smooth	Fleece	ISO	Gypsum Board	Wood fiber/Perlite	EPS/ XEPS	Fanfold	3/6 oz. Polymat	FR 50/10	None	Mech Fast.	Adhesive	Hot[1]
Steel	X		X	X	X	X[3]		X[3]			X	X	
		X	X	X	X	X					X	X	
Wood	X		X	X	X	X[3]	X[3]	X	X		X	X	X[2]
		X	X	X	X	X	X		X	X	X	X	X[2]
Structural Concrete & Gypsum	X		X	X	X	X[3]	X[3]	X			X	X	X
		X	X	X	X	X	X			X	X	X	X
Lightweight Insulating Concrete	X		X	X	X	X[3]	X[3]	X			X	X	X[2]
		X	X	X	X	X	X			X	X	X	X[2]
Cementitous Wood Fiber	X		X	X	X	X[3]	X[3]	X			X	X	X[2]
		X	X	X	X	X	X			X	X	X	X[2]

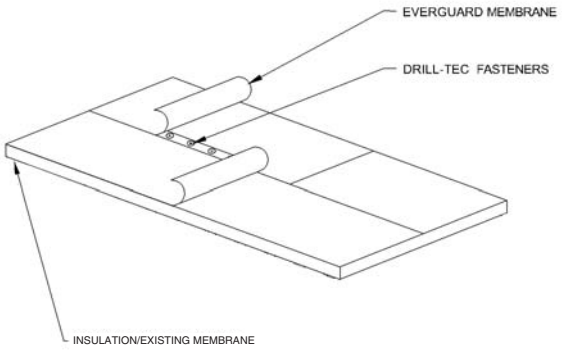
1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet
3. XEPS/Fanfold in combination with a 3 oz. polymat separator
4. Fanfold to be used as an overlay board only

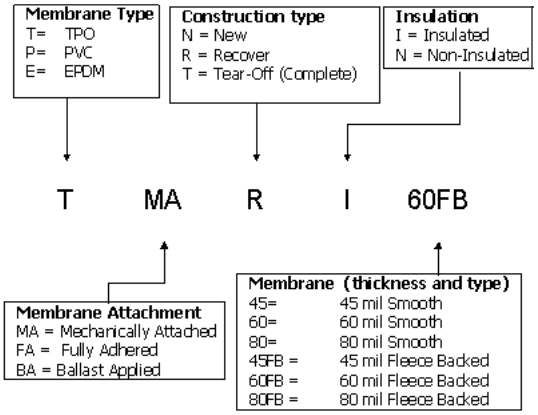
PVC DESIGN TABLE - RECOVER - MECHANICALLY ATTACHED

Exiting Roofing System Type	Membrane Type		Insulation/Substrate								Insulation/Substrate Attachment		
	Smooth	Fleece	ISO	Gypsum Board	Wood fiber/Perlite	EPS/ XEPS	Fanfold	3/6 oz. Polymat	FR 50/10	None	Mech Fast.	Adhesive	Hot[1]
Smooth BUR/MB	X		X	X	X	X[4]	X[4]	X	X		X	X	X
		X	X	X	X	X	X			X	X	X	X
Single Ply Membrane	X		X	X	X	X[4]	X[4]	X	X		X		
		X	X	X	X	X	X			X	X		
Granule Surfaced BUR/MB	X		X	X	X	X[4]	X[4]	X			X	X	X
		X	X	X	X	X	X			X	X	X	X
Gravel Surfaced BUR/MB	X		X	X	X	X[4]	X[4]	X[4]			X	X	X
		X	X	X	X	X	X				X	X	X
Standing Seam Metal[3]	X		X	X	X	X[4]		X[4]			X		
		X	X	X	X	X					X		

1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems
3. XEPS only as flute material with overlay board
4. XEPS/Fanfold in combination with a 3 oz. polymat separator
5. Fanfold to be used as an overlay board only

INSULATED TPO MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE

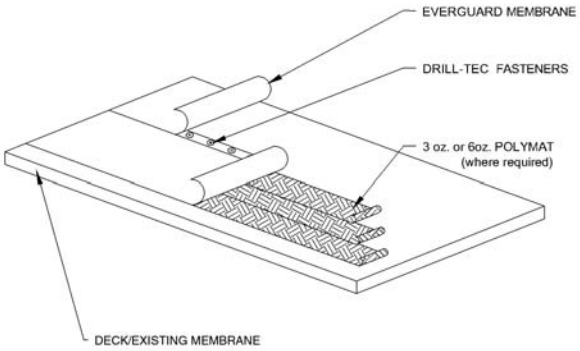


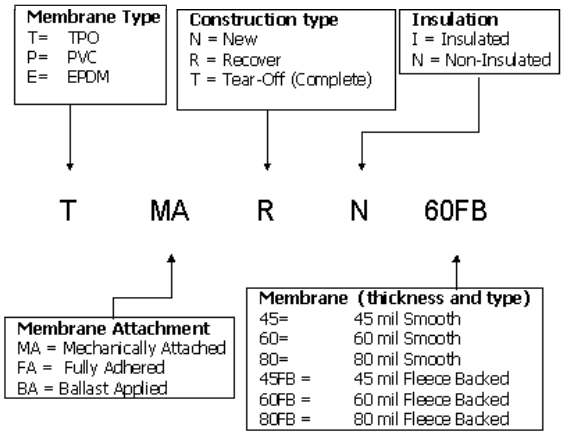


Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-MA-N-I-45	Mechanically Attached	New	Yes	.045	12
T-MA-N-I-60				.060	15
T-MA-N-I-80				.080	20
T-MA-T-I-45	Mechanically Attached	Tear Off	Yes	.045	12
T-MA-T-I-60				.060	15
T-MA-T-I-80				.080	20
T-MA-R-I-45	Mechanically Attached	Recover	Yes	.045	12
T-MA-R-I-60				.060	15
T-MA-R-I-80				.080	20
T-MA-N-I-45FB	Mechanically Attached	New	Yes	.045 FB	12
T-MA-N-I-60FB				.060 FB	15
T-MA-N-I-80FB				.080FB	20
T-MA-T-I-45FB	Mechanically Attached	Tear Off	Yes	.045 FB	12
T-MA-T-I-60FB				.060 FB	15
T-MA-T-I-80FB				.080FB	20
T-MA-R-I-45FB	Mechanically Attached	Recover	Yes	.045 FB	12
T-MA-R-I-60FB				.060 FB	15
T-MA-R-I-80FB				.080FB	20

Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached systems require the use of half sheets.

NON-INSULATED TPO MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE

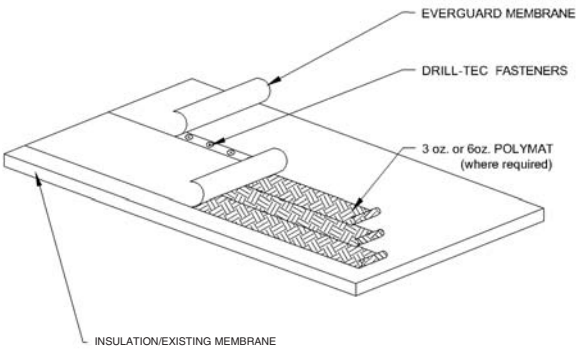


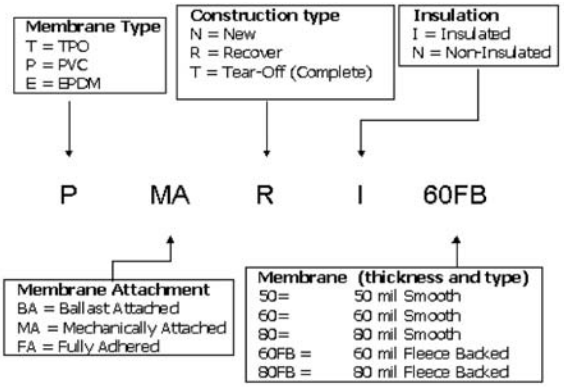


Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-MA-N-N-45	Mechanically Attached	New	No	.045	12
T-MA-N-N-60				.060	15
T-MA-N-N-80				.080	20
T-MA-T-N-45	Mechanically Attached	Tear Off	No	.045	12
T-MA-T-N-60				.060	15
T-MA-T-N-80				.080	20
T-MA-R-N-45	Mechanically Attached	Recover	No*	.045	12
T-MA-R-N-60				.060	15
T-MA-R-N-80				.080	20
T-MA-N-N-45FB	Mechanically Attached	New	No	.045 FB	12
T-MA-N-N-60FB				.060 FB	15
T-MA-N-N-80FB				.080FB	20
T-MA-T-N-45FB	Mechanically Attached	Tear Off	No	.045 FB	12
T-MA-T-N-60FB				.060 FB	15
T-MA-T-N-80FB				.080FB	20
T-MA-R-N-45FB	Mechanically Attached	Recover	No	.045 FB	12
T-MA-R-N-60FB				.060 FB	15
T-MA-R-N-80FB				.080FB	20

* Separator Sheet required; 3/6 oz polymat or StormSafe™.
Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached systems require the use of half sheets.

INSULATED PVC MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE

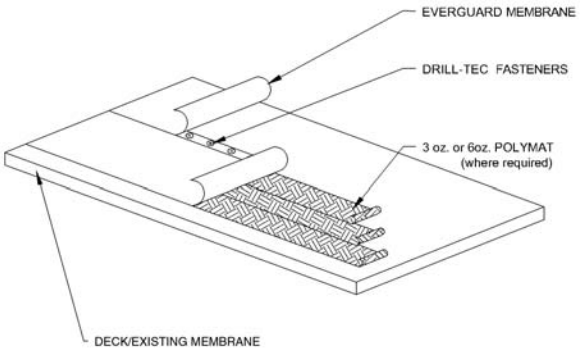


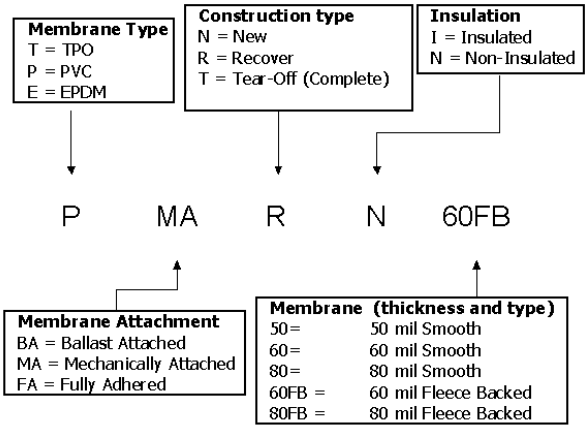


Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-MA-N-I-50	Mechanically Attached	New	Yes	.050	12
P-MA-N-I-60				.060	15
P-MA-N-I-80				.080	20
P-MA-T-I-50	Mechanically Attached	Tear Off	Yes	.050	12
P-MA-T-I-60				.060	15
P-MA-T-I-80				.080	20
P-MA-R-I-50	Mechanically Attached	Recover	Yes	.050	12
P-MA-R-I-60				.060	15
P-MA-R-I-80				.080	20
P-MA-N-I-60FB	Mechanically Attached	New	Yes	.060 FB	15
P-MA-N-I-80FB				.080FB	20
P-MA-T-I-60FB	Mechanically Attached	Tear Off	Yes	.060 FB	15
P-MA-T-I-80FB				.080FB	20
P-MA-R-I-60FB	Mechanically Attached	Recover	Yes	.060 FB	15
P-MA-R-I-80FB				.080FB	20

Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached systems require the use of half sheets.

NON-INSULATED PVC MECHANICALLY ATTACHED SYSTEMS SPECIFICATION PLATE





Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-MA-N-N-50	Mechanically Attached	New	No	.050	12
P-MA-N-N-60				.060	15
P-MA-N-N-80				.080	20
P-MA-T-N-50	Mechanically Attached	Tear Off	No	.050	12
P-MA-T-N-60				.060	15
P-MA-T-N-80				.080	20
P-MA-R-N-50	Mechanically Attached	Recover	No*	.050	12
P-MA-R-N-60				.060	15
P-MA-R-N-80				.080	20
P-MA-N-N-60FB	Mechanically Attached	New	No	.060 FB	15
P-MA-N-N-80FB				.080FB	20
P-MA-T-N-60FB	Mechanically Attached	Tear Off	No	.060 FB	15
P-MA-T-N-80FB				.080FB	20
P-MA-R-N-60FB	Mechanically Attached	Recover	No*	.060 FB	15
P-MA-R-N-80FB				.080FB	20

*Separator Sheet required; 3/6 oz. polymat or StormSafe™.
Refer to Insulation Attachment and Membrane Attachment Tables for attachment requirements.
Mechanically attached systems require the use of half sheets.

NOTES

Mechanically Attached Installation Specification

TPO & PVC

Part 1 – General

1.01 System Description

A. Mechanically attached heat-welded thermoplastic sheet roof membrane system.

B. EverGuard® PVC and EverGuard® TPO materials are not compatible with one another. DO NOT use 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 and slope.

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 manufacturers' name, product brand name and type.

B. Store materials in weather protected environment, clear of ground and moisture, in accordance with GAF 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. Reference data sheets for product storage requirements.

D. Follow GAF directions and requirements for protection of materials prior to and during installation.

E. Do NOT use materials that are wet or damaged to the extent that they will no longer serve their intended purpose. 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. High or gusting winds make the installation of materials difficult.

D. 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.

E. 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 accessory materials in a warming box
2. Use as soon as possible
3. Allow adhesives to properly cure
4. Adjust welder settings to insure proper welds for applicable ambient conditions

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 housekeeping 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 as roofing membrane. EverGuard® Freedom™ TPO can be used with EverGuard® TPO membrane for flashing in the same thickness as the field membrane.

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.

2.03 Flashing Accessories

A. EverGuard® preformed flashing accessories to be of same type as roofing membrane.

1. EverGuard® TPO and PVC laminated metal flashings to be a minimum of 25 mils TPO and 40 mils PVC of

Mechanically Attached Installation Specification

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non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 24 ga. galvanized steel sheet metal.

2. Pre-formed Vent Boots with stainless steel clamping bands.
3. Pre-formed Universal Corners for TPO. Individual pre-formed inside outside corners for PVC.
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 Membranes for TPO flashing. UN-80 Detailing Membranes for PVC flashing. For miscellaneous penetrations in lieu of pre-formed accessories.
7. EverGuard® TPO Cover Strip for stripping in of flat metal edges.
8. EverGuard® Pre-formed Sealant Pans are available for irregularly-shaped penetrations and pitch pans.

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 and the appropriate Membrane Attachment Table at the end of this section for the correct type, length and diameter.

2.05 Adhesives and Sealants

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

2.06 Traffic Protection

A. EverGuard® TPO and PVC walkway 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 C-578, Type II nominal 1.5 pound density.
3. EnergyGuard™ expanded polystyrene insulation with plastic facer meeting or exceeding the requirements for ASTM C-578, Type II nominal 1.5 pound density.

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 with plastic facer 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, except for fan-fold recover board, which comes in 2' x 4' sections with a 50' total length.
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. EnergyGuard™ 3/8" extruded polystyrene fan-fold recover board with plastic facer meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).
3. EnergyGuard™ 1/2" extruded polystyrene recover board meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).

4. EnergyGuard™ 1/2" expanded polystyrene recover board with

plastic facer meeting or exceeding the requirements for ASTM D-578, Type II (min. 15 psi compressive strength).

2.10 Base Sheets

A. GAFGLAS® Stratavent® Eliminator™ Nailable Base Sheet

B. GAFGLAS® #80 Ultima™ Base Sheet

C. GAFGLAS® #75 Base Sheet

2.11 Protection Layer

A. EverGuard® Polymat slipsheet, 3.0 oz/sq.yd.

B. EverGuard® Polymat cushioning slipsheet, 6.0 oz/sq.yd.

C. VersaShield™ products as protection layer in all sections (fully adhered, ballasted, etc.)

2.12 Other Accessories

A. Subject to compliance with requirements, provide the following products not available from GAF:

1. Wood Nailers: New wood nailers shall be #2 or better lumber. Do NOT use asphaltic or creosote-treated lumber.
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. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (gypsum roof from Georgia-Pacific).

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.

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

E. Where work must continue over completed roof areas, protect the finished roofing system 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.

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.

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. When recovering over an existing single ply roof, that roof must be first cut into 10'x10' areas maximum first, before the application of new separator sheet and/or membrane.

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. If the wall/curb flashings are in good condition and tightly adhered to the substrate, new TPO flashing materials may be installed over these to a height of 24"; new PVC flashing materials may be installed over a separator layer of polymat or insulation board.

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.

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.

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I. Recover installation over coal tar pitch roofs require that the existing loose gravel be broomed (do not spud); if high spots remain, use a thicker insulation board to provide a smooth substrate for the EverGuard® membrane. Recover with EverGuard® TPO membranes over coal tar pitch roofs require the installation of a minimum 1/2" recover board prior to the installation of the membrane. Do not use EPS/XEPS over coal tar pitch roofs. A minimum 1.5" recover board is required for PVC applications.

3.04 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers.
2. Shim Material:
   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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
4. Three 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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
4. Three anchors per length of wood nailer minimum.

D. Shim Material

Secure simultaneously with overlying solid wood nailer.

1. Shim material must be continuous. Do NOT use spaced shims.

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. Do NOT use gypsum boards that are wet, warped or buckled; they must be discarded. Insulation boards that are broken, cracked, or crushed shall not be installed unless the damaged area is first removed and discarded.
5. Remove and replace gypsum boards that become wet or damaged after installation.
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. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
   d. Install fasteners such that the fastener plate is pulled slightly below the insulation 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°F-475°F.
   e. Walk in the boards after installation to ensure a proper bond.
   f. Maximum board size: 4' x 4'.
   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 manufacturer's instructions.
   b. Adhesive beads shall be evenly spaced at the rate required for the board size and type of roofing system being installed.
   c. Apply the proper grade adhesive based on current air and surface temperatures.
   d. Walk in the boards after installation to ensure a proper bond.
   e. Maximum board size: 4' x 4'.

3.06 Air/Vapor Retarder Installation

A. General
1. Air/vapor retarder components shall typically be installed when required by design professional to address internal building air pressure or humidity conditions.
2. All air porous decks with openings in the walls or area directly below the roof deck that exceeds 10% of the total wall area are projects for which design professionals should recommend air retarders.
3. Designers should recommend air retarders when the internal pressurization of the building is in excess of 5 lbs. per sq. ft.
4. Designers should recommend air retarders if the building height exceeds 50 ft.
5. Buildings with large openings & overhangs shall be evaluated for air retarders or the installation of half sheets of roof membrane.
6. The installation of an air retarder shall be required for EverGuard® 20-year guarantees as follows:
   a. All single layer installations of roof insulations or roof panels
   b. Installations with openings in the wall that exceed 25% of the total wall area
   c. Installations of 10' wide or greater membranes with side lap mechanical attachment that exceeds 6" o.c. (For 10' wide sheets, the requirements for an air barrier is dependent upon building height and fastener density. Contact your Regional Contractor Services Manager for air barrier requirements.)

B. Application
1. Install the air/vapor retarder components loose-applied to the deck or fire barrier board so that wrinkles and buckles are not formed.
2. Overlap air/vapor retarders components per applicable installation recommendations of the supplier.
3. Seal perimeter and penetrations areas with foam sealant.
4. Seal all perimeter nailers with fully adhered roof membrane placed over the nailer and covering the exterior face of the nailer by 1".

3.07 Protection Layer Installation – Polyester

A. General
1. Install polymat protection layer between the roofing membrane and the substrate in accordance with the Design Table.

B. Application
1. Install polymat protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
2. Overlap polymat protection layer a minimum of 6" for side and end laps.

3.08 Protection Layer Installation – Fiberglass

A. General
1. VersaShield™ protection layer shall typically be installed when required by design professional or code authority to address code or approval requirements, or as a separator layer in accordance with the Design Table.

B. Application
1. Install fiberglass sheet protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
2. Overlap fiberglass sheet protection layer a minimum of 6" for side and end laps.

3.09 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 or adhesive.
2. Nailable base sheet shall be applied over substrates that are not suitable for asphalt adhesion and requires installation of insulation in hot asphalt or adhesive.
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.

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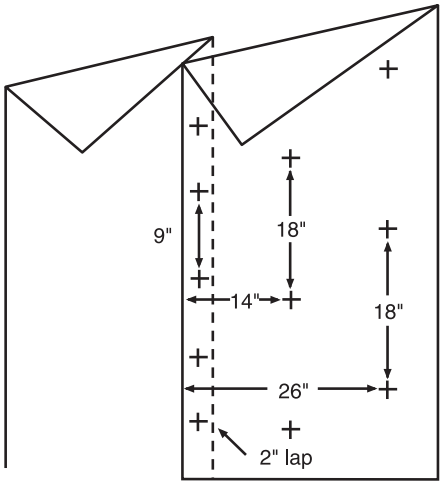
B. Mechanical Securement-Nailable Base Sheet

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

Fig. 1



install required number of fasteners in accordance with Figure 1.

2. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
3. Install fasteners such that the fastener plate is pulled flush with the venting base sheet surface and lies flat on the deck.

C. Base Sheet Installation

1. StormSafe™ is a non-breathable 48" wide underlayment which can be used over wood and light weight decks in conjunction with Freedom™ systems.
2. Install StormSafe™ underlayment so that wrinkles and buckles are not formed
3. Overlap base sheet a min of 2" for side laps and 6" for end laps
4. StormSafe™ underlayment should be attached at 9" o.c. along the 2" side laps with three rows of fasteners in the field located at 10", 24" and 38" with 18" o.c. fastening pattern. Use deck appropriate fasteners for attachment.

3.10 Recover Board/Insulation Installation

A. General

1. Install insulation board and recover board as required in accordance with the Design Table.
2. 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 Contractor Services.
3. The use of extruded or expanded polystyrene insulation is limited in PVC roofing systems to under a fleece back membrane, where protected by a 3 or 6 oz. polymat
slip sheet, or where an overlay board is used.

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. Install tapered insulation to provide a sump area a minimum of 36" x 36" where applicable.
6. Do NOT install insulation boards that are wet, warped or buckled; they 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. Remove and replace insulation boards that become wet or damaged after installation.
8. Install no more insulation 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 insulation type, board size, and type of roofing system installed.
   c. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
   d. Install fasteners such that the fastener plate is pulled slightly below the insulation board surface.
   e. Use fastener of correct length as required by the Insulation Attachment Table. The use of any fastener greater than 8" in length must be preapproved by GAF Contractor Services. May require a cover board.
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 insulation 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. When applying asphalt in this manner, the existing substrate must be free of dirt, dust and any loose materials. Depending on the existing roof, this may require vacuuming, power brooming or power washing.

d. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475°F.

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

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

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 manufacturer's 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 the proper grade adhesive based on current air and surface temperatures.

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

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

3.11 Membrane Installation

A. Placement

1. Place roof membrane so that wrinkles and buckles are not formed. Remove any wrinkles or buckles removed from the sheet prior to permanent securement. Roof membrane shall be mechanically fastened after it is rolled out, followed by welding to adjacent sheets.
2. Full-width rolls shall be installed in the field of the roof.
3. Half-width rolls shall be installed in the perimeter region of the roof. Width of the roof perimeter region shall be determined in accordance with the Perimeter Half Sheet Table.
4. Overlap roof membrane a minimum of 6" for side laps of mechanically attached systems, and a minimum of 3" for end laps. Membranes are provided with lap lines along the side laps, the inside line is for mechanically attached system overlaps (6" for TPO and 5" for PVC) and the other line is for adhered and ballasted systems overlap.
5. Install membrane so that the laps run across the roof slope lapped toward drainage points. On metal decking, install sheets perpendicular to deck direction so that fasteners will penetrate the top flanges and not the flutes; however, there will be limited areas of the roof (i.e. perimeter areas) where this is not practical.
6. All exposed sheet corners shall be rounded a minimum of 1".
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. Securement

1. Roof membrane shall be mechanically fastened in the side lap area to the roof deck with fasteners and plates of a type and spacing appropriate to the deck type and as required by the Membrane Attachment Table.
2. The metal plates must be placed within 1/4" - 3/4" of the membrane edge. Plates must not be placed closer than 1/4" to the membrane edge.
3. Fasteners must be installed to achieve the proper embedment depth. Install fasteners vertical to the deck, without lean or tilt.
4. In the corner areas, additional fasteners will also be installed through the perimeter half-width membrane rolls to form a grid pattern, with an 8" wide reinforced membrane flashing strip heat-welded over the additional fasteners. "Corners" include both outside and inside corners that measure 75°-105°. Perimeter cap sheets may overlap one another in the corner areas. Alternatively, the half sheet may be laid out in a "picture frame" manner, burying the fasteners under the half sheets.
5. Mechanically attach membrane with screws and plates to the roof deck at locations of deck angle changes in excess of 5° (2" in 12").
6. Membrane may be heat welded to coated metal flanges. Membrane must be secured to the roof deck within 6" of the base of walls and curbs, at the perimeter, and all penetrations with DRILL-TEC™ Fasteners of a type and spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing. 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™ Fasteners and inverted Termination Bar of type and spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing. This alternative detail is required to be used for pressurized buildings.

7. 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. Field Seaming

1. Fabricate field seams using a current-generation automatic hot air welding machine and a 10,000 watt voltage-controlled generator minimum. In addition, fabricate detail seams with automated hot air welders where possible. 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 TPO and PVC reinforced membranes must be sealed with EverGuard® TPO or PVC Cut Edge Sealant.

D. Substrate Surface Preparation

1. Prepare substrate surfaces thoroughly prior to application of new roofing materials. This is particularly important for recover and reroofing applications.
2. 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.
3. 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.

E. 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 use or acetone for PVC. 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 Cleaner or acetone for PVC. 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 Cleaner or acetone for PVC and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner or acetone for PVC. Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above. Be sure to wait for solvent to flash off prior to welding.
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. The membrane should be removed and replaced in these situations.

3.12 Flashing Installation

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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 pre-formed corners or unreinforced membrane.
3. Heat weld all flashing membranes, accessories, and coated metal together to achieve a minimum 2" wide (hand welder) weld. A minimum 1.5" will be acceptable when using robotic welders.
4. All cut edges of reinforced TPO and PVC membrane must be sealed with EverGuard® TPO or PVC Cut Edge Sealant.
5. When using bonding adhesive, be sure to use adhesive specific to membrane type.
6. Minimum flashing height is 8".
7. The maximum distance from the wall that horizontal mechanical attachment is installed is 6". When you must go past 6", move the attachment to the vertical substrate.
8. Installation of EverGuard® PVC flashing membrane over asphalt-based substrates must have a separator sheet or approved insulation boards, metal, wood,etc., under the PVC flashing membrane.

B. Coated Metal Flashings

1. Coated metal flashing allows much of the metal-work 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.
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 unreinforced membrane 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. PVC and TPO coated metal flashings shall be stripped in using 6" unreinforced membranes.
5. Coated metal base flashings must be provided with min. 4" wide flanges screwed to wood nailers. Coated metal base flashings must be formed with a 1" cant.
6. Provide a 1/2" hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
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.
9. When installing coated metal on walls or curbs that completely cover the existing flashing, the flashing does not need to be removed provided that it is in good condition and tightly adhered

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 or PVC adhesives, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, gypsum roof board, gypsum roof 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 120 sq. ft./gal. which covers both surfaces yielding 60 square feet of finished, mated surface per gallon for solvent-based bonding adhesives, and at the rate of 200 sq. ft./gal. covering both surfaces yielding 100 square feet of finished, mated surface area per gallon for water-based bonding adhesive. Solvent-based adhesive must be allowed to dry until tacky to the touch before mating flashing membrane. 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 adhesive and outside temperatures are above 40°F and rising. Application temperatures above 50°F are recommended to allow easier adhesive application.
5. Carefully position the membrane flashing prior to application to avoid wrinkles and buckles.
6. Heat-weld all laps in EverGuard® smooth-reinforced flashing membrane in accordance with heat welding guidelines.
7. Porous substrates may require double application of adhesive.

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8. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.
9. Alternatively, the Freedom® System can be used for flashings. Consult the Freedom® section for installation instructions.
10. Also available are Corner Curb Wraps, consisting of a pre-formed combination corner and flashing pieces that are 12" in height and can be ordered in various lengths. These pre-fabricated corners can be configured to fit 12"x 12", 18" x 18", 24" x 24" and 30" x 30" curb flashings. They may be fully adhered or dry hung in place and only require a 1" weld.

D. Adhered Reinforced Membrane Flashings - Fleece-Back

1. Apply bonding adhesive to the substrate at the 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. Application temperatures above 50°F are recommended to allow easier adhesive application.
4. When installing fleece-back membranes to a vertical surface, the material should have top edge termination installed immediately to avoid slippage.
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. All cut edges of TPO and PVC reinforced membranes must be sealed with EverGuard® TPO or PVC Cut Edge Sealant.
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 guarantee lengths, 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 24" 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 may 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 120 sq. ft./gal. which covers both surfaces yielding 60 square feet of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 200 sq. ft./gal.covering both surfaces yielding 100 square feet of 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.
4. Finish the penetration with Water Block between the pipe and the membrane, install clamping band, and caulk.

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 minimum 3" wide flange nailed 4" on center into wood nailers and heat weld 8" membrane strip to metal flanges and field membrane.
3. Metal roof edging must be provided with a continuous metal hook strip to secure the lower fascia edge. Secure the continuous hook strip 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-based metal edging may be flashed using EverGuard® TPO Cover Strip after priming both the metal and the TPO membrane for guarantee lengths up to 15 years. Allow approximately 3" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. Caulk all corners, tape overlaps and T-joints with EverGuard® caulking or TPO Cut Edge Sealant per published standard EverGuard® details. Caulk

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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 or EverGuard® pre-fab coated metal scupper 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 loose-applied membrane flashing; membrane flashing applied to the wall substrate with bonding adhesive; or with coated metal flashing fastened with DRILL-TEC™ fasteners 4" on center to wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Apply water-block between the wall surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 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 at a fastener spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing.
4. Metal counterflashings with fully adhered membrane wall flashings are required on 20-year warranties. All termination bars, either exposed or covered, must be sealed with caulking.
5. 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. Refer to scupper section for other detail options.
6. Maximum flashing height without intermediate fastening:
   - 24" - Loose-Applied Flashing
   - 54" - Adhered Flashing
7. Metal cap flashings shall have continuous cleats or be face-fastened 12" o.c. on both the inside and outside of the walls.

I. Round and Square Tube Penetrations

1. Four options are available for penetration flashings. These are stepped pipe boots, open pipe boots, square tube wraps and field fabrication with unsupported membrane and target.
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 maximum of 12" on center, with a minimum of four 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. Fill sealant pans with non-shrink quick-set grout, and top off sealant pans with a 2" minimum thickness of EverGuard® 2-part Pourable Sealant.
4. Pre-formed sealant pans made of PVC and TPO are available.
   a. PVC. Installation of pre-formed PVC sealant pans require the flange of the PVC sealant pan to be fastened with a minimum of 4 fasteners per penetration. A PVC membrane target is installed around the base of the sealant pan over the flanges of the PVC sealant pan and heat welded to the flanges. Install the fasteners near the outside edge of the flanges to allow for proper heat welding of the target. The outside edge of the target membrane is heat welded to the field membrane.
   b. TPO. Installation of pre-formed TPO sealant pans require field membrane securement around the penetration. A minimum of 4 system appropriate screws and plates are required around the penetration. A membrane target must be installed prior to the installation of the TPO sealant pan if the location of the plates do not allow for a continuous 2" weld of the TPO sealant pan flange. Properly heat-weld the flange of TPO sealant pan to the field/target membrane.
   c. If the sealant pan is cut to install around the penetration, the cut must be stripped-in with a minimum 4" wide unreinforced membrane. The unreinforced strip-in membrane must extend a minimum of 2" beyond the outside edge of the sealant pan flange and be fully welded.
   d. Prior to filling the TPO sealant pan, the inside vertical pan sides must be primed with GAF TPO primer. Fill the base of the pans with non-shrink grout and top with a minimum 2" thickness of GAF Two Part Pourable Sealer.
   e. Reinforced targets must be sealed as system appropriate with EverGuard® Cut Edge Sealant

K. Curbs

1. Flashings can be done two different ways, either with adhesive applied to the membrane and substrate or

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loose applied up to 24" high. EverGuard® Coated Metal flashings shall be fastened at 4" o.c.

2. Secure membrane flashing at the top edge with a termination bar, flat slip or counterflashing. Apply water-block between the curb surface and membrane flashing. Exposed termination bars shall be mechanically fastened 6" on center; termination bars that are counterflashed shall be fastened 12" on center. If wood is present at the top of the curb, install ring shanks 12" on center. This can be used in lieu of the bar if nailed on the top or preferably the back side of the wood.
3. Roof membrane must be mechanically attached along the base of curbs and ducts that are flashed with membrane flashing with screws and plates/termination bar at 12" on center.
4. Metal counter flashing may be needed for extended length warranties. All termination bars must be sealed with EverGuard® Caulking.

L. Expansion Joints

1. Install expansion joint covers at all flat type and raised curbed type expansion joint conditions. There currently three types of expansion joints approved for EverGuard® Systems. There are two prefabricated expansion joints one each for TPO and PVC. Also TPO and PVC can also be field fabricated to meet expansion joint needs. For PVC any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or EverGuard® DRILL-TEC™ fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb expansion joints with screws and plates a minimum of 12" 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.

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 if possible. 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" membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.
4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of Water Block on the drain flange prior to securement with the compression clamping ring. Typical Water Block application 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 above in a full bed of Water Block and secured as above.
6. Do NOT locate lap seams within the sump area. Where lap seams must be located within the sump area, a separate smooth reinforced 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. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide reinforced membrane strip heat welded to the 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 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-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ fasteners 6" on center, a minimum of 2 fasteners per side.
4. All corners must be reinforced with EverGuard® PVC or EverGuard® TPO Universal Corners or field fabricated from EverGuard® unreinforced materials.
5. Strip in scupper with flashing membrane target sheet.
6. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to membrane on the wall face and roof deck and terminated on the outside wall face with a termination bar, Water Block, and caulk.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available. Consult your Territory Manager or local distributor for details..

O. Heater Stacks

1. Field-fabricated two-piece membrane flashings of EverGuard® unreinforced flashing are typically installed at heater stacks. EverGuard® TPO and PVC have coned type prefabricated pipe flashing that may work in this instance. If not then field fabricated membrane flashings of EverGuard® TPO UN-55 or EverGuard® PVC UN-80 may be used. The temperature of any heater stack that comes into contact with the EverGuard® membrane should not exceed 160°F.
2. Heat stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not directly in contact with 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 over Water Block and sealed with EverGuard® Caulking.
5. Field-fabricated membrane flashings may 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 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, if possible. Fasteners shall be installed 12" on center or a minimum of 4 per penetration.
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 if applicable.
7. All drains shall be provided with a strainer basket.

Q. Wood Support Blocking

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

R. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of EverGuard® Walkway Pad.

S. Lightning Suppression Clips

1. 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.

3.13 Traffic Protection

A. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install walkway rolls at other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkway rolls must be spaced 6" to allow for drainage.

C. Heat weld walkway rolls to the roof membrane surface continuously around the walkway pad perimeter.

D. TPO walkway rolls 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.

3.14 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.

3.15 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. All voids that are found must be patched over per specifications. Do NOT reweld seam voids more than 24 hours after initial welding of the seam.

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.

3.16 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.

3.17 Maintenance

A. Upon completion of the roofing system, the owner should establish a semi-yearly inspection and maintenance program in accordance with standard good roofing practice guarantee requirements.

B. Repair cuts, punctures and other membrane damage by cleaning membrane (see section 3.11.E), followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2" beyond the damaged area. If heat welding to the top surface of the existing membrane is ineffective, the patch must be heat welded to the underside of the existing sheet after proper preparation.

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.

NOTES

Insulation Attachment Table For Mechanically Attached Systems
(Meets FM attachment requirements*)

NUMBER OF FASTENERS					
Insulation Type	**Board Size**	**Thickness**	**Fasteners/Board**		
			Field	**Perimeter**	**Corner**
Isocyanurate	4x4	any	4	4	4
	4x8	1/2" - 1.2"	6	6	6
	4x8	≥1.3"	5	5	5
Perlite	4x4	any	4	4	4
Wood fiber	4x4	any	4	4	4
	4x8	any	6	6	6
Extruded Polystyrene***	4x4	any	4	4	4
	4x8	1/2" – 1.2"	6	6	6
	4x8	≥1.3"	5	5	5
Expanded Polystyrene***	4x4	any	4	4	4
	4x8	1/2" – 1.2"	6	6	6
	4x8	≥1.3"	5	5	5
Fanfold – TPO or Fleece backed PVC only	Fanfold**	3/8" min.	2-1-2-1-2	2-1-2-1-2	2-1-2-1-2
Gypsum Board	4x8	1/4" – 5/8"	6	6	6

TYPE OF INSULATION FASTENER			
Deck	**Fastener**	**Plate**	**Penetration (minimum)**
Steel – all gauges	DRILL-TEC™ HD (#14) or Standard (#12)	3" Galvalume	3/4" through the deck
Wood – plank and sheathing	DRILL-TEC™ HD (#14) or Standard (#12)	3" Galvalume	1" thread into/through the deck
Structural Concrete	DRILL-TEC™ HD (#14) or DRILL-TEC™ Spike	3" Galvalume	1" thread/shank into the deck
Insulating Concrete	DRILL-TEC™ HD (#14)	3" Galvalume	3/4" thread through steel form
Gypsum Concrete	DRILL-TEC™ Polymer screw	3" Galvalume	1 1/2" thread into the deck
Cementitious Wood Fiber	DRILL-TEC™ Polymer screw	3" Galvalume	1 1/2" thread into the deck

*Attachment requirements to meet determined uplift resistance are dependent on deck type, specific fastener, etc.
**Fanfold attachment spacing is for each 2'x4' section.
***Smooth PVC must have 3/6 oz. polymat separator sheet.
****Gypsum installed over steel decks should be placed perpendicular to the deck flutes with the edges over the flute surface for proper bearing support.

TPO Membrane Attachment Table For Mechanically Attached Systems

(10' field sheets, except when noted)

Deck Type	Minimum Pull-out Values (lbs)	Fastener Type	Plate	Penetration	Standard Pattern	90 psf* Pattern
22 ga. standard (33 ksi)	450	DRILL-TEC™ XHD(#15)	2 3/8" barbed XHD	3/4" through the deck	12" o.c.	6" o.c.
	450	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the deck	12" o.c.	6" o.c.
	450	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	12" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the deck	6" o.c.	
22 ga. high strength (80 ksi)	750	DRILL-TEC™ SXHD (#21)	2 3/4" double barbed SXHD	3/4" through the deck	12" o.c.	12" o.c.
	450	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	12" o.c.	12" o.c. (8' wide field sheets only)
	450	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	12" o.c.	6" o.c.
24 ga. standard	350	DRILL-TEC™ XHD(#15)	2 3/8" barbed XHD	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the deck	6" o.c.	
2" Nominal Wood Plank	800	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	1" into the deck	12" o.c.	6" o.c.
	800	DRILL-TEC™ (#14)	2" double barbed	1" into the deck	12" o.c.	6" o.c.
1" Nominal Wood Plank	450	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	9" o.c.	
	450	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	9" o.c.	
3/4" Nominal Wood Plank	525	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	12" o.c.	6" o.c.
	525	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	12" o.c.	6" o.c.

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90, Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide/ROOFNAV.

TPO Membrane Attachment Table For Mechanically Attached Systems

(10' field sheets, except when noted)

Deck Type	Minimum Pull-out Values (lbs)	Fastener Type	Plate	Penetration	Standard Pattern	90 psf* Pattern
1/2" Plywood	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	6" o.c.	
Structural Concrete	700	DRILL-TEC™ HD (#14)	2 3/8" barbed HD	1" into the deck	12" o.c.	6" o.c.
	700	DRILL-TEC™ HD (#14)	2" double barbed	1" into the deck	12" o.c.	6" o.c.
	900	DRILL-TEC™ Spike	2 3/8" barbed HD	1" into the deck	12" o.c.	6" o.c.
	900	DRILL-TEC™ Spike	2" double barbed	1" into the deck	12" o.c.	6" o.c.
	900	DRILL-TEC™ Spike	2 3/4" double barbed SXHD	1" into the deck	12" o.c.	12" o.c.
Lightweight Insulating Concrete, 22 ga. standard form	450	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the form	12" o.c.	6" o.c.
	450	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the form	12" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the form	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the form	6" o.c.	
Lightweight Insulating Concrete, 24 ga. standard form	350	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the form	6" o.c.	
	350	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the form	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the form	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the form	6" o.c.	
Gypsum Concrete	400	DRILL-TEC™ Polymer Screw	2" double barbed	1 1/2" into the deck	9" o.c.	6" o.c.
	400	DRILL-TEC™ Polymer Screw	2 barbed XHD	1 1/2" into the deck	9" o.c.	6" o.c.
Cementitious Wood Fiber	300	DRILL-TEC™ Polymer Screw	2" double barbed	1 1/2" into the deck	6" o.c.	
	300	DRILL-TEC™ Polymer Screw	2 barbed XHD	1 1/2" into the deck	6" o.c.	

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90, Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide/ROOFNAV.

PVC Membrane Attachment Table For Mechanically Attached Systems

Deck Type	Minimum Pull-out Values (lbs)	Fastener Type	Plate	Penetration	Standard Pattern	90 psf* Pattern
22 ga. standard (33 ksi)	450	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the deck	18" o.c.	6" o.c.
	450	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the deck	18" o.c.	
	450	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	18" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the deck	18" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the deck	12" o.c.	
22 ga. high strength (80 ksi)	550	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the deck	18" o.c.	12" o.c.
	450	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the deck	12" o.c.	6" o.c.
24 ga. standard	350	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the deck	12" o.c.	6" o.c.
	350	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the deck	12" o.c.	
	350	DRILL-TEC™ XHD (#15)	2 3/4" double barbed SXHD	3/4" through the deck	12" o.c.	
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the deck	6" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the deck	6" o.c.	
2" Nominal Wood Plank	800	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	1" into the deck	18" o.c.	6" o.c.
	800	DRILL-TEC™ HD (#14)	2" double barbed	1" into the deck	18" o.c.	6" o.c.
1" Nominal Wood Plank	450	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	12" o.c.	
	450	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	12" o.c.	
3/4" Plywood	525	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	18" o.c.	6" o.c.
	525	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	18" o.c.	6" o.c.
1/2" Plywood	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	Through the deck	12" o.c.	
	350	DRILL-TEC™ HD (#14)	2" double barbed	Through the deck	12" o.c.	

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90, Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide/ROOFNAV.

PVC Membrane Attachment Table For Mechanically Attached Systems

Deck Type	Minimum Pull-out Values (lbs)	Fastener Type	Plate	Penetration	Standard Pattern	90 psf* Pattern
Structural Concrete	700	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	1" into the deck	18" o.c.	12" o.c.
	700	DRILL-TEC™ XHD (#15)	2" double barbed	1" into the deck	18" o.c.	
	900	DRILL-TEC™ Spike	2 3/8" barbed XHD	1" into the deck	18" o.c.	12" o.c.
	900	DRILL-TEC™ Spike	2" double barbed	1" into the deck	18" o.c.	12" o.c.
	900	DRILL-TEC™ Spike	2 3/4" double barbed SXHD	1" into the deck	18" o.c.	12" o.c.
Lightweight Insulating Concrete, 22 ga. standard form	450	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the form	18" o.c.	6" o.c.
	450	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the form	18" o.c.	
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the form	12" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the form	6" o.c.	
Lightweight Insulating Concrete, 24 ga. standard form	350	DRILL-TEC™ XHD (#15)	2 3/8" barbed XHD	3/4" through the form	12" o.c.	6" o.c.
	350	DRILL-TEC™ XHD (#15)	2" double barbed	3/4" through the form	12" o.c.	
	350	DRILL-TEC™ HD (#14)	2 3/8" barbed XHD	3/4" through the form	12" o.c.	6" o.c.
	350	DRILL-TEC™ HD (#14)	2" double barbed	3/4" through the form	12" o.c.	
Gypsum Concrete 2" pour or precast	400	DRILL-TEC™ Polymer Screw	2" galvalume plate	1 1/2" into the deck	12" o.c.	
	400	DRILL-TEC™ Polymer Screw	2 3/8" barbed XHD	1 1/2" into the deck	12" o.c.	6" o.c.
Cementitious Wood Fiber 2" panel	300	DRILL-TEC™ Polymer Screw	2" galvalume plate	1 1/2" into the deck	12" o.c.	
	300	DRILL-TEC™ Polymer Screw	2 3/8" barbed XHD	1 1/2" into the deck	12" o.c.	6" o.c.

*90 psf is attachment pattern to provide 90 lbs. per square foot of uplift pressure resistance and may equate to FM I-90, Refer to current FMRC Approval Guide.

NOTE: For designing at elevated uplift pressures, please consult the current FMRC Approval Guide/ROOFNAV.

Perimeter Half Sheet Table

Building Width	Building Height	Number of EverGuard® TPO 60" Half Sheets	Number of EverGuard® PVC 36" Half Sheets
<200’	0-34’	1	2
	35-100’	2	3
	>100’	Formula: Install half sheets throughout the perimeter and corner region. The width of this region is defined as the least of the following two measurements: 0.1 x building width or 0.4 x building height Note: the minimum width is 4’	
≥200	any height		

NOTE: FM attachment requires the Formula calculation.

Notes

Fully Adhered Systems

Membrane adhered with cold-applied bonding adhesive or hot applied asphalt.

Contents

- Design Tables
- Specification Plates
- TPO/PVC Three-Part Guide Installation Specification

TPO DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - FULLY ADHERED

Deck	Membrane Attachment		Membrane Type		Insulation/Substrate					Insulation/Substrate Attachment		
	Fully Adhered											
	Adhesive	Hot	Smooth	Fleece (FB)	ISO	Gypsum Board[5]	Wood fiber/ Perlite	EPS/ XEPS[2]	None	Mech Attached	Adhesive	Hot[1]
Steel	x		x		x	x	x[4]	x		x	x	
				x[6]	x	x	x[4]	x		x	x	
		x		x	x	x	x	x[7]		x	x	
Wood	x		x		x	x	x[4]	x	x	x	x	x[3]
				x[6]	x	x	x[4]	x	x	x	x	x[3]
		x		x	x	x	x		x[3]	x	x	x[3]
Structural Concrete & Gypsum	x		x		x	x	x[4]	x		x	x	x
				x[6]	x	x	x[4]	x	x	x	x	x
		x		x	x	x	x		x	x	x	x
Lightweight Insulating Concrete	x		x		x	x	x[4]	x		x	x	x[3]
				x[6]	x	x	x[4]	x	x[6]	x	x	x[3]
		x		x	x	x	x	x[7]	x[3]	x	x	x[3]
Cementitious Wood Fiber	x		x		x	x	x[4]	x		x	x	x[3]
				x[6]	x	x	x[4]	x	x	x	x	x[3]
		x		x	x	x	x	x[7]	x[3]	x	x	X[3]

1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Attachment of membrane to XEPS, EPS, must be with water-based adhesive
3. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet.
4. Wood fiber only with bonding adhesives.
5. Glass mat facer required for fully adhered membranes.
6. Attachment of membrane must be with water-based adhesive.
7. Overlay board required.

TPO DESIGN TABLE - RECOVER - FULLY ADHERED

Exiting Roofing System Type	Membrane Attachment		Membrane Type		Insulation/Substrate					Insulation/Substrate Attachment		
	Fully Adhered		Smooth	Fleece	ISO	Gypsum Board[6]	Wood fiber/ Perlite[3]	EPS/XEPS[2]	None	Mech Fast.	Adhesive	Hot[1]
	Adhesive	Hot										
Smooth BUR/MB	X		X		X	X	X[5]	X		X	X	X
				x[8]	X	X	X[5]	X		X	X	X
		X		X	X	X	X	X[7]	X	X	X	X
Single Ply Membrane	X		X		X	X	X[5]	X		X		
				x[8]	X	X	X[5]	X		X		
		X		X	X	X	X	X[7]		X		
Granule Surfaced BUR/MB	X		X		X	X	X[5]	X		X	X	X
				x[8]	X	X	X[5]	X		X	X	X
		X		X	X	X	X	X[7]	X	X	X	X
Gravel Surfaced BUR/MB	X		X		X	X	X[5]	X		X	X	X
				x[8]	X	X	X[5]	X		X	X	X
		X		X	X	X	X	X[7]		X	X	X
Standing Seam Metal[4]	X		X		X	X	X[5]	X		X		
				x[8]	X	X	X[5]	X		X		
		X		X	X	X	X	X[7]		X		

1. No hot attachment of polymat, XEPS, EPS, or Fanfold
2. Attachment of membrane to XEPS, EPS, or Fanfold must be with water-based adhesive
3. Roof moisture scan required for use of perlite/wood fiber in recover roof systems.
4. XEPS is the only material allowed as flute fill with overlay board required
5. Wood fiber only with bonding adhesives.
6. Glass mat facer required for fully adhered membranes.
7. Overlay board required.
8. Attachment of membrane must be with water-based adhesive.

PVC DESIGN TABLE - NEW CONSTRUCTION ON TEAR-OFF - FULLY ADHERED

Deck	Membrane Attachment		Membrane Type		Insulation/Substrate					Insulation/Substrate Attachment		
	Fully Adhered											
	Adhesive	Hot	Smooth	Fleece	ISO	Gypsum Board[4]	Wood fiber/ Perlite	EPS/ XEPS[2]	None	Mech. Attached	Adhesive	Hot[1]
Steel	x		x		x	x	x[7]			x	x	
				x[5]	x	x	x[7]	x		x	x	
		x		x	x	x	x	x[6]		x	x	
Wood	x		x		x	x	x[7]		x	x	x	x[3]
				x[5]	x	x	x[7]	x	x	x	x	x[3]
		x		x	x	x	x		x[3]	x	x	x[3]
Structural Concrete & Gypsum	x		x		x	x	x[7]			x	x	x
				x[5]	x	x	x[7]	x	x	x	x	x
		x		x	x	x	x		x	x	x	x
Lightweight Insulating Concrete	x		x		x	x	x[7]			x	x	x[3]
				x[5]	x	x	x[7]	x	x[5]	x	x	x[3]
		x		x	x	x	x	x[6]	x[3]	x	x	x[3]
Cementitious Wood Fiber	x		x		x	x	x[7]			x	x	x[3]
				x[5]	x	x	x[7]	x	x	x	x	x[3]
		x		x	x	x	x	x[6]	x[3]	x	x	X[3]

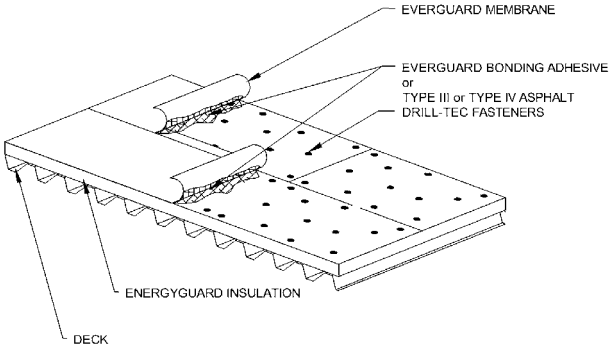
1. No hot attachment of XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet.
4. Glass mat facer required for fully adhered membrane attachment.
5. Membrane attachment must be with water-based adhesive.
6. Overlay board required.
7. Wood fiber insulation only.

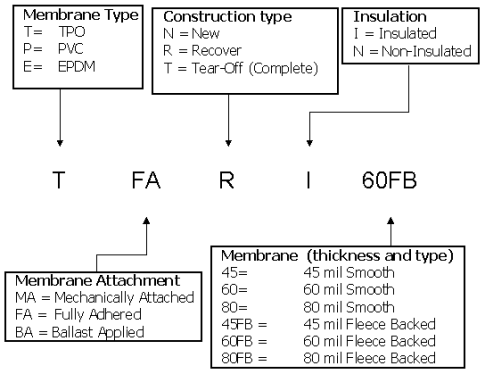
PVC DESIGN TABLE - RECOVER - FULLY ADHERED

Deck Type	Membrane Attachment		Membrane Type		Insulation/ Substrate					Insulation/Substrate Attachment		
	Fully Adhered		Smooth	Fleece (FB)	ISO	Gypsum Board[4]	Wood fiber/ Perlite[5]	EPS/ XEPS[2]	None	Mech Fast.	Adhesive	Hot[1]
	Adhesive	Hot										
Smooth BUR/MB	X		X		X	X	X[7]			X	X	X
				x[8]	X	X	X[7]	X		X	X	X
		X		X	X	X	X	X[6]	X	X	X	X
Single Ply Membrane	X		X		X	X	X[7]			X		
				x[8]	X	X	X[7]	X		X		
		X		X	X	X	X	X[6]		X		
Granule Surfaced BUR/MB	X		X		X	X	X[7]			X	X	X
				x[8]	X	X	X[7]	X		X	X	X
		X		X	X	X	X	X[6]	X	X	X	X
Gravel Surfaced BUR/MB	X		X		X	X	X[7]			X	X	X
				x[8]	X	X	X[7]	X		X	X	X
		X		X	X	X	X	X[6]		X	X	X
Standing Seam Metal[3]	X		X		X	X	X[7]			X		
				x[8]	X	X	X[7]	X		X		
		X		X	X	X	X	X[6]		X		

1. No hot attachment of XEPS or EPS.
2. Attachment of membrane to XEPS or EPS must be with water-based adhesive.
3. XEPS only as flute fill material with overlay board.
4. Glass mat facer required for fully adhered membrane attachment.
5. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems.
6. Overlay board required.
7. Wood fiber insulation only.
8. Attachment of membrane must be with water-based adhesive.

Insulated TPO Fully Adhered Specifications Plate

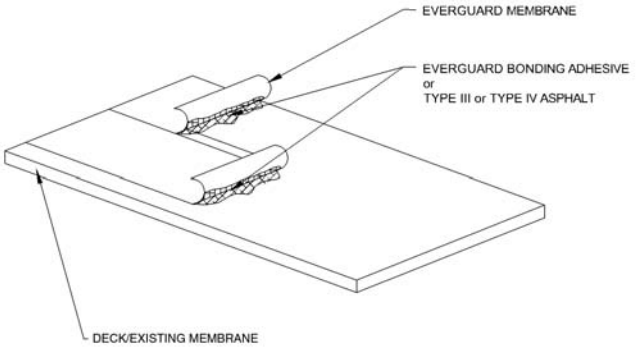


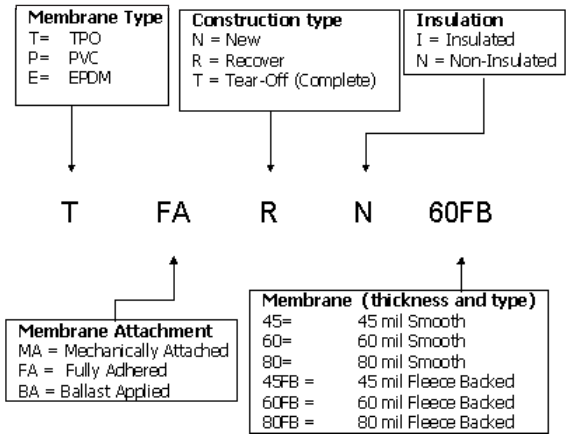


Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-FA-N-I-45	Fully Adhered	New	Yes	.045	12
T-FA-N-I-60				.060	15
T-FA-N-I-80				.080	20
T-FA-T-I-45	Fully Adhered	Tear Off	Yes	.045	12
T-FA-T-I-60				.060	15
T-FA-T-I-80				.080	20
T-FA-R-I-45	Fully Adhered	Recover	Yes	.045	12
T-FA-R-I-60				.060	15
T-FA-R-I-80				.080	20
T-FA-N-I-45FB	Fully Adhered	New	Yes	.045 FB	12
T-FA-N-I-60FB				.060 FB	15
T-FA-N-I-80FB				.080 FB	20
T-FA-T-I-45FB	Fully Adhered	Tear Off	Yes	.045 FB	12
T-FA-T-I-60FB				.060 FB	15
T-FA-T-I-80FB				.080 FB	20
T-FA-R-I-45FB	Fully Adhered	Recover	Yes	.045 FB	12
T-FA-R-I-60FB				.060 FB	15
T-FA-R-I-80FB				.080 FB	20

Refer to Insulation Attachment Table for mechanical attachment requirements.

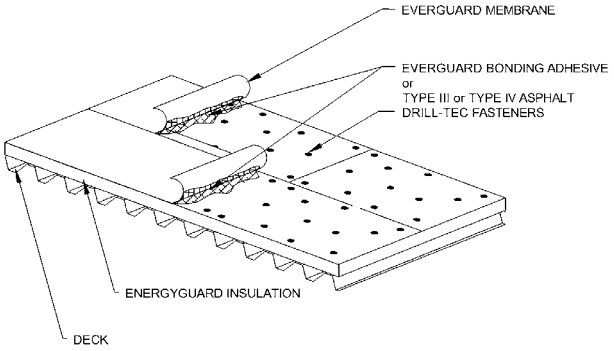
Non-Insulated TPO Fully Adhered Systems Specifications Plate

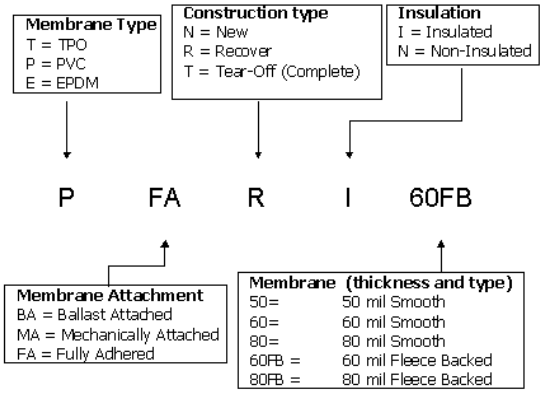




Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-FA-N-N-45	Fully Adhered	New	No	.045	12
T-FA-N-N-60				.060	15
T-FA-N-N-80				.080	20
T-FA-T-N-45	Fully Adhered	Tear Off	No	.045	12
T-FA-T-N-60				.060	15
T-FA-T-N-80				.080	20
T-FA-N-N-45FB	Fully Adhered	New	No	.045 FB	12
T-FA-N-N-60FB				.060 FB	15
T-FA-N-N-80FB				.080 FB	20
T-FA-T-N-45FB	Fully Adhered	Tear Off	No	.045 FB	12
T-FA-T-N-60FB				.060 FB	15
T-FA-T-N-80FB				.080 FB	20
T-FA-R-N-45FB	Fully Adhered	Recover	No	.045 FB	12
T-FA-R-N-60FB				.060 FB	15
T-FA-R-N-80FB				.080 FB	20

Insulated TPO Fully Adhered Specifications Plate

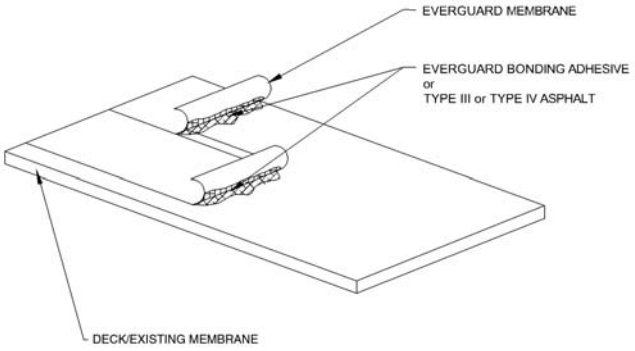


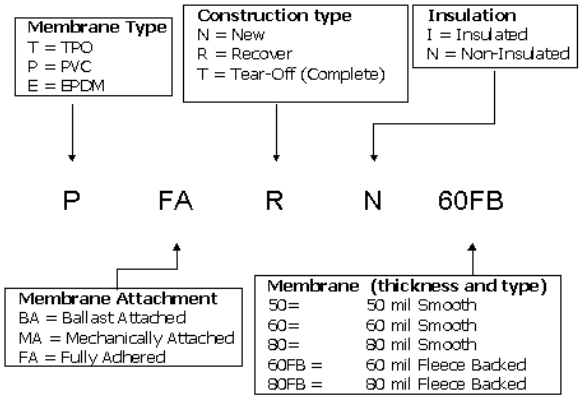


Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-FA-N-I-50	Fully Adhered	New	Yes	.050	12
P-FA-N-I-60				.060	15
P-FA-N-I-80				.080	20
P-FA-T-I-50	Fully Adhered	Tear Off	Yes	.050	12
P-FA-T-I-60				.060	15
P-FA-T-I-80				.080	20
P-FA-R-I-50	Fully Adhered	Recover	Yes	.050	12
P-FA-R-I-60				.060	15
P-FA-R-I-80				.080	20
P-FA-N-I-60FB	Fully Adhered	New	Yes	.060 FB	15
P-FA-N-I-80FB				.080 FB	20
P-FA-T-I-60FB	Fully Adhered	Tear Off	Yes	.060 FB	15
P-FA-T-I-80FB				.080 FB	20
P-FA-R-I-60FB	Fully Adhered	Recover	Yes	.060 FB	15
P-FA-R-I-80FB				.080 FB	20

Refer to Insulation Attachment for mechanical attachment requirements.

Non-Insulated TPO Fully Adhered Systems Specifications Plate





Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-FA-N-N-50	Fully Adhered	New	No	.050	12
P-FA-N-N-60				.060	15
P-FA-N-N-80				.080	20
P-FA-T-N-50	Fully Adhered	Tear Off	No	.050	12
P-FA-T-N-60				.060	15
P-FA-T-N-80				.080	20
P-FA-N-N-60FB	Fully Adhered	New	No	.060 FB	15
P-FA-N-N-80FB				.080 FB	20
P-FA-T-N-60FB	Fully Adhered	Tear Off	No	.060 FB	15
P-FA-T-N-80FB				.080 FB	20
P-FA-R-N-60FB	Fully Adhered	Recover	No	.060 FB	15
P-FA-R-N-80FB				.080 FB	20

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 manufacturers' 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. Raise all materials stored outside above ground or roof level on pallets, and cover 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 GAF Contractor Services for suggestions.

D. Follow GAF directions and requirements for protection of materials prior to and during installation.

E. Do NOT use materials that are wet or damaged to the extent that they will no longer serve their intended purpose. 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. High or gusting winds make the installation of materials difficult.

D. 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.

E. Material installation during periods of low ambient temperatures, typically below 40°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 accessory 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.
5. Do not install fully adhered systems until the temperature is 40°F and rising.
6. Adjust welder settings to insure proper welds for applicable ambient conditions.

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 housekeeping 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.

Fully Adhered Installation Specification

TPO & PVC

2.03 Flashing Accessories

A. EverGuard® preformed flashing accessories to be of same type as roofing membrane.

1. EverGuard® TPO and PVC laminated metal flashings to be a minimum of 25 mils TPO and 40 mils PVC of non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 24 ga. galvanized steel sheet metal.
2. Pre-formed Vent Boots with stainless steel clamping bands.
3. Pre-formed Universal Corners for TPO. Individual pre-formed inside outside corners for PVC.
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 Membranes for TPO flashing. UN-80 Detailing Membranes for PVC flashing. For miscellaneous penetrations in lieu of pre-formed accessories.
7. EverGuard® TPO Cover Strip for stripping in of flat metal edges.
8. EverGuard® Pre-formed Sealant Pans are available for irregularly-shaped penetrations and pitch pans.

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 sealant pans.
4. EverGuard® Caulking for use in sealing termination bars and penetration clamping bands.
5. EverGuard® TPO Cut Edge Sealant and PVC 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 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. To be used only with Fleeceback and as hot asphalt.

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).

Fully Adhered Installation Specification

TPO & PVC

2.10 Base Sheet

A. GAFGLAS® Stratavent® Eliminator™ Nailable base sheet.

B. GAFGLAS® Stratavent® Eliminator™ Perforated base sheet.

C. GAFGLAS® #80 Ultima™ Base Sheet

D. GAFGLAS® #75 Base Sheet

2.11 Other Accessories

A. Subject to compliance with requirements, provide the following products not available from GAF:

1. Wood Nailers: New wood nailers shall be #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 GAF 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. If the wall/curb flashings are in good condition and tightly adhered to the substrate, new TPO flashing materials may be installed over these to a height of 24"; new PVC flashing materials may be installed over a separator layer of polymat or insulation board.

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.

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.

I. Recover installation over coal tar pitch roofs require that the existing loose gravel be broomed (do not spud); if high spots remain, use a thicker insulation board to provide a smooth substrate for the EverGuard® membrane. Recover with EverGuard® TPO membranes over coal tar pitch roofs require the installation of a minimum 1/2" recover board prior to the installation of the membrane. Do not use EPS/XEPS over coal tar pitch roofs. Recover with EverGuard® PVC membranes over coal tar pitch roofs is not recommended; a minimum 1-1/2" cover board is required for PVC applications.

3.04 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers.
2. Shim Material:
   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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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. Ensure existing gravel and dirt is vacuumed, power-broomed or power-washed away.

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'.

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 XL™ systems.

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

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

3.06 Air/Vapor Retarder Installation

A. General

1. Air/vapor retarders components shall typically be installed when required by design professional to address internal building air pressure or humidity conditions.
2. All air porous decks with openings in the wall or area directly below the roof deck that exceeds 10% of the total wall area are projects that design professionals should recommend air retarders.
3. Designers should recommend air retarders when the internal pressurization of the building is in the excess of 5 lbs. per sq. ft.
4. Designers should recommend air retarders if the building height exceeds 100 ft.
5. Buildings with large openings & overhangs shall be evaluated for the installation of air retarders.
6. The installation of an air retarder shall be required for EverGuard® 20-year guarantees as follows:

a. All single layer installation of roof insulation or roof panels

B. Application

1. Install the air/vapor retarder components adhered or loose-applied.
2. Overlap all air/vapor retarder components per applicable installation recommendations of the supplier.
3. Seal perimeter and penetrations areas with foam sealant.
4. Seal all perimeter nailers with fully adhered roof membrane placed over the nailer and covering the exterior face of the nailer by 1 inch.

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.

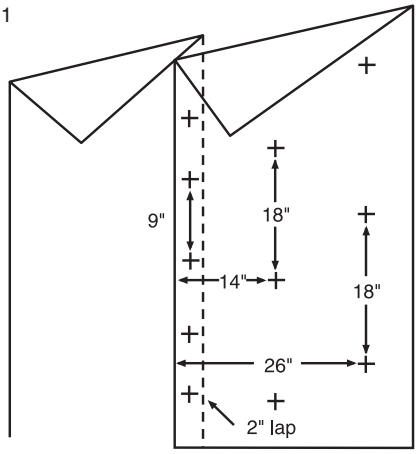
B. Mechanical Securement–Nailable Base Sheet

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

Fully Adhered Installation Specification

TPO & PVC

Fig. 1



required number of fasteners in accordance with Figure 1.

2. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
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. A 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. Perlite is only acceptable as a recover board when the membrane is installed in hot asphalt.
3. The use of extruded and expanded polystyrene insulations is limited to a maximum roof membrane temperature of 165ºF. Use under colored membranes requires special approval from GAF 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. Install tapered insulation to provide a sump area a minimum of 36" x 36" where applicable.
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.
5. Use fastener of correct length as required by the Insulation Attachment Table. The use of any fastener greater than 8" in length must be preapproved by GAF Contractor Services.

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 425-475ºF.
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 XL™ systems according to manufacturer's instructions.
5. Walk in the insulation boards after installation to ensure a proper bond.
6. Maximum board size: 4' x 4'.

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 lap lines along the side laps; the black line is for mechanically attached system overlaps and the red line is for adhered and ballasted systems overlap. PVC does not have a fully adhered line.
4. Install membrane so that the laps run across the roof slope lapped toward drainage points. Butt ends of fleece-backed membrane, if possible.
5. All exposed sheet corners shall be rounded a minimum of 1".
6. All cut edges of reinforced TPO/PVC 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 4 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 (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).
6. Alternately, utilization of Roof Transition Anchor (RTA) Strip may be installed as the method of supplemental securement as described in #1 & #2 in this section for a non-penetrating base attachment detail on fully adhered TPO systems.

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, gypsum, 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 at the rate of 3 squares of finished, mated surface area per five gallons of adhesive, and at the rate of 5 squares of finished, mated surface area per five gallons for water-based bonding adhesive. Coverage rates will vary depending on substrate. Porous substrates may require double application of adhesive.

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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. Broom 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, gypsum, cured structural concrete or gypsum 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. TPO membranes may be adhered to lightweight insulating concrete with water-based bonding adhesive.
2. Fully adhere membrane sheets with bonding adhesive at a rate of 60 sq.ft. or 300 sq.ft. per five-gallon bucket. For water-based adhesive, the rate is 120 sq.ft. per gallon, or 600 sq.ft. per five-gallon bucket. For fleece-back (FB) membranes, all of the water-based adhesive goes on the substrate, and the sheet is installed in the adhesive wet. This will give a rate of one five-gallon bucket per 600 sq.ft. Porous substrates may need a double application of adhesive.
3. Roll membrane into adhesive as soon as practical; do not allow to dry or string.
4. 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 4" inches back from the seam area.
4. Roll membrane into asphalt immediately.
5. Broom membrane to ensure complete bonding between asphalt and membrane.
6. For roofs with a slope over 1.5:12, contact your GAF regional manager for review prior to installation.

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 applying pressure to cause 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/PVC membrane must be sealed with EverGuard® TPO/PVC 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 airborne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard® TPO Cleaner or use acetone for PVC. 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 Cleaner or use acetone for PVC. 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 Cleaner or use acetone for PVC and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner or use acetone for PVC. Be sure to wait for solvent to flash off prior to welding. 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. The membrane should be removed and replaced 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/PVC membrane must be sealed with EverGuard® TPO or PVC Cut Edge Sealant.
5. When using bonding adhesive, be sure to use adhesive specific to membrane type.
6. Minimum flashing height is 8".
7. The maximum distance from the wall that horizontal mechanical attachment is installed is 6". When you must go past 6", move the attachment to the vertical substrate.
8. Installation of EverGuard® PVC flashing membrane over asphalt-based substrates must have a separator sheet or approved insulation boards, metal, wood,etc., under the PVC flashing membrane.

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.
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 unreinforced 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 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 wood nailers or otherwise mechanically attached to the roof deck, or to the wall or curb substrate, in accordance with construction detail requirements.
9. When installing coated metal on walls or curbs that completely cover the existing flashing, the flashing does not need to be removed provided that it is in good condition and tightly adhered.

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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, gypsum, 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.
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.
9. All cut edges of TPO and PVC reinforced membranes must be sealed with EverGuard® TPO and PVC Cut Edge Sealant."

D. Adhered Reinforced Membrane Flashings - Fleece-Back

1. Apply bonding adhesive to the substrate 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. When installing Fleece-Back membranes to a vertical surface, the material should be fixed at the top of the sheet upon placement to avoid slippage.
5. All selvage edge laps in EverGuard® Fleece-Back flashing membrane shall be heat welded in accordance with heat welding guidelines. Lap width is 3".
6. 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® reinforced PVC or EverGuard® TPO Flashing membrane over joint.
7. 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 heigh is 24" 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 may 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.
4. The penetration is finished with Water Block between the

pipe and the membrane, install clamping band, and caulk.

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 minimum 3" wide flange nailed 4" on center into wood nailers and heat weld 8" membrane strip to metal flange and field membrane.
3. Coated metal roof edging must be provided with a continuous metal hook strip to secure the lower fascia edge. The continuous hook strip must be secured to the building a minimum of 12" on center.
4. Alternately, utilization of Roof Transition Anchor (RTA) Strip may be installed as the alternate method of base securement for a non-penetrating base attachment detail on fully adhered TPO systems.
5. Galvanized-based metal edging may be flashed using EverGuard® TPO Cover Strip after priming both the metal and the TPO membrane for up to 15-year guarantees. Allow approximately 3" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. All T-joints and tape overlaps shall be covered with T-joint covers. Caulk all corners, tape overlaps and T-joints per published standard EverGuard® details. 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 or EverGuard® pre-fab coated metal scupper 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 loose-applied membrane flashing, membrane flashing applied to the wall substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to 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 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:
   - 24" - Loose-Applied Flashing
   - 54" - Adhered Flashing
8. Metal cap flashings shall have continuous cleats or be face-fastened 12" o.c. on both the inside and outside of the walls.
9. Alternatively an RTA strip may be added for base tie in of all EverGuard® Fully Adhered Systems. Refer to detail for application instructions.

I. Round and Square Tube Penetrations
1. Four options are available for penetration flashings. These are stepped pipe boots, open pipe boots, square tube wraps and field fabrication with unsupported membrane and target.
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 four 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.
4. Pre-formed sealant pans made of PVC and TPO are available.
   a. PVC. Installation of pre-formed PVC sealant pans require the flange of the PVC sealant pan to be fastened with a minimum of 4 fasteners per penetration. A PVC membrane target is installed around the base of the sealant pan over the flanges of the PVC sealant pan and heat welded to the flanges. Install the fasteners near the outside edge of the flanges to allow for proper heat welding of the target. The outside edge of the target

membrane is heat welded to the field membrane.

b. TPO. Installation of pre-formed TPO sealant pans require field membrane securement around the penetration. A minimum of 4 system appropriate screws and plates are required around the penetration. A membrane target must be installed prior to the installation of the TPO sealant pan if the location of the plates do not allow for a continuous 2" weld of the TPO sealant pan flange. Properly heat-weld the flange of TPO sealant pan to the field/target membrane.

c. If the sealant pan is cut to install around the penetration, the cut must be stripped-in with a minimum 4" wide unreinforced membrane. The unreinforced strip-in membrane must extend a minimum of 2" beyond the outside edge of the sealant pan flange and be fully welded.

d. Prior to filling the TPO sealant pan, the inside vertical pan sides must be primed with GAF TPO primer. Fill the base of the pans with non-shrink grout and top with a minimum 2" thickness of GAF Two Part Pourable Sealer.

e. Reinforced targets must be sealed as system appropriate with EverGuard® Cut Edge Sealant.

K. Curbs

1. Flash curbs and ducts with loose-applied membrane flashing, membrane flashing applied to the curb substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to 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 expansion joint covers at all flat type and raised curbed type expansion joint conditions. There currently three types of expansion joints approved for EverGuard® Systems. There are two prefabricated expansion joints one each for TPO and PVC. Also TPO and PVC can also be field fabricated to meet expansion joint needs. For PVC any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or EverGuard® DRILL-TEC™ fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb expansion joints with screws and plates a minimum of 12" 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.

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, if possible. 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.
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 and attached per spec. 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. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide reinforced membrane strip heat welded to the 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 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-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ fasteners 6" 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.
6. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to the membrane on the wall face and roof deck and terminated on the outside wall face with a termination bar, Water Block, and caulk.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available. Consult your Territory Manager or local distributor for details.

O. Heater Stacks

1. Field-fabricated two-piece membrane flashings of EverGuard® unreinforced flashing are typically installed at heater stacks. EverGuard® TPO and PVC have coned type prefabricated pipe flashing that may work in this instance. If not then field fabricated membrane flashings of EverGuard® TPO UN-55 or EverGuard® PVC UN-80 may be used.
2. Heater stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not directly in contact with 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, if possible.
4. The drain insert is installed on top of the roofing membrane and is secured to the roof deck 12" 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 if applicable.
7. All drains shall be provided with a strainer basket.

Q. Wood Support Blocking

1. 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 Rolls. Place wood blocking on oversized slip sheet, fold two sides vertically, and fasten with roofing nails into the blocking.

R. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of EverGuard® Walkway Rolls.

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.

T. Also available are Corner Curb Wraps, consisting of a pre-formed combination corner and flashing pieces that are 12" in height and can be ordered in various lengths. They may be fully adhered or dry hung in place.

3.12 Traffic Protection

A. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install

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

B. Walkway rolls must be spaced 6" to allow for drainage.

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

D. TPO walkway rolls 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 (see section 3.10.G) 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.

NOTES

INSULATION ATTACHMENT TABLE FOR FULLY ADHERED SYSTEMS

NUMBER OF FASTENERS								
Insulation Type	**Board Size**	**Thickness**	**Standard Attachment Fasteners/Board**			**Attachment Fasteners/Board for 90 psf Uplift Resistance**		
			Field	***Perimeter***	***Corner***	***Field***	***Perimeter***	***Corner***
Isocyanurate	4x4	1" – 1.4"	8	12	15			
	4x4	1.5" – 1.9"	6	8	10	8	12	16
	4x4	2" minimum	4	6	8	4	6	8
	4x8	1" – 1.4"	16	24	28			
	4x8	1.5" – 1.9"	11	16	20	16	24	32
	4x8	2" minimum	8	12	15	8	12	16
EPS/XEPS[1]	4x4	1" – 1.4"	8	12	15			
	4x4	1.5" – 1.9"	6	8	10			
	4x4	2" minimum	4	6	8			
	4x8	1" – 1.4"	16	24	28			
	4x8	1.5" – 1.9"	11	16	20			
	4x8	2" minimum	8	12	15			
Gypsum Board	4x8	1/4" – 5/8"	16	24	28			
	4x8	1/2" minimum	16	24	28	21	32	36
Wood Fiber	4x4	1/2" minimum	6	8	10			
	4x4	1" minimum	4	6	8			
	4x8	1/2" minimum	16	24	32			

TYPE OF INSULATION FASTENERS			
Deck	**Fastener**	**Plate**	**Penetration (minimum)**
Steel– all gauges	DRILL-TEC™ HD (#14) or Standard (#12)	3" Galvalume	3/4" through the deck
Wood – plank and sheathing	DRILL-TEC™ HD (#14) or Standard (#12)	3" Galvalume	1" thread into/through the deck
Structural Concrete	DRILL-TEC™ HD (#14) or Drill*Tec Spike	3" Galvalume	1" thread/shank into the deck
Insulating Concrete	DRILL-TEC™ HD (#14)	3" Galvalume	3/4" thread through steel form
Gypsum Concrete	DRILL-TEC™ Polymer screw	3" Galvalume	1 1/2" thread into the deck
Cementitious Wood fiber	DRILL-TEC™ Polymer screw	3" Galvalume	1 1/2" thread into the deck

- Attachment requirements to meet determined uplift resistance are dependent on deck type, specific fastener, etc.
- [1]Water-based adhesive only fully adhering to EPS/XEPS insulation boards; no smooth PVC membrane direct to EPS/XEPS

Ballast Applied Systems

Membrane laid over substrate and weighted with stone or paver ballast.

Contents

- Design Tables
- Specification Plates
- TPO/PVC Three-Part Guide Installation Specification

TPO DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - BALLAST APPLIED

Deck	Membrane Type		Insulation/Substrate							Insulation/ Substrate Attachment
	Smooth	Fleece (FB)	ISO	Gypsum Board	Wood fiber/ Perlite	EPS/ XEPS	3/6 oz Polymat	FR 50/10	None	Loose
Steel	x		x	x	x	x				x
		x	x	x	x	x				x
Wood	x		x	x	x	x	x	x		x
		x	x	x	x	x			x	x
Structural Concrete & Gypsum	x		x	x	x	x	x			x
		x	x	x	x	x			x	x
Lightweight Insulating Concrete	x		x	x	x	x	x			x
		x	x	x	x	x			x	x
Cementitious Wood Fiber	x		x	x	x	x	x			x
		x	x	x	x	x			x	x

TPO DESIGN TABLE - RECOVER - BALLAST APPLIED

Existing Roofing System Type	Membrane Type		Insulation/Substrate							Insulation/ Substrate Attachment
	Smooth	Fleece (FB)	ISO	Gypsum Board	Wood fiber/ Perlite[1]	EPS/ XEPS	3/6 oz Polymat	FR 50/10	None	Loose
Smooth BUR/MB	x		x	x	x	x	x	x		x
		x	x	x	x	x			x	x
Single Ply Membrane	x		x	x	x	x	x	x		x
		x	x	x	x	x			x	x
Granule Surfaced BUR/MB	x		x	x	x	x	x			x
		x	x	x	x	x			x	x
Gravel Surfaced BUR/MB[2]	x		x	x	x	x				x
		x	x	x	x	x				x

1. Roof moisture scan required for use of wood fiber/perlite in recover roofing systems.
2. Recover over coal tar pitch roofs is not allowed.

PVC DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - BALLAST APPLIED

Deck	Membrane Type		Insulation/Substrate						Insulation/ Substrate Attachment
	Smooth	Fleece	ISO	Gypsum Board	Wood fiber/ Perlite	EPS/ XEPS	3/6 oz Polymat	None	Loose
Steel	x		x	x	x	x[1]	x[1]		x
		x	x	x	x	x			x
Wood	x		x	x	x	x[1]	x		x
		x	x	x	x	x		x	x
Structural Concrete & Gypsum	x		x	x	x	x[1]	x		x
		x	x	x	x	x		x	x
Lightweight Insulating Concrete	x		x	x	x	x[1]	x		x
		x	x	x	x	x		x	x
Cementitious Wood Fiber	x		x	x	x	x[1]	x		x
		x	x	x	x	x		x	x

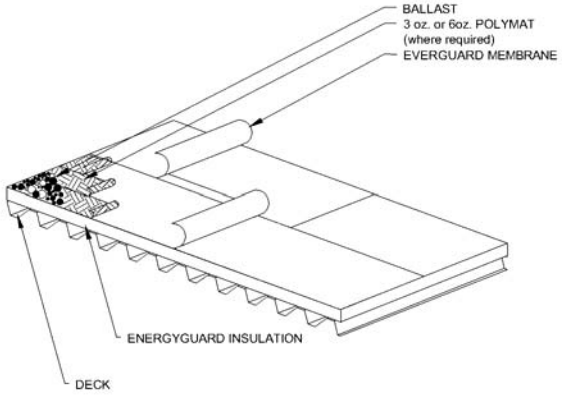
1. EPS/XEPS in combination with a minimum 3 oz. Polymat separator for smooth PVC membrane

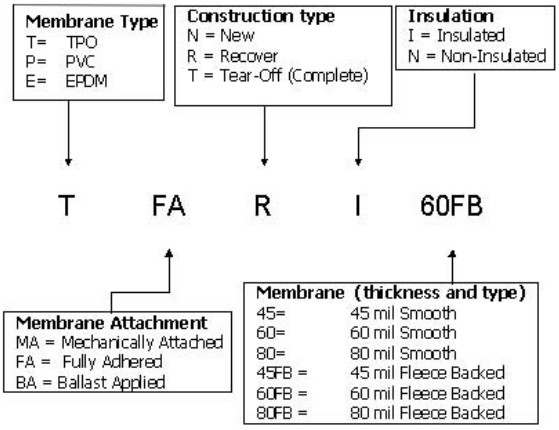
PVC DESIGN TABLE - RECOVER - BALLAST APPLIED

Exiting Roofing System Type	Membrane Type		Insulation/Substrate							Insulation/Substrate Attachment
	Smooth	Fleece	ISO	Gypsum Board	Wood fiber/ Perlite[1]	EPS/XEPS	3/6oz. Polymat	FR 50/10	None	Loose
Smooth BUR/MB	X		X	X	X	X[2]	X	X		X
		X	X	X	X	X			X	X
Single Ply Membrane	X		X	X	X	X[2]	X	X		X
		X	X	X	X	X			X	X
Granule Surfaced BUR/MB	X		X	X	X	X[2]	X			X
		X	X	X	X	X			X	X
Gravel Surfaced BUR/MB[4]	X		X	X	X	X[2]	X[3]			X
		X	X	X	X	X				X

1. Roof moisture scan required for use of perlite/wood fiber in recover roofing systems.
2. EPS/XEPS in combination with a minimum 3 oz. Polymat separator with smooth PVC membrane.
3. Must be used with EPS/XEPS insulation.
4. Recover over coal tar pitch roofs is not allowed.

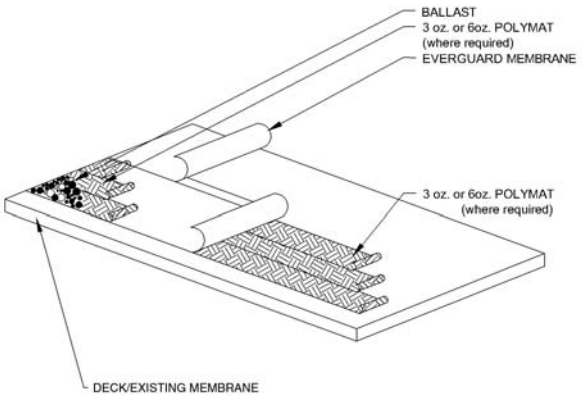
Insulated TPO Ballasted Systems Specification Plate

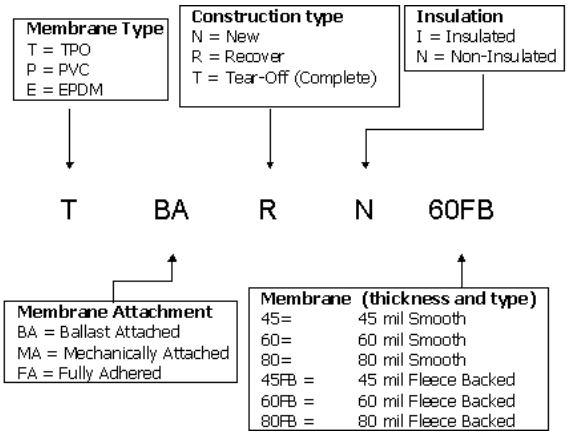




Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-BA-N-I-45	Ballasted	New	Yes	.045	12
T-BA-N-I-60				.060	15
T-BA-N-I-80				.080	20
T-BA-T-I-45	Ballasted	Tear Off	Yes	.045	12
T-BA-T-I-60				.060	15
T-BA-T-I-80				.080	20
T-BA-R-I-45	Ballasted	Recover	Yes	.045	12
T-BA-R-I-60				.060	15
T-BA-R-I-80				.080	20
T-BA-N-I-45FB	Ballasted	New	Yes	.045 FB	12
T-BA-N-I-60FB				.060 FB	15
T-BA-N-I-80FB				.080 FB	20
T-BA-T-I-45FB	Ballasted	Tear Off	Yes	.045 FB	12
T-BA-T-I-60FB				.060 FB	15
T-BA-T-I-80FB				.080 FB	20
T-BA-R-I-45FB	Ballasted	Recover	Yes	.045 FB	12
T-BA-R-I-60FB				.060 FB	15
T-BA-R-I-80FB				.080 FB	20

Non-Insulated TPO Ballasted Systems Specification Plate

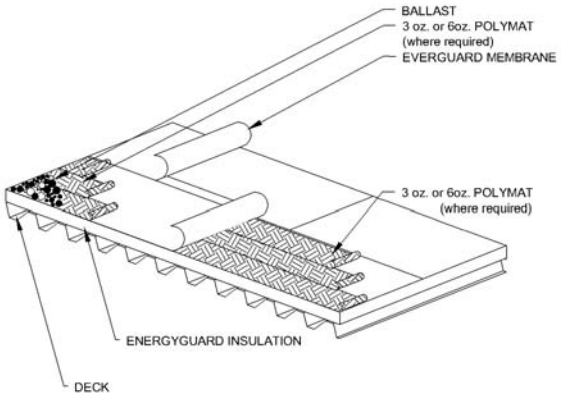


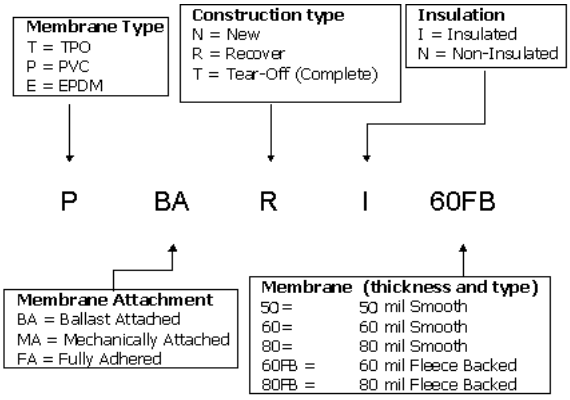


Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-BA-N-N-45	Ballasted	New	No*	.045	12
T-BA-N-N-60				.060	15
T-BA-N-N-80				.080	20
T-BA-T-N-45	Ballasted	Tear Off	No*	.045	12
T-BA-T-N-60				.060	15
T-BA-T-N-80				.080	20
T-BA-R-N-45	Ballasted	Recover	No*	.045	12
T-BA-R-N-60				.060	15
T-BA-R-N-80				.080	20
T-BA-N-N-45FB	Ballasted	New	No	.045 FB	12
T-BA-N-N-60FB				.060 FB	15
T-BA-N-N-80FB				.080 FB	20
T-BA-T-N-45FB	Ballasted	Tear Off	No	.045 FB	12
T-BA-T-N-60FB				.060 FB	15
T-BA-T-N-80FB				.080 FB	20
T-BA-R-N-45FB	Ballasted	Recover	No	.045 FB	12
T-BA-R-N-60FB				.060 FB	15
T-BA-R-N-80FB				.080 FB	20

* Separator Sheet required; 3/6 oz polymat or FR 50/10

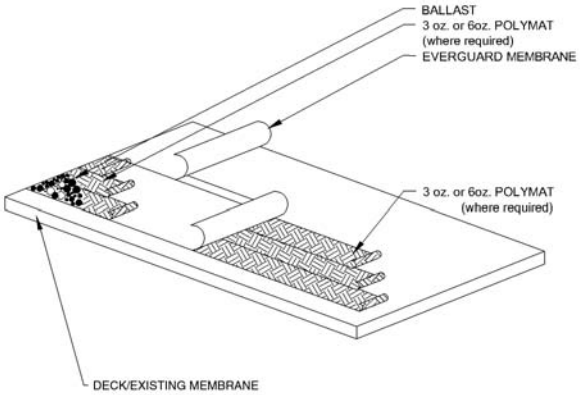
Insulated PVC Ballasted Systems Specification Plate

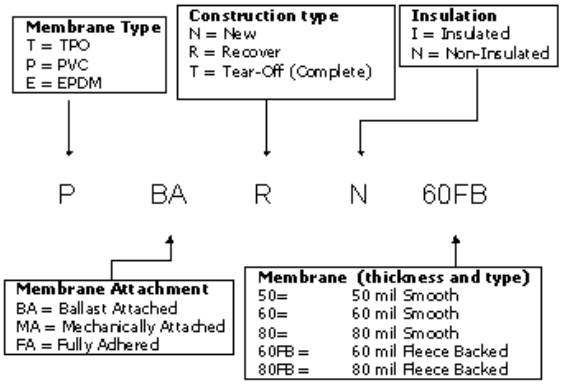




Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-BA-N-I-50	Ballasted	New	Yes	.050	12
P-BA-N-I-60				.060	15
P-BA-N-I-80				.080	20
P-BA-T-I-50	Ballasted	Tear Off	Yes	.050	12
P-BA-T-I-60				.060	15
P-BA-T-I-80				.080	20
P-BA-R-I-50	Ballasted	Recover	Yes	.050	12
P-BA-R-I-60				.060	15
P-BA-R-I-80				.080	20
P-BA-N-I-60FB	Ballasted	New	Yes	.060 FB	15
P-BA-N-I-80FB				.080 FB	20
P-BA-T-I-60FB	Ballasted	Tear Off	Yes	.060 FB	15
P-BA-T-I-80FB				.080 FB	20
P-BA-R-I-60FB	Ballasted	Recover	Yes	.060 FB	15
P-BA-R-I-80FB				.080 FB	20

Non-Insulated PVC Ballasted Systems Specification Plate





Specification Number	Attachment Type	Construction Type	Insulation	PVC Thickness	Guarantee Length Up To (Years)
P-BA-N-N-50	Ballasted	New	No*	.050	12
P-BA-N-N-60				.060	15
P-BA-N-N-80				.080	20
P-BA-T-N-50	Ballasted	Tear Off	No*	.050	12
P-BA-T-N-60				.060	15
P-BA-T-N-80				.080	20
P-BA-R-N-50	Ballasted	Recover	No*	.050	12
P-BA-R-N-60				.060	15
P-BA-R-N-80				.080	20
P-BA-N-N-60FB	Ballasted	New	No	.060 FB	15
P-BA-N-N-80FB				.080 FB	20
P-BA-T-N-60FB	Ballasted	Tear Off	No	.060 FB	15
P-BA-T-N-80FB				.080 FB	20
P-BA-R-N-60FB	Ballasted	Recover	No	.060 FB	15
P-BA-R-N-80FB				.080 FB	20

* Separator Sheet required; 3/6 oz polymat or FR 50/10

Ballast Applied Installation Specification

TPO & PVC

Part 1 – General

1.01 System Description

A. Ballast applied heat-welded thermoplastic sheet roof membrane system.

B. EverGuard® PVC and EverGuard® TPO materials are not compatible with one another. DO NOT use 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 manufacturers' 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 GAF Contractor Services for suggestions.

D. Follow GAF's directions and requirements for protection of materials prior to and during installation.

E. Do NOT use materials that are wet or damaged to the extent that they will no longer serve their intended purpose. 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. High or gusting winds make the installation of materials difficult, usually resulting in a lesser-quality installation.

D. 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.

E. 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, physical discomfort of roofing personnel, etc. To avoid these problems:

1. Store accessory materials in a warming box.
2. Use as soon as possible.
3. Allow adhesive to properly cure.
4. Adjust welder settings to insure proper welds for applicable ambient conditions

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 housekeeping 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 as roofing membrane.

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.

Ballast Applied Installation Specification

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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 Unreinforced Membrane for flashing of miscellaneous penetrations in lieu of preformed accessories.
7. EverGuard® TPO Cover Strip for stripping in of flat metal edges.
8. EverGuard® 6" RTS strip.
9. Sealant pans
10. TPO pre-fabricated scuppers.

2.04 Fasteners

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

2.05 Adhesives And Sealants

A. EverGuard® bonding adhesives, sealants and caulking.

1. EverGuard® TPO and PVC 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. EverGuard® Water Block for use in sealing behind termination bars and at drain flanges as a water cut-off.
7. EverGuard® TPO Primer.

2.06 Traffic Protection

A. EverGuard® TPO and PVC walkway 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 or loose-laid 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 or loose-laid 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 with plastic facer 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, except for fan-fold recover board, which comes in 2' x 4' sections with a 50' total length.

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. EnergyGuard™ 3/8" extruded polystyrene fan-fold recover board with plastic facer meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compres-

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sive strength).

3. EnergyGuard™ 1/2" extruded polystyrene recover board meeting or exceeding the requirements for ASTM D-578, Type IV (min. 25 psi compressive strength).
4. EnergyGuard™ 1/2" expanded polystyrene recover board with plastic facer meeting or exceeding the requirements for ASTM D-578, Type II (min. 15 psi compressive strength).

2.10 Protection Layer

A. EverGuard® Polymat separation slipsheet, 3.0 oz/sq.yd.

B. EverGuard® Polymat cushioning slipsheet, 6.0 oz/sq.yd.

C. EverGuard® Firesheet 10 fiberglass fire barrier slipsheet.

D. EverGuard® Firesheet 50 fiberglass fire barrier slipsheet.

2.11 Stone Ballast/Pavers

A. Smooth and clean stone ballast, with rounded edges and corners, worn by water washing, typically referred to as river-washed stone. Subject to compliance with requirements, provide stone ballast in accordance with the following:

1. Size gradation of 3/4" to 1-1/2" diameter, No. 4 conforming to ASTM D-448.
2. Size gradation of 1" to 2-1/2" diameter, No. 2 conforming to ASTM D-448.

B. Interlocking extruded freeze/thaw resistant concrete pavers with smooth bottom surface finish and integral drainage channels. Approximate size of 12" x 16" to 18" x 18", approximate weight of 12 lbs./sq.ft. Interlocking paver manufacturer must provide prior approval of application when interlocking pavers are to be used as the ballast system. Contractor needs to leave all seams exposed for inspection.

C. Heavyweight non-interlocking extruded freeze/thaw resistant concrete pavers with smooth bottom surface finish. Approximate size of 18" x 18" to 30" x 30", approximate weight of 25 lbs./sq.ft.

2.12 Other Accessories

A. Subject to compliance with requirements, provide following products not available from GAF:

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. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (gypsum roof, by Georgia-Pacific).

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.

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

E. Where work must continue over completed roof areas, protect the finished roofing system 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.

C. Secure all loose decking. Remove and replace all deteriorated decking.

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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. If the wall/curb flashings are in good condition and tightly adhered to the substrate, new TPO flashing materials may be installed over these to a height of 18"; new PVC flashing materials may be installed over a separator layer of polymat or insulation board.

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.

F. Confirm quality and condition of roof decking by visual inspection if possible, and by fastener pull-out testing.

G. Remove abandoned equipment and equipment supports.

H. Raise equipment supports to allow the installation of full-height flashings.

I. Installation of a ballast applied EverGuard® Membrane over an existing coal tar pitch membrane is not allowed; contact GAF Contractor Services for further information.

3.04 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers
2. Shim Material:
   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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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. Do NOT use spaced shims.

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. Do NOT install gypsum boards that are wet, warped or buckled 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. Remove and replace gypsum boards that become wet or damaged after installation.
6. Install no more gypsum board than can be properly covered by the end of each day with roofing membrane.

C. Securement

1. Gypsum board, insulation, and recovery boards are loose laid under ballast applied membranes.

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3.06 Air/Vapor Barrier Installation

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.

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 Protection Layer Installation – Polyester

A. General

1. Install polymat protection layer between the roofing membrane and the substrate, in accordance with the Design Table.

B. Application

1. Install polymat protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
2. Overlap polymat protection layer a minimum of 6" for side and end laps.

3.08 Protection Layer Installation – Fiberglass

A. General

1. VersaShield™ sheet protection layer shall typically be installed when required by design professional, or code authority to address code or approval requirements, or as a separator layer in accordance with the Design Table.

B. Application

1. Install fiberglass sheet protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
2. Overlap fiberglass sheet protection layer a minimum of 6" for side and end laps.

3.09 Recover Board/Insulation Installation

A. General

1. Insulation board and recover board shall be installed as required, in accordance with the Design Table.
2. The use of extruded and expanded polystyrene insulations is limited to a maximum roof membrane temperature of 165° F.
3. The use of extruded or expanded polystyrene insulations is limited in PVC roofing systems to under a fleece-back membrane or where protected by a 3 or 6 oz. polymat slipsheet.

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.
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. Install tapered insulation to provide a sump area a minimum of 36" x 36" where applicable.
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. Securement

1. Insulation is typically installed loosely laid without securement.
2. In the event that mechanical attachment of the insulation is required by the design professional, 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 in the Mechanically Attached Section. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks. Install fasteners such that the fastener plate is pulled slightly below the insulation board surface. Use fastener of correct length as required by the Insulation Attachment Table.

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 throughout all regions

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of the roof.

3. Overlap roof membrane a minimum of 3" for side and end laps. 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. PVC does not have a fully adhered line
4. Install membrane so that the laps run across the roof slope lapped toward drainage points.
5. All exposed sheet corners shall be rounded a minimum of 1".
6. All cut edges of reinforced membrane must be sealed with EverGuard® TPO or PVC 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 or overlapping adjacent sheets and heat welding an 8" wide EverGuard® PVC or EverGuard® TPO reinforced membrane flashing strip over the joints.

B. 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 (see Supplemental Attachment Table) at 6" on center maximum spacing. Membrane may be heat welded to coated metal flanges. Note: a minimum of 4 fasteners per penetration is required. 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 Plates or an inverted Termination Bar at an 6" on center maximum spacing. This detail is required to be used for all pressurized buildings.
2. Fasteners must be installed to achieve the proper embedment depth. Install fasteners vertical to the deck or horizontal to the wall/curbs without lean or tilt.
3. 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. 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 applying pressure to cause 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.

D. 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 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 Cleaner or use acetone for PVC. 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® Cleaner or use acetone for PVC. 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

Cleaner or use acetone for PVC and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner or use acetone for PVC. Be sure to wait for solvent to flash off prior to welding. 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. The membrane should be removed and replaced 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 and PVC membrane must be sealed with EverGuard® TPO and PVC Cut Edge Sealant.
5. When using bonding adhesive, be sure to use adhesive specific to membrane type.
6. Minimum flashing height is 8".
7. Horizontal mechanically-attachment should not be installed more than 6" from the wall. When you must go past 6", move the attachment to the vertical substrate.
8. Installation of EverGuard® PVC flashing membrane over asphalt-based substrates must have a separator sheet or approved insulation boards, metal, wood,etc., under the PVC flashing membrane

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.
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 unreinforced 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. Two inches wide aluminum tape should 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 wood nailers. Coated metal base flashings must be formed with 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 either nailed or screwed to wood nailers, or flashings can be mechanically attached to the roof deck with DRILL-TEC™ approved fasteners or to the wall or curb substrate, in accordance with construction detail requirements.
9. When installing coated metal on walls or curbs that completely cover the existing flashing, the flashing does not need to be removed provided that it is in good condition and tightly adhered.

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, gypsum roof, gypsum roof 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 gal. for solvent-based bonding adhesives, and at the rate of 100 sq. ft. of finished, mated surface area per gal. 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.
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 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. When installing fleece-back membranes to a vertical surface, the material should be fixed at the top of the sheet upon placement to avoid slippage.
5. All selvage edge laps in EverGuard® Fleece-Back flashing membrane shall be heat welded in accordance with heat welding guidelines. Lap width is 3".
6. 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.
7. 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 system 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 24" 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 may 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 gal. for solvent-based bonding adhesives, and at the rate of 100 sq. ft. of finished, mated surface area per gal. 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.
4. The penetration is finished with Water Block between the pipe and the membrane, install clamping band, and caulk.

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 minimum 3' wide flange nailed 4" on center into wood nailers and heat weld 8" membrane strip to metal flange and field membrane.
3. 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

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8" on center prior to installing the snap-on fascia.

5. Galvanized-based metal edging may be flashed in using EverGuard® TPO Cover Strip after priming both the metal and the TPO membrane for guarantees up to 15 years. Allow approximately 3" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. All T-joints and tape overlaps shall be covered with T-joint covers. Caulk all corners, tape overlaps and T-joints per published standard EverGuard® details. Caulk the back edge of the tape with EverGuard® caulking when slopes exceed 1"/12".
6. Flash roof edge scuppers with a scupper insert of coated metal or EverGuard® pre-fab coated metal scupper 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 loose-applied membrane flashing, membrane flashing applied to the wall substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to 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 mechanically fastened 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 at 6" on center maximum spacing.
4. All coated metal wall flashings and loose membrane 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:
   - 24" - Loose-Applied Flashing
   - 54" - Adhered Flashing
8. Metal cap flashings shall have continuous cleats or be face-fastened 12" o.c. on both the inside and outside of the walls

I. Round and Square Tube Penetrations

1. Four options are available for penetration flashings. These are stepped pipe boots, open pipe boots, square tube wraps and field fabrication with unsupported membrane and target.
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 the draw band with caulking.
3. At all penetrations larger than 12" in diameter, roof membrane must be mechanically attached at the base of each penetration with screws and plates a minimum of 6" on center, with a minimum of four 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 coated 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.
4. Pre-formed sealant pans made of PVC and TPO are available.
   a. PVC. Installation of pre-formed PVC sealant pans require the flange of the PVC sealant pan to be fastened with a minimum of 4 fasteners per penetration. A PVC membrane target is installed around the base of the sealant pan over the flanges of the PVC sealant pan and heat welded to the flanges. Install the fasteners near the outside edge of the flanges to allow for proper heat welding of the target. The outside edge of the target membrane is heat welded to the field membrane.
   b. TPO. Installation of pre-formed TPO sealant pans require field membrane securement around the penetration. A minimum of 4 system appropriate screws and plates are required around the penetration. A membrane target must be installed prior to the installation of the TPO sealant pan if the location of the plates do not allow for a continuous 2" weld of the TPO sealant pan flange. Properly heat-weld the flange of TPO sealant pan to the field/target membrane.
   c. If the sealant pan is cut to install around the penetration, the cut must be stripped-in with a minimum 4" wide unreinforced membrane. The unreinforced strip-

in membrane must extend a minimum of 2" beyond the outside edge of the sealant pan flange and be fully welded.

d. Prior to filling the TPO sealant pan, the inside vertical pan sides must be primed with GAF TPO primer. Fill the base of the pans with non-shrink grout and top with a minimum 2" thickness of GAF Two Part Pourable Sealer.

e. Reinforced targets must be sealed as system appropriate with EverGuard® Cut Edge Sealant

K. Curbs

1. Flash curbs and ducts with loose-applied membrane flashing, membrane flashing applied to the wall substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to wood nailers.
2. Secure membrane flashing at the top edge with a termination bar, flat slip, or counterflashing. Water Block shall be applied between the curbs surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 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 6" o.c. 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. All termination bars must be sealed with caulking.

L. Expansion Joints

1. Install expansion joint covers at all flat type and raised curbed type expansion joint conditions. There currently three types of expansion joints approved for EverGuard® Systems. There are two prefabricated expansion joints one each for TPO and PVC. Also TPO and PVC can also be field fabricated to meet expansion joint needs. For PVC any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or EverGuard® DRILL-TEC™ fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb expansion joints with screws and plates a minimum of 6" 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.

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, if possible. 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.
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-back 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 reinforced 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. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide
reinforced membrane strip heat welded to the 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 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-riveted to the flanges to create a continuous flange. All flange

corners must be rounded.

3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ fasteners 6" 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.
6. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to the membrane at the wall face and roof deck and terminated on the outside wall face with a termination bar, Water Block, and caulk.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available. Consult your Territory Manager or local distributor for details.

O. Heater Stacks

1. Field-fabricated two-piece membrane flashings of EverGuard® unreinforced flashing are typically installed at heater stacks. EverGuard® TPO and PVC have coned type prefabricated pipe flashing that may work in this instance. If not then field fabricated membrane flashings of EverGuard® TPO UN-55 or EverGuard® PVC UN-80 may be used.
2. Heater stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not directly in contact with 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 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 PVC drain inserts by heat welding the membrane to the PVC coated drain flange.
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, if possible.
4. The drain insert is installed on top of the roofing membrane and is secured to the roof deck 12" 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 the compatible drain flange.
6. Install the drain clamping ring if applicable.
7. All drains shall be provided with a strainer basket.

Q. Wood Support Blocking

1. 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. Place wood blocking on oversized slip sheet, fold two sides vertically, and fasten with roofing nails into the blocking.

R. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of EverGuard Walkway Rolls.

S. Lightening 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.

T. Also available are Corner Curb Wraps, consisting of a pre-formed combination corner and flashing pieces that are 12" in height and can be ordered in various lengths. They may be fully adhered or dry hung in place.

3.12 Traffic Protection

A. Concrete Pavers

1. For stone-ballasted applications, install heavyweight concrete pavers over a layer of Polymat 6 oz. cushioning
protection mat at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
2. Concrete pavers must be spaced 6" to allow for drainage.

B. Walkway Rolls

1. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install walkway rolls at other designated locations including

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

2. Walkway rolls must be spaced 6" to allow for drainage.
3. Heat weld walkway rolls to the roof membrane surface around the perimeter of the pad/roll.
4. TPO walkway rolls 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.
5. Do not install EverGuard walkway rolls within the defined ballast enhanced perimeter and corner areas. In these areas, concrete pavers must be used.
6. The total walkway area using rolls should not exceed 2% of the total roof area.

3.13 Separation Mat Installation

A. General

1. Polymat 3 oz separation slipsheet shall typically be installed above the roofing membrane under all ballasted installations where existing stone ballast is reused.
2. Polymat 3 oz separation slipsheet shall typically be installed above the roofing membrane under all paver ballast applications where paver underside is smooth and regular and has integral drainage channels.
3. Polymat 6 oz cushioning slipsheet shall typically be installed above the roofing membrane under all paver applications where pavers are used as walkways, work surfaces, or as heavyweight perimeter ballast.

B. Application

1. Install separation mat loose-laid over the membrane so that wrinkles and buckles are not formed.
2. Overlap separation mat a minimum of 6" for side and end laps.
3. Immediately install ballast or pavers over the loose-laid separation mat.

3.14 Ballast/Paver Installation

A. Stone Ballast

1. Install stone ballast of the gradation and at the rate in accordance with the Ballast Application Table, pg. 277. Ballast shall be installed evenly over the entire roof surface.
2. Minimum ballast application rate for #4 nominal 1-1/2" ballast is 10 lbs. per sq.ft.
3. Minimum ballast application rate for #2 nominal 2-1/2" ballast is 13 lbs. per sq.ft.
4. Existing stone ballast can be reused, provided that it is screened to remove debris and fines and the ballast gradation continues to comply with ASTM D-448.

B. Interlocking Pavers

1. Install interlocking concrete pavers in accordance with the Ballast Application Table, at the end of this manual and the paver manufacturer's requirements for stagger and interlock.
2. Utilize perimeter securement of interlocking pavers and/or paver clips in accordance with the paver manufacturer's requirements.
3. Utilize strapping or caulking of adjacent pavers in accordance with the paver manufacturer's requirements.
4. Install an EverGuard® 3 oz. Polymat Separation Layer over the new roofing membrane prior to paver application.

C. Non-Interlocking Pavers

1. Install concrete pavers in accordance with the Ballast Application Table, pg. 234 and the paver manufacturer's requirements.
2. Utilize perimeter securement of non-interlocking pavers in accordance with the paver manufacturer's requirements.
3. Install an EverGuard® 6 oz. Polymat Cushioning Layer over the new roofing membrane prior to paver application.

D. Warranty Inspection

1. If polymat is used it must be situated so that it can be easily moved for the seam inspection process. All stone ballast must be off the seam area as well for warranty inspections.
2. If pavers are to be used then the contractor must inform the local Roof Protection Services representative as to time of paver's installation, so that they can inspect the hot air welded seams.

3.15 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.

3.16 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.

3.17 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.

3.18 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 (see section 3.10.D), followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2" beyond the damaged area. If heat welding to the top surface of the existing membrane is ineffective, the patch must be heat welded to the underside of the existing sheet after proper preparation.

C. Building owner shall be responsible for removing all materials or overburden at their expense to facilitate membrane investigation or maintenance.

NOTES

TriPosite XL™ Systems

Hybrid system. Membrane adhered with hot asphalt to multiple fiberglass ply sheets set in hot asphalt.

Contents

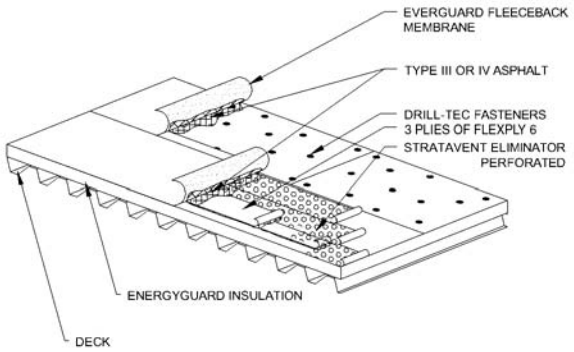
- Design Tables
- Specification Plates
- TPO/PVC Three-Part Guide Installation Specification

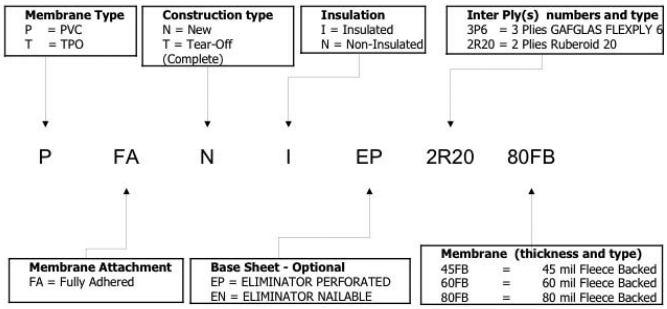
TPO/PVC DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - TRIPOSITE XL™

Deck	Insulation/Substrate			Insulation/Substrate Attachment		
	Ultra	Gypsum Board	None	Mech. Fast.	Adhesive	Hot
Steel	x	x		x	x	
Wood	x	x	x[1]	x	x	x[1]
Structural Concrete & Gypsum	x	x	x	x	x	x
Lightweight Insulating Concrete	x	x	x[1]	x	x	x[1]
Cementitious Wood Fiber	x	x	x[1]	x	x	x[1]

1. Insulation/membrane can be installed in hot asphalt only when mopping to mechanically attached base sheet.

TRIPOSITE XL™ TPO/PVC FULLY ADHERED SYSTEMS (RUBEROID® 20) SPECIFICATION PLATE

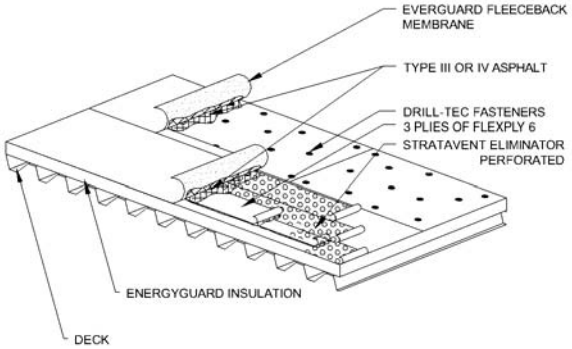


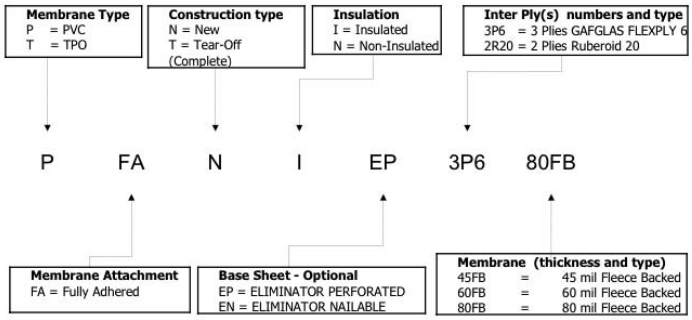


Specification Number	Attachment Type	Construction Type	Insulation	TPO/PVC Thickness	Guarantee Length Up To (Years)
T/P-FA-N-I-EP-2R20-FB45	Fully Adhered	New	Yes	.045	15
T/P-FA-N-I-EP-2R20-FB60				.060	20
T/P-FA-N-I-EP-2R20-FB80				.080	25
T/P-FA-T-I-EP-2R20-FB45	Fully Adhered	Tear Off	Yes	.045	15
T/P-FA-T-I-EP-2R20-FB60				.060	20
T/P-FA-T-I-EP-2R20-FB80				.080	25
T/P-FA-N-N-EP-2R20-FB45	Fully Adhered	New	No	.045	15
T/P-FA-N-N-EP-2R20-FB60				.060	20**
T/P-FA-N-N-EP-2R20-FB80				.080	20
T/P-FA-T-N-EP-2R20-FB45	Fully Adhered	Tear Off	No	.045	15
T/P-FA-T-N-EP-2R20-FB60				.060	20**
T/P-FA-T-N-EP-2R20-FB80				.080	20

**20-year for TPO only, PVC for 15-year.

TRIPOSITE XL™ TPO/PVC FULLY ADHERED SYSTEMS (FLEXPLY 6) SPECIFICATION PLATE





Specification Number	Attachment Type	Construction Type	Insulation	TPO/PVC Thickness	Guarantee Length Up To (Years)
T/P-FA-N-I-EP-3P6-FB45	Fully Adhered	New	Yes	.045	15
T/P-FA-N-I-EP-3P6-FB60				.060	20
T/P-FA-N-I-EP-3P6-FB80				.080	25
T/P-FA-T-I-EP-3P6-FB45	Fully Adhered	Tear Off	Yes	.045	15
T/P-FA-T-I-EP-3P6-FB60				.060	20
T/P-FA-T-I-EP-3P6-FB80				.080	25
T/P-FA-N-N-EN-3P6-FB45	Fully Adhered	New	No	.045	15
T/P-FA-N-N-EN-3P6-FB60				.060	20**
T/P-FA-N-N-EN-3P6-FB80				.080	20
T/P-FA-T-N-EN-3P6-FB45	Fully Adhered	Tear Off	No	.045	15
T/P-FA-T-N-EN-3P6-FB60				.060	20**
T/P-FA-T-N-EN-3P6-FB80				.080	20

** 20-year for TPO only, PVC for 15-year

TriPosite XL™ Installation Specification

TPO & PVC

Part 1 – General

1.01 System Description

A. TriPosite XL™ heat-welded thermoplastic sheet roof membrane system.

B. EverGuard® PVC and EverGuard® TPO materials are not compatible with one another. DO NOT use 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 manufacturers' 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 breathable tarpaulin or other waterproof material. Factory-installed plastic wrapping is not an adequate covering.

D. Follow GAF's directions and requirements for protection of materials prior to and during installation.

E. Do NOT use materials that are wet or damaged to the extent that they will no longer serve their intended purpose. 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's cold weather application procedures for asphaltic materials.

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.

F. Material installation during periods of low ambient temperatures, typically below 40°F, can result in poor installation quality due to increased material stiffness, vulnerability to damage, and rapidly cooling asphalt temperatures. To avoid these problems:

1. Store materials in a warming box.
2. Use as soon as possible.
3. Allow adhesive to properly cure.
4. Adjust welder settings to insure proper welds for applicable ambient conditions

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 housekeeping to remove debris and other hazards.

Part 2 – Products

2.01 Membrane

A. EverGuard® PVC fleece-backed 80 mil, and fleece-backed 60 mil thermoplastic membrane with non-woven polyester fleece backing.

B. EverGuard® TPO fleece-backed 80 mil, fleece-backed 60 mil and fleece-backed 45 mil thermoplastic membrane with non-woven polyester fleece backing.

2.02 Flashing

A. EverGuard® PVC or TPO membrane flashings to be of same type, thickness and color as roofing membrane, with optional fleece backing.

2.03 Flashing Accessories

A. EverGuard® PVC or TPO pre-formed flashing accessories to be of same type as roofing membrane.

1. EverGuard® PVC or TPO laminated metal flashings to be a minimum of 25 mils TPO and 40 mils PVC of non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 24 ga. galvanized steel sheet metal.
2. Pre-formed Vent Boots with stainless steel clamping bands.

TriPosite XL™ Installation Specification

TPO & PVC

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 in lieu of preformed accessories.
7. EverGuard® TPO Cover Strip for stripping in of flat metal edges on 15-year warranties only.
8. EverGuard® Pre-Formed Sealant Pans are available for irregularly-shaped penetrations and pitch pans. See Accessories Section on Page 21 for a list of available products.

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® bonding adhesive, sealants and caulking.
   1. EverGuard® TPO or PVC 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. Roofing asphalt conforming to ASTM D-312, Type III or Type IV.
   6. EverGuard® Water Block for use in sealing behind termination bars and at drain flanges as a water cut-off.
   7. EverGuard® TPO Cut Edge Sealant.
   8. EverGuard® TPO Primer.

2.06 Traffic Protection

A. EverGuard® TPO and PVC walkway rolls for EverGuard® TPO respectively and PVC membrane.

2.07 Insulation

A. EnergyGuard™ Ultra polyisocyanurate insulation with glass-based UltraShield™ facer meeting or exceeding the requirements of ASTM C-1289 (min. 16 psi compressive resistance). Minimum 1" thickness. Board size to be 4' x 4' for adhered attachment and tapered systems.

2.08 Insulation – High Traffic Applications

A. EnergyGuard™ Ultra polyisocyanurate insulation with glass-based UltraShield facer meeting or exceeding the requirements of ASTM C1289 (min. 25 psi compressive resistance). Minimum 1" thickness. Board size to be 4' x 4' for adhered attachment and tapered systems.

2.09 Venting Base Sheet

A. GAFGLAS® Stratavent® Eliminator™ Nailable base sheet.

B. GAFGLAS® Stratavent® Eliminator™ Perforated base sheet.

2.10 Inter Ply Sheets

A. Asphalt coated fiberglass ply sheet, meeting the requirements of ASTM D-2178, Type VI.
   1. GAF Materials Corporation's GAFGLAS® FlexPly® 6 Ply Sheet.

B. SBS coated modified asphalt over a non-woven fiberglass core.
   1. GAF Materials Corporation's RUBEROID® 20 modified bituminous interply sheets.

2.11 Other Accessories

A. Subject to compliance with requirements, provide following products not available from GAF:
   1. New wood nailers and shall be, #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.
   5. Air/Vapor Barrier: Asphalt impregnated kraft paper composite (Permate from BMCA).
   6. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (gypsum roof or gypsum roof Prime from Georgia-Pacific).

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.

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

E. Where work must continue over completed roof areas, protect the finished roofing system 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 reroofing applications. Preparation includes, but is not limited to, removal of existing flashings, removal of 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.

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 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers.
2. Shim Material:
   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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12” oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
4. Three 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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12” oc, through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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.

E. Slippage of mop applied systems may occur when roof slope exceeds 1/2'' per foot. On slopes greater than 1/2'':12'', use Type IV asphalt only. If roof slope is greater than 1/2" but less than 2'' per foot, use wood nailers at the eave, at the ridge and at intermediate spacing of no more than 16 feet. If roof slope is 2'' to 3'' per foot, use wood nailers at the eave, at the ridge and at intermediate spacing, of no more than 8 feet. Maximum roof slope is 3:12. Nailers installed on slopes between 1/2" to 3" per foot serve as insulation stops and should be of the same thickness as the insulation.

3.04 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 be over flute surface for bearing support.

4. Gypsum 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.
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 Installation 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.
   d. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425°F-475°F.
   e. Walk in the boards after installation to ensure a proper bond.
   f. Maximum board size: 4' x 4'.
   g. Hot asphalt application requires priming of concrete and gypsum decks.
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 manufacturer's instructions.
   b. Adhesive beads shall be evenly spaced at the rate required for the board size and type of roofing system being installed.
   c. Apply adhesive when the air, surface and adhesive temperature is at least 40°F.
   d. Additional adhesive beads must be installed in corner/perimeter roof areas for EverGuard® Fully Adhered and TriPosite XL™ systems.
   e. Walk in the boards after installation to ensure a proper bond.
   f. Maximum board size: 4' x 4'.

3.05 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.

3.06 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 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.
5. As an alternative, install 2 plies of FlexPly 6 ply sheet or 1 ply of Ruberoid® 20 in hot asphalt at the rate of 25 lbs. per 100 sq. ft.

3.07 Venting Base Sheet Installation (No Insulation)

TriPosite XL™ Installation Specification

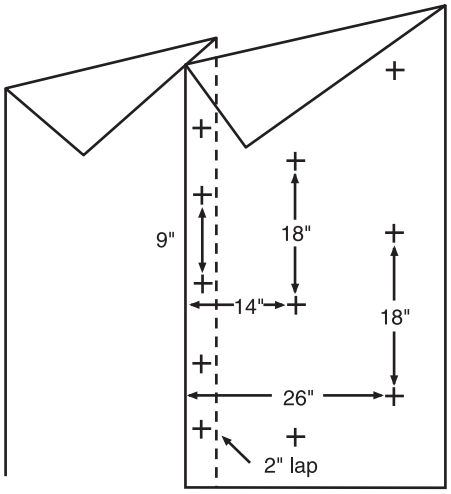
TPO & PVC

A. General

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

Fig. 1



1. Secure 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 Fig 1.
2. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
3. Install fasteners such that the fastener plate is pulled flush with the base sheet surface.

C. Adhered Securement-Perforated Base Sheet

1. Prime the substrate surface with asphalt primer at the rate of 1/2 to 1 gallon per 100 sq. ft.
2. Dry lay perforated base sheet over the prepared substrate.
3. Immediately follow with interply sheet installation in hot asphalt. Use appropriate asphalt grade for deck slope, either Type III or Type IV at the rate of 25 lbs per 100 sq. ft. A greater quantity of asphalt may be required based upon substrate surface condition.

3.08 Insulation Installation

A. General

1. Insulation board shall be installed as required, in accordance with the Design Table.

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 must 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, if possible.
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 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.
5. Use fastener of correct length as required by the Insulation Attachment Table.

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.

4. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475° F.
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.

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. When temperatures are below 40°F, check with GAF Contractor Services for proper storage and application precautions.
4. Additional adhesive beads must be installed in corner/perimeter roof areas for EverGuard® Fully Adhered and TriPosite XL™ systems according to the manufacturer's instructions.
5. Maximum board size: 4' x 4'.

3.09 Cant Strip Installation

A. Cant strips are not required on the TriPosite XL™ System.

3.10 Venting Base Sheet Installation - Insulated

A. General

1. Venting perforated fiberglass base sheet shall be installed over isocyanurate foam insulation.

B. Application

1. Install venting perforated fiberglass base sheet loose-laid over the isocyanurate insulation so that wrinkles and buckles are not formed. Spot-attach base sheet to the insulation with hot asphalt as required only to secure the sheet until the balance of the roofing system can be applied.
2. Overlap venting base sheet a minimum of 2" for side laps and 6" for end laps.

3.11 Ply Sheet Installation

A. General

1. A minimum of three GAFGLAS® FlexPly® 6 or two Ruberoid® 20 interply sheets shall be installed over the base sheet, fire barrier board, or insulation, as appropriate for the roof assembly.
2. Install ply sheets so that wrinkles and buckles are not formed.
3. Lap fiberglass ply sheets 26-15/16" with a 12-7/16" exposure and 6" end laps. Stagger adjacent end laps a minimum of 18".
4. Install the first Ruberoid® 20 interply sheet with 4" side laps and a 6" end laps staggered from the base sheet laps. Install the second Ruberoid® 20 interply sheet with 4" side laps and a 6" end laps staggered from laps in the base sheet and first modified interply sheet.
5. Extend ply sheets 2" above top of cant strips.

B. Application

1. Adhere ply sheets shingle fashion in hot asphalt at the rate of 25 lbs. per 100 sq. ft.
2. Use either Type III or Type IV asphalt up to 1/2" per foot slope and Type IV for slopes up to 3" per foot.
3. Broom ply sheets to ensure complete bonding between asphalt and ply sheets.
4. Use intermediate attachment of the sheets on slopes above 1/2" per foot. Run sheets parallel with the slope and back-nail them into the wood nailers approximately 4" from the leading edge of the sheets. All end laps must terminate at wood nailers and be blind nailed on 6" centers across the top of the sheet. Use nails with integral heads a minimum of 1" square or round.

3.12 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 of fully adhered systems. Butt ends of fleece-backed membrane rolls. Membranes are provided with a lap line along the side laps, the inside line is for mechanically attached system overlaps and the outside line is for adhered and ballasted systems overlap. PVC does not have a fully adhered line
4. Install membrane so that the laps run across the roof slope lapped toward drainage points for slopes less than 1/2" per foot. For slopes 1/2" per foot and higher, install membrane parallel with the slope.
5. All exposed sheet corners shall be rounded a minimum of 1".
6. All cut edges of reinforced smooth TPO and PVC membrane must be sealed with EverGuard® TPO and PVC Cut Edge Sealant, e.g., at end lap 8" cover strips.

7. End laps 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 and at internal walls and curbs. Membrane is extended vertically 2" and secured to the wall/curb substrate with DRILL-TEC™ Membrane Fasteners and Plates or with inverted Termination Bar at a 12" o.c. maximum spacing.
2. Install fasteners parallel to the wall/curb, without lean or tilt.
3. 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. Hot Asphalt Adhesion

1. Use either Type III or Type IV asphalt up to 1/2" per foot slope and Type IV for slopes up to 3" per foot.
2. Fully adhere membrane sheets with hot asphalt at the rate of 25 lbs. per 100 sq. ft. Apply asphalt to substrate surface only.
3. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.
4. Roll membrane into asphalt immediately following asphalt application. Do not allow mopping to get more than 3' to 5' from membrane being adhered.
5. Using multiple mops or mechanical spreaders will help to insure consistent application temperature.
6. Broom membrane to ensure complete bonding between asphalt and membrane.
7. For slopes greater than 1/2", run sheets parallel with the slope. All end laps must terminate at wood nailers and be fastened on 12" centers across the top of the sheet with a DRILL-TEC™ #12 and 2 3/8" barbed plate into the nailer. The end lap is completed with the installation of an 12" wide cover strip of reinforced TPO smooth membrane.

D. 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 applying pressure to cause 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. Fleece-backed membrane end laps shall be covered with 8" wide strips of reinforced membrane, welded to each side of the butt joint.
6. 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.

E. 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 airborne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard® TPO Cleaner or use acetone for PVC. 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 Cleaner or use acetone for PVC. 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 Cleaner or use acetone for PVC and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner or use acetone for PVC. Be sure to wait for solvent to flash off prior to welding. 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. The membrane should be removed and replaced in these situations.

3.13 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. Non-selvage edge laps in fleece-backed membrane flashing are made by butting adjacent sheets and heat-welding an 8" wide strip of reinforced membrane flashing strip over the lap/joint area.
5. All cut edges of reinforced smooth TPO/PVC membrane must be sealed with EverGuard® Cut Edge Sealant.
6. When using tape be sure to use bonding adhesive specific to membrane type.
7. Minimum flashing height is 8".
8. The maximum distance from the wall that horizontal mechanical attachment is installed is 6". When you must go past 6", move the attachment to the vertical substrate.
9. Installation of EverGuard® PVC flashing membrane over asphalt-based substrates must have a separator sheet or approved insulation boards, metal, wood,etc., under the PVC flashing membrane.

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 in all 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 unreinforced 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 should 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 wood nailers. Coated metal base flashings must be formed with a cant suitable to accommodate the membrane 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 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 or thicker.
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, gypsum roof, gypsum roof 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 gal. for solvent-based bonding adhesives, and at the rate of 100 sq. ft. of finished, mated surface area per gal. for water-based bonding adhesive. The bonding solvent adhesive must be allowed to dry until tacky to the touch before flashing membrane application. Coverage rates will vary depending on substrate. 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.
7. Porous substrates may require double applications 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 adhesive 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. When installing fleece membranes to a vertical surface, the material should be fixed at the top of the sheet upon placement to avoid slippage.
5. All selvage edge laps in EverGuard® fleece-back flashing membrane shall be heat welded in accordance with heat welding guidelines. Lap width is 3".
6. 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.
7. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

E. Unreinforced Membrane Flashings

1. Unreinforced membrane is used as a field-fabricated penetration/reinforcement flashing only on corners and where pre-formed pipe boots cannot be properly installed and as shown in EverGuard® TriPosite XL™ details.
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 membrane is heat welded to the membrane at the corner.
4. The unreinforced vertical membrane flashing may be adhered to the pipe penetration surface. Apply bonding adhesive to both the pipe surface and the underside of the flashing membrane, at the rate of 60 sq. ft. of finished, mated surface area per gal. for solvent-based bonding adhesive, and at the rate of 100 sq.ft. of finished, mated surface area per gal. 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.
5. The penetration is finished with Water Block between the pipe and the membrane, install clamping band, and caulk.

F. 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 minimum 3" wide flange nailed 4" on center into wood nailers and heat weld 8" membrane strip to metal flange and field membrane.
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 tape and face nailing the membrane 8" on center prior to installing the snap-on fascia.
5. Galvanized-based metal edging may be flashed in using EverGuard® TPO Cover Strip after priming both the metal and the TPO membrane for up to 15 year guarantees. Allow approximately 3" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. Use caulk or TPO/PVC Cut edge Sealant. Caulk all corners, tape overlaps and T-joints per published standard EverGuard® details. Caulk the back edge of the tape with EverGuard® caulking when the slope exceeds 1" per

foot.

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.

G. 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 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. Termination bars shall be counterflashed and fastened 12" on center.
3. All coated metal wall flashings must be provided with separate metal counterflashings, or metal copings.
4. 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.
5. Maximum adhered flashing height without intermediate fastening is 54".
6. Metal cap flashings shall have continuous cleats or be face-fastened 12" o.c. on both the inside and outside of the walls.

H. Round and Square Tube Penetrations

1. Four options are available for penetration flashings. These are stepped pipe boots, open pipe boots, square tube wraps and field fabrication with unsupported membrane and target.
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.
4. All square tube penetrations require a rain collar to be installed above the draw band.

I. 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.

J. Curbs

1. Flash curbs and ducts with membrane flashing adhered to the curb substrate with bonding adhesive, or with coated metal flashing fastened 4" on center to 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. Termination bars shall be fastened 12" on center and counterflashed.
3. Roof membrane must be mechanically attached along the top of the curb.
4. All coated metal curb flashings must be provided with separate metal counterflashings, metal copings, or flashed with equipment flanges.

K. Expansion Joints

1. Install expansion joint covers at all flat type and raised curbed type expansion joint conditions. There currently three types of expansion joints approved for EverGuard® Systems. There are two prefabricated expansion joints one each for TPO and PVC. Also TPO and PVC can also be field fabricated to meet expansion joint needs. For PVC any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or EverGuard® DRILL-TEC™ fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb expansion joints with screws and plates a minimum of 12" on center unless otherwise shown on TriPosite XL™ details.
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.

L. Roof Drains

1. Roof drains must be fitted with compression clamping rings and strainer baskets.
2. Roof drains must be provided with a min. 36" x 36" sumped area, if possible. 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" membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.

4. The flashing 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. Lap seams should not be located within the sump area. Where lap seams will be located within the sump area, a separate roof membrane drain flashing a minimum of 12" larger than the sump area must be installed. The membrane flashing shall be heat welded to the roof membrane. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide reinforced membrane strip heat welded to the membrane.
6. Tighten the drain compression clamping ring in place.

M. Scuppers

1. Coated metal roof edge scuppers must be provided with a min. 4" wide flange nailed to wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.
2. Coated metal wall scuppers must be provided with 4" wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ fasteners 6" on center, a minimum of 2 fasteners per side.
4. All corners must be reinforced with uninforced membrane flashing.
5. Strip in scupper with unreinforced flashing membrane target sheet.
6. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to membrane on the wall face and roof deck and terminated on the outside wall face with a termination bar, Water Block, and caulk.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available. Consult your Territory Manager or local distributor for details.

N. Heater Stacks

1. Field-fabricated two-piece membrane flashings of EverGuard® unreinforced flashing are typically installed at heater stacks. EverGuard® TPO and PVC have coned type prefabricated pipe flashing that may work in this instance. If not then field fabricated membrane flashings of EverGuard® TPO UN-55 or EverGuard® PVC UN-80 may be used.
2. Heater stacks must be equipped with either cone-shaped or vertical tube-type flashing sleeves so that the membrane flashing is not directly in contact with 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.

O. Wood Support Blocking

1. 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 EverGuard® TPO membrane or EverGuard® Walkway Roll. Place wood blocking on oversized slip sheet, fold two sides vertically, and fasten with roofing nails into the blocking.

P. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of EverGuard Walkway Roll.

Q. 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.

R. Also available are Corner Curb Wraps, consisting of a pre-formed combination corner and flashing pieces that are 12" in height and can be ordered in various lengths. These pre-fabricated corners can be configured to fit 12"x 12", 18"x 18", 24"x 24" and 30"x 30" curb flashings. They may be fully adhered or dry hung in place and only require a 1" weld.

3.14 Traffic Protection

A. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install walkway rolls at other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkways rolls must be spaced 6" to allow for drainage between the rolls.

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

D. TPO walkway rolls may also be installed with TPO primer

and 3" seam tape. First, roll or brush the TPO primer on in the back of the TPO pad along the edges and down the middle 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.

3.15 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.

3.16 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.

3.17 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. EverGuard® fleece-back will require a flashing strip in to flash in the patch to the existing membrane.

3.18 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 (see section 3.12.E), followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2" beyond the damaged area.

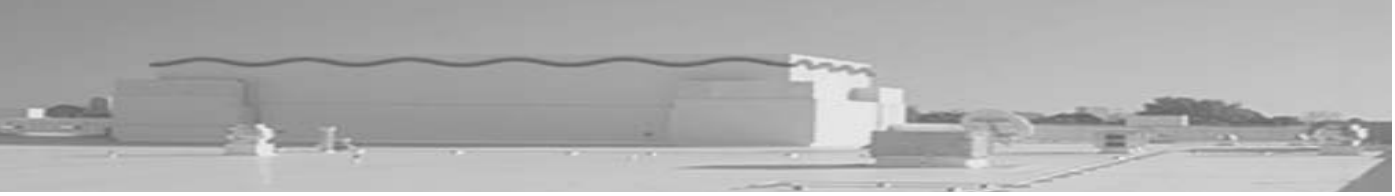
C. Any damage to adhered membrane areas or at locations of mechanical attachment shall be repaired so that the repaired area remains fully adhered or mechanically attached.

INSULATION ATTACHMENT TABLE FOR TRIPOSITE™ SYSTEMS

NUMBER OF FASTENERS								
Insulation Type	**Board Size**	**Thickness**	**Standard Attachment Fasteners/Board**			**Attachment Fastener/Board for 90 psf Uplift Resistance**		
			Field	**Perimeter**	**Corner**	**Field**	**Perimeter**	**Corner**
Isocyanrate	4x4	1" – 1.4"	8	12	15			
	4x4	1.5" – 1.9"	6	8	10	8	12	14
	4x4	2" minimum	4	6	8	4	6	8
	4x8	1" – 1.4"	16	24	28			
	4x8	1.5" – 1.9"	11	16	20	16	24	28
	4x8	2" minimum	8	12	15	8	12	15
Gypsum Board	4x8	1/4" – 5/8"	16	24	28			
	4x8	1/2" minimum				21	32	36

TYPE OF INSULATION FASTENER			
Deck	**Fastener**	**Plate**	**Penetration (minimum)**
Steel – all gauges	Drill•Tec HD (#14) or Standard (#12)	3" Galvalume	3/4" through the deck
Wood – plank and sheathing	Drill•Tec HD (#14) or Standard (#12)	3" Galvalume	1" thread into/through the deck
Structural Concrete	Drill•Tec HD (#14) or Drill*Tec Spike	3" Galvalume	1" thread/shank into the deck
Insulating Concrete	Drill•Tec HD (#14)	3" Galvalume	3/4" thread through steel form
Gypsum Concrete	Drill•Tec Polymer screw	3" Galvalume	1 1/2" thread into the deck
Cementitious Wood Fiber	Drill•Tec Polymer screw	3" Galvalume	1 1/2" thread into the deck

• Attachment requirements to meet determined uplift resistance are dependent on deck type, specific fastener, etc.



EverGuard® Freedom™ Systems

Self-adhered membrane to appropriate substrate

Contents

- Design Tables
- Specification Plates
- EverGuard® Freedom™ Three-Part Guide Installation Specification

TPO DESIGN TABLE - NEW CONSTRUCTION OR TEAR-OFF - FREEDOM™

Deck	Insulation/Substrate					Insulation/Substrate Attachment		
	Iso	Gypsum Board[2]	Wood fiber	EPS/XEPS[3]	None	Mech. Fast.	Adhesive	Hot
Steel	x	x	x	x		x	x	
Wood	x	x	x	x	x	x	x	x[1]
Structural Concrete & Gypsum	x	x	x	x	x	x	x	x
Lightweight Insulated Concrete	x	x	x	x		x	x	x[1]
Cementitious Wood Fiber	x	x	x	x		x	x	x[1]

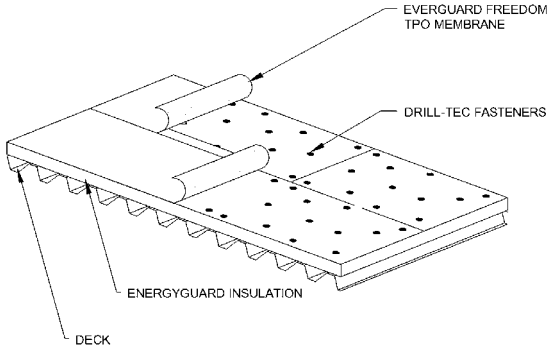
1. Insulation can be installed in hot asphalt only when mopping to mechanically attached base sheet.
2. Glass mat facer required for self-adhered membranes.
3. Overlay board required with EPS/XEPS

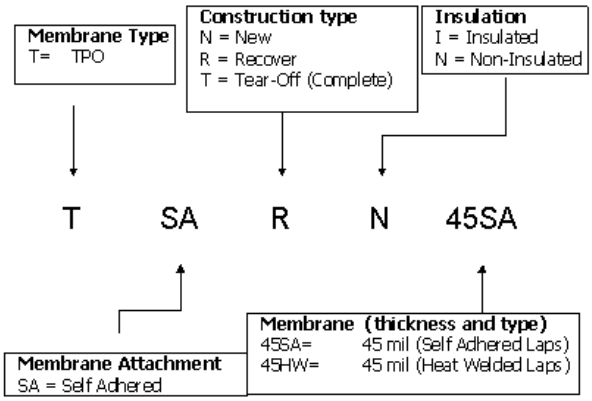
TPO DESIGN TABLE - RECOVER - FREEDOM™

Existing Roofing System Type	Insulation/Substrate				Insulation/Substrate Attachment		
	Iso	Gypsum Board[3]	Wood Fiber[1]	EPS/XEPS[4]	Mech. Fast.	Adhesive	Hot
Smooth BUR/MB	x	x	x	x	x	x	x
Single Ply Membrane	x	x	x	x	x		
Granule Surfaced BUR/MB	x	x	x	x	x	x	x
Gravel Surfaced BUR/MB	x	x	x	x	x	x	x
Standing Seam Metal[2]	x	x	x		x		

1. Roof moisture scan required for use of wood fiber in recover roofing systems.
2. XEPS is the only material allowed as flute fill with overlay board required.
3. Glass mat facer required for self-adhered membranes.
4. Overlay board required with EPS/XEPS.

INSULATED & NON-INSULATED TPO FREEDOM™ SELF ADHERED SYSTEMS

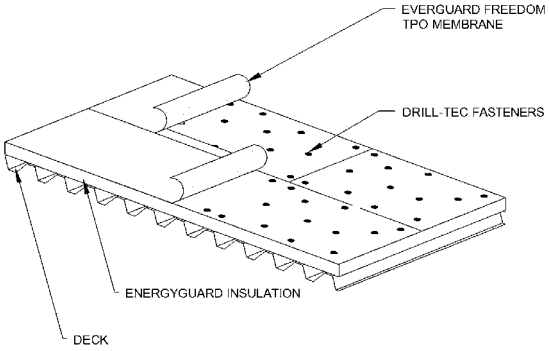


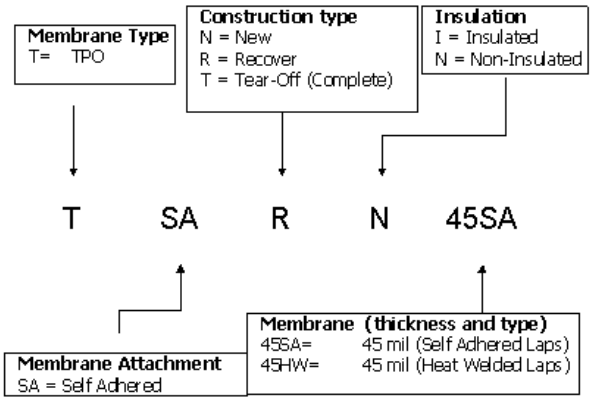


Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-SA-N-I-45-SA	Self Adhered	New	Yes	.045	10*
T-SA-N-I-45-HW				.045	15**
T-SA-N-I-60-HW				.060	20
T-SA-T-I-45-SA	Self Adhered	Tear Off	Yes	.045	10*
T-SA-T-I-45-HW				.045	15**
T-SA-T-I-60-HW				.060	20
T-SA-R-I-45-SA	Self Adhered	Recover	Yes	.045	10*
T-SA-R-I-45-HW				.045	15**
T-SA-R-I-60-HW				.060	20
T-SA-N-N-45-SA	Self Adhered	New	No	.045	10*
T-SA-N-N-45-HW				.045	15**
T-SA-N-N-60-HW				.060	20
T-SA-T-N-45-SA	Self Adhered	Tear Off	No	.045	10*
T-SA-T-N-45-HW				.045	15**
T-SA-T-N-60-HW				.060	20

*Self adhered seam
** Hot air welded seam

INSULATED & NON-INSULATED TPO FREEDOM™ SELF ADHERED SYSTEMS





Specification Number	Attachment Type	Construction Type	Insulation	TPO Thickness	Guarantee Length Up To (Years)
T-SA-N-N-SA	Self Adhered	New	No	.045	10*
T-SA-N-N-HW				.045	15**
T-SA-N-N-HW				.060	20**
T-SA-T-N-SA	Self Adhered	Tear Off	No	.045	10*
T-SA-T-N-HW				.045	15**
T-SA-T-N-HW				.060	20**

*Self adhered seam
** Hot air welded seam

NOTES

EverGuard® Freedom™ Installation Specification

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Part 1 – General

1.01 System Description

A. Self-adhering thermoplastic sheet roof membrane 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 manufacturers' 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 GAF Contractor Services for suggestions.

D. Follow GAF directions and requirements for protection of materials prior to and during installation. Note: Ensure that all roofing materials are stored and installed at ambient temperatures of 50°F and rising. Do not install roll if membrane core temperature and/or ambient temperature is below 50°F.

E. Do NOT use materials that are wet or damaged to the extent that they will no longer serve their intended purpose. 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. Only install EverGuard® Freedom™ membrane when ambient temperatures are 50°F and rising.

D. High or gusting winds make the installation of materials difficult.

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 housekeeping to remove debris and other hazards.

Part 2 – Products

2.01 Membrane

A. EverGuard® Freedom™ TPO self-adhering thermoplastic polyolefin membrane HW (Hot air welded seam).

B. Freedom™ TPO Self-Adhering thermoplastic polyolefin membrane RS with Rapid Seam technology.

2.02 Flashing

A. EverGuard® Freedom™ membrane flashings should be Freedom™, smooth-back reinforced with adhesive, or weldable metal.

2.03 Flashing Accessories

A. EverGuard® Freedom™ preformed flashing accessories to be of same type as roofing membrane.

1. Freedom™ Self-Adhering Curb Flashings.
2. EverGuard® TPO Flashing (reinforced).
3. EverGuard® Termination Bar.
4. Freedom™ TPO Self-Adhering Premolded Outside Corners.
5. Freedom™ Self-Adhering TPO Pipe Boots to be used with Freedom™ RapidSeam™.
6. EverGuard® laminated metal flashings to be a minimum of 25 mils of non-reinforced thermoplastic membrane of same type as roofing membrane, laminated to 24 ga. galvanized steel sheet metal.
7. Pre-formed Vent and Pipe Boots with stainless steel clamping bands.
8. Pre-formed Universal Corners for reinforcement of inside and outside corners.
9. Pre-formed Expansion Joint Covers for roof-roof and roof-wall expansion joints.
10. Membrane Flashing Strips for miscellaneous applications.
11. Detailing Membrane for flashing of miscellaneous penetrations in lieu of preformed accessories.
12. EverGuard® TPO Cover Strip for stripping in of flat metal edges.

13. EverGuard® 6" RTS strip (or may be field fabricated from EverGuard® Freedom™ membrane).
14. A Pre-formed Sealant Pan and Pre-formed Wall Scupper are also available.

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 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 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 C-578, Type X (min. 15 psi compressive strength).
3. EnergyGuard™ expanded polystyrene insulation with plastic facer meeting or exceeding the requirements for ASTM C-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. High density wood fiber insulation, minimum 1/2", ASTM C-208, Class E.

B. 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 Other Accessories

A. Subject to compliance with requirements, provide the following products not available from manufacturer:
1. Wood nailers shall be, #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.
5. Air/Vapor Barrier: Asphalt impregnated kraft paper composite (Permate from BMCA).
6. Fire Barrier: Silicone-treated fiberglass-faced gypsum panels, min. 1/4" thick (gypsum roof from Georgia-Pacific).
7. Urethane Adhesive: Membrane and/or insulation adhesive of acceptable type from approved manufacturer. Requires special approval from GAF Contractor Services.
8. StormSafe™ a nailable base sheet used over top of light-weight concrete and wood type decking that accepts direct applications of Freedom™ HW and RS.

Part 3 – Execution

3.01 Site Conditions

A. Obtain verification that the building structure can

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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 pullout 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.

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.

I. Recover installation over coal tar pitch roofs require that the existing loose gravel be broomed (do not spud); if high spots remain, use a thicker insulation board to provide a smooth substrate for the EverGuard® membrane. Recover with EverGuard® TPO membranes over coal tar pitch roofs require the installation of a minimum 1/2" recover board prior to the installation of the membrane. Do not use EPS/XEPS over coal tar pitch roofs.

3.04 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers
2. Shim Material:
   Non-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

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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 pullout 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.

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.

I. Recover installation over coal tar pitch roofs require that the existing loose gravel be broomed (do not spud); if high spots remain, use a thicker insulation board to provide a smooth substrate for the EverGuard® membrane. Recover with EverGuard® TPO membranes over coal tar pitch roofs require the installation of a minimum 1/2" recover board prior to the installation of the membrane. Do not use EPS/XEPS over coal tar pitch roofs.

3.04 Wood Nailer Installation

A. Acceptable Material

1. Solid Blocking:
   Wood, #2 Grade or better, nominal 5/4" x 4" minimum; stagger multiple layers
2. Shim Material:
   Non-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. Wood nailers attached to gypsum, concrete, cellular concrete and cementious wood fiber shall be fastened 12" oc, or through the nailer into the substrate with substrate-approved DRILL-TEC™ fasteners.
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. Do NOT install gypsum boards that are wet, warped or buckled 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. Remove and replace gypsum boards that become wet or damaged after installation.
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® adhered systems. Be sure that the existing gravel is vacuumed or power broomed off and the existing dirt is blown off or power washed away.
   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. Ensure existing gravel and dirt is vacuumed, power-broomed or power-washed away.
   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'.
   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

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in corner/perimeter roof areas for EverGuard® Freedom™ 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

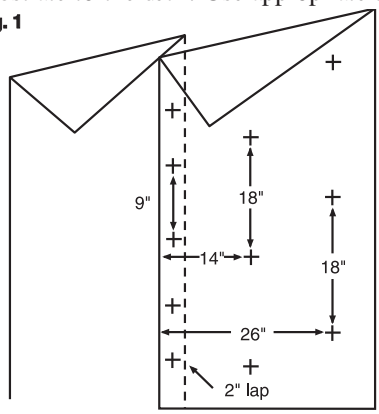
A. General

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

Fig. 1



of approved fastener for structural deck type, and install required number of fasteners in accordance with Figure 1.

2. Pre-drilling is required for concrete decks, and may be required for gypsum concrete and cementitious wood fiber decks.
3. Install fasteners such that the fastener plate is pulled flush with the venting base sheet surface and lies flat on the deck surface.

C. Mechanical Securement-Nailable StormSafe™

1. GAF StormSafe is a non-breathable nailable underlayment with a beige colored weather side coating with a polypropylene coating used directly over lightweight concrete or wood decks.
2. Secure the non-breathable nailable underlayment to the approved decking using the appropriate length and type of fasteners.
3. Install fasteners so that the plate is secured flush with the underlayment and the sheets surface rests flat to the deck surface.
4. Overlap the sheet a minimum of 3” for the side laps and 6” for end laps.
5. Because of the width of the sheet an extra row of fasteners in the body of the sheet will have to be installed. Refer to fig 1 for length and width spacing requirements.

3.09 Recover Board/Insulation Installation

A. General

1. Insulation board shall be installed as required, in accordance with the Design Table.
2. A recover board overlay must be installed over expanded or extruded polystyrene insulation for all membrane applications.

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 GAF Contractor Services.

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, if possible.
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.
5. Use fastener of correct length as required by the Insulation Attachment Table.

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. Ensure existing gravel and dirt is vacuumed, power-broomed or power-washed away.
4. Apply asphalt at its EVT temperature to obtain a proper bond, typically within the range of 425-475°F.
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 50°F.
4. Additional adhesive beads must be installed in corner/perimeter roof areas for EverGuard® Freedom™ TPO systems according to the manufacturer's instructions.
5. Walk in the insulation boards after installation to ensure a proper bond.
6. Maximum board size: 4' x 4'.

3.10 Membrane Installation

A. General

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. If the TPO membrane is cut, apply EverGuard® TPO Cut Edge Sealant to the cut edge.
3. Install EverGuard® Freedom™ TPO Self-Adhering roofing system starting at the low point of the roof and continuing to the highest point. In keeping with good roofing practice, all laps shall be lapped shingle fashion and shall not create backwater laps.
4. When installing EverGuard® Freedom™ directly to a concrete deck, the deck must be smooth troweled and primed with EverGuard® TPO primer.

B. Membrane Surface Preparation

1. Membrane must be clean of dirt and contaminants, and free from dew, rain, and other sources of moisture. Factory-fresh EverGuard® Freedom™ TPO HW 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 airborne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard® TPO 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 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 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 Cleaner. Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above. Be sure to wait for solvent to flash off prior to welding.
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. The membrane should be removed and replaced in these situations.

C. First Course Application

1. Position the EverGuard® Freedom™ TPO RS or EverGuard® Freedom™ TPO HW membrane over the approved substrate without stretching. EverGuard® Freedom™ HW and RS membrane may be installed over the following sound, clean, smooth and dry substrates: 5/8" min plywood or OSB that is free of splintered edges and fastened to the substrate with screws and smooth troweled structural concrete can also be utilized after priming with TPO primer at a rate of 100 sq. ft./gallon.
2. Unroll the roll of the EverGuard® Freedom™ TPO membrane. For EverGuard® Freedom™ TPO HW, turn the 3" selvage which has no adhesive on the reverse side down the fascia. Starting at the low point of the roof, place the EverGuard® Freedom™ TPO membrane so that the factory applied lap guide is on the up-slope side of the roll to facilitate proper lapping of the seams.
3. Fold the membrane in half longitudinally, exposing the split in the release liner.
4. Peel the upper half of the release liner from the adhesive film back of the membrane and lay to the side of the panel.
5. Roll the membrane with the exposed adhesive onto the substrate in line with the original layout position. Maintain a rounded radius at the longitudinal fold when rolling out to avoid creating wrinkles.
6. Apply pressure to the membrane using a fully loaded lawn roller of about 275 lbs. Roll in the installed section of EverGuard® Freedom™ TPO Self-Adhering membrane to promote maximum adhesion to the substrate. This installed area will be the anchor point and alignment guide for the installation of the remainder of the roll. Rolling in the width direction of the panel help keep the membrane from creating wrinkles in the sheet.
7. Install the other side of the sheet by folding the EverGuard® Freedom™ TPO Self-Adhering membrane back to the point that the release liner becomes accessible. Be careful to avoid creasing the membrane at the fold. Peel the remaining release liner from the adhesive on the rest of the roll. Roll the membrane into place while maintaining a rounded radius at the fold.
8. Apply pressure using a linoleum or lawn roller. Roll the remaining installed EverGuard® Freedom™ TPO Self-Adhering membrane sheet to promote maximum adhesion to the substrate. Rolling in the width direction of the membrane will helps keep the membrane from
creating wrinkles in the sheet.
9. Rapid Seam End laps may be installed in two ways. First clean the existing sheet you are going to overlap with EverGuard® TPO Cleaner, dampening a clean white rag with cleaner before using. Clean the entire 6” butt end of the installed sheet, and then prime this same area using EverGuard® TPO Primer and allowing it to flash off. Now mate the new Freedom sheet to the primed area and roll in with a silicone roller. Apply EverGuard® Cut Edge Sealant to the overlap area to complete the detail. A second method is to use 6” EverGuard® Cover Tape to complete the detail. Begin by butting the new sheet up against the previously installed sheet. Clean both butt ends and 3” past on both sides with EverGuard® Cleaner using a clean white dampened rag. Brush or roller apply the EverGuard® Primer 3” onto each sheet carrying this past the ends 3”. Install the EverGuard® 6” cover tape

over the primer after flash off and roll in with a silicone roller. Add EverGuard® Cut Edge Sealant to all edges to complete the detail.

10. Proceed with the appropriate installation method detailed below.

D. Hot Air Welded (HW) Seam Method

1. Position the next sheet to overlap the installed first course membrane a minimum of 3", while ensuring the lap is installed shingle-fashion to prevent backwater laps.
2. Unroll the EverGuard® Freedom™ TPO membrane roll. Place the EverGuard® Freedom™ TPO membrane so that the factory applied lap guide is on the upslope side of the roll to facilitate proper lapping of the seams.
3. Fold the membrane in half longitudinally, exposing the split in the release liner.
4. Peel the upper half of the release liner from the adhesive film back of the membrane and lay to the side of the panel. Do not cut release liner.
5. Roll the membrane with the exposed adhesive onto the substrate in line with the original layout position. Maintain a rounded radius at the longitudinal fold when rolling out to avoid creating wrinkles.
6. Apply pressure to the membrane using either a linoleum or a lawn roller. Roll in the installed section of EverGuard® Freedom™ TPO Self-Adhering membrane to promote maximum adhesion to the substrate. This installed
area will be the anchor point and alignment guide for the installation of the remainder of the roll. Rolling in the width direction of the panel will aid in keeping the membrane from creating wrinkles in the sheet.
7. Install the other side of the sheet by folding the EverGuard® Freedom™ TPO Self-Adhering membrane back to the point that the release liner becomes accessible. Be careful to avoid creasing the membrane at the fold. Peel the remaining release liner from the adhesive on the rest of the roll. Roll the membrane into place while maintaining a rounded radius at the fold.
8. Apply pressure using a linoleum or lawn roller. Roll the remaining installed EverGuard® Freedom™ TPO Self-Adhering membrane sheet to promote maximum adhesion to the substrate. Rolling in the width direction of the membrane will aid in keeping the membrane from creating wrinkles in the sheet.
9. Using a clean rag with EverGuard® TPO Cleaner, thoroughly clean an area on the installed sheet at least 3" wide if the area to be seamed has become contaminated with dirt, debris, etc., and allow to dry. Clean and prime this area on the previously installed Rapid Seam sheet. Change rags frequently to avoid depositing previously removed materials. Be sure to let the cleaner flash off before heat welding or a false weld may occur.
10. Using an approved automatic heat welding machine or hand held heat gun and silicone roller, continuously weld to a specified seam width. GAF recommends that only Robotic Automatic Walker Welders be used to weld all field seams.
11. Rapid Seam End laps may be installed in two ways. First clean the existing sheet you are going to overlap with EverGuard® TPO Cleaner, dampening a clean white rag with cleaner before using. Clean the entire 6" butt end of the installed sheet, and then prime this same area using EverGuard® TPO Primer and allowing it to flash off. Now mate the new Freedom sheet to the primed area and roll in with a silicone roller. Apply EverGuard® Cut Edge Sealant to the overlap area to complete the detail.A second method is to use 6" EverGuard® Cover Tape to complete the detail. Begin by butting the new sheet up against the previously installed sheet. Clean both butt ends and 3" past on both sides with EverGuard® Cleaner using a clean white dampened rag. Brush or roller apply the EverGuard® Primer 3" onto each sheet carrying this past the ends 3". Install the EverGuard® 6" cover tape over the primer after flash off and roll in with a silicone roller. Add EverGuard® Cut Edge Sealant to all edges to complete the detail.
12. All HW welded seams must be manually checked for voids or seam deficiencies by probing the entire seam area with a seam probe after the seam has cooled. In addition, there must be destructive seam cuts taken each day at the job start and every time there is an interruption in the welding process (i.e., power failure, welder shut down, job site conditions change and after lunch). All deficiencies must be repaired.

E. Subsequent Membrane Application Rapid Seam Method

1. Position the next sheet to overlap the installed first course membrane a minimum of 6" ensuring the lap is installed shingle fashion to prevent backwater laps.
2. Unroll the roll of the EverGuard® Freedom™ TPO membrane. Place the EverGuard® Freedom™ TPO membrane so that the factory applied lap guide is on the upslope side of the roll to facilitate proper lapping of the seams.
3. Fold the membrane in half longitudinally, exposing the split in the release liner.
4. Peel the upper half of the release liner from the adhesive film back of the membrane and lay to the side of the

panel.

5. Roll the membrane with the exposed adhesive onto the substrate in line with the original layout position. Maintain a rounded radius at the longitudinal fold when rolling out to avoid creating wrinkles.

6. Apply pressure to the membrane with either a linoleum or lawn roller. Roll in the installed section of EverGuard® Freedom™ TPO Self-Adhering membrane to promote maximum adhesion to the substrate. This will be the anchor point and alignment guide for the installation of the remainder of the roll. Rolling in the width direction of the panel will aid in keeping the membrane from creating wrinkles in the sheet.

7. Roll back the remaining unadhered half of the EverGuard® Freedom™ TPO RS membrane over the previously adhered portion.

8. Remove the release liners from the overlapping membrane and Rapid Seam area and gently roll the adhesive/membrane carefully in place.

9. Apply pressure to the adhered membrane using either a linoleum or lawn roller. Roll the membrane surface in order to achieve maximum adhesion to the roofing substrate. The rolling motion should be across the short dimension of the membrane panel in order to avoid creating wrinkles in the EverGuard® Freedom™ TPO RS membrane panel.

10. Use a 2" silicone coated roller to apply maximum pressure in the 6" Rapid Seam area. Roll the seam area at a 45° angle to the seam as well as in the machine direction. Any wrinkles that impede the flow of water drainage must be cut out, laid flat, and repaired using EverGuard® TPO Cover Tape or 6” strip of RapidSeam™ following standard repair procedures.

11. Rapid Seam End laps may be installed in two ways. First clean the existing sheet you are going to overlap with EverGuard® TPO Cleaner, dampening a clean white rag with cleaner before using. Clean the entire 6” butt end of the installed sheet, and then prime this same area using EverGuard® TPO Primer and allowing it to flash off. Now mate the new Freedom sheet to the primed area and roll in with a silicone roller. Apply EverGuard® Cut Edge Sealant to the overlap area to complete the detail. A second method is to use 6” EverGuard® Cover Tape to complete the detail. Begin by butting the new sheet up against the previously installed sheet. Clean both butt ends and 3” past on both sides with EverGuard® Cleaner using a clean white dampened rag. Brush or roller apply the EverGuard® Primer 3” onto each sheet carrying this past the ends 3”. Install the EverGuard® 6” cover tape over the primer after flash off and roll in with a silicone roller. Add EverGuard® Cut Edge Sealant to all edges to complete the detail.

3.11 Flashing Installation

A. General

1. Install perimeter wall flashings, flashings around vents, skylights, and miscellaneous roof projections using Freedom™ TPO Self-Adhering flashing, EverGuard® TPO membrane, EverGuard® TPO Coated Metal, Freedom™ TPO Self-Adhering Outside Corners and Pipe Boots and/or other EverGuard® TPO accessories. EverGuard® TPO offers numerous alternatives for flashings using standard details. Self-adhering flashings are limited to walls no greater than 54" in height without intermediate attachment.
2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or unreinforced membrane.
4. Heat weld all heat weld flashing membranes, accessories, and coated metal together to achieve a minimum 2" wide (hand welder) weld.
5. All cut edges of reinforced TPO membrane must be sealed with EverGuard® TPO Cut Edge Sealant.
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.
2. Form coated metal 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 unreinforced 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.

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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 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.
9. When installing coated metal on walls or curbs that completely cover the existing flashing, the flashing does not need to be removed provided that it is in good condition and tightly adhered.

C. Freedom™ Reinforced Membrane Flashings

1. The thickness of the flashing membrane shall be the same or greater then the thickness of the roofing membrane.
2. When using EverGuard® Freedom™, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), high density wood fiber board, gypsum, 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. These substrates must first be primed with EverGuard® TPO Primer, or EverGuard® Surface Seal.
3. Apply flashings only when the ambient temperature is 50°F and rising. Ensure that the substrate, adhesive and sheet are 50°F or warmer. This may require a hot box for storage or inside storage of the materials overnight.
4. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
5. All laps in EverGuard® Freedom™ flashing membrane shall be heat welded in accordance with heat welding guidelines or have a heat welded cover strip.
6. Porous substrates may require double applications of primer.
7. For extended guarantee lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.
8. All vertical butt ends of flashings must be stripped in.

D. Alternative flashing methods include:

1. Using the field sheet and running it up the wall utilizing an inverted 6" strip of Freedom™ membrane. Fasten the sheet at the base of the wall or curb, or fashion an "L" out of the strip and fasten the vertical part of the "L" to the wall. In lieu of the Freedom™ strip, GAF EverGuard® prefabricated RTA strip may be installed in the same manner. Fasten both strips at 12" on center and simply remove the covering strip from the prefabricated RTS strip or cut through the liner on the Freedom™ strip and remove. Mate the two strips together and continue up the TPO primed curb or wall.
2. The Freedom™ 5' Dual HW Flashing's advantage over standard 10' Freedom™ is that there are two surfaces that can be welded and therefore less waste. This sheet can be measured for the height of the wall or curb and split if necessary. Hang Dual HW flashing just like conventional wall flashings after priming the vertical surface with TPO primer and fastening the base attachment at 12" on center. Roll in all Freedom™ flashing membranes with a silicone roller. Finish butt ends, cut edge sealant and top edge terminations to specifications.

E. 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 flashing 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 may be adhered to the penetration surface. Apply bonding adhesive to both the penetration surface and the under-side of the flashing membrane, at the rate of 120 sq. ft./gal. which covers both surfaces yielding 60 sq. ft. of finished, mated surface area per gallon for solvent-based bonding adhesives, and at the rate of 200 sq. ft./gal. covering both surfaces yielding 100 sq. ft. of 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.
4. The penetration is finished with Water Block between the pipe and the membrane, install clamping band, and caulk.

F. 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 wood nailers,

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and heat weld 8" membrane strip to metal flanges and Freedom™ membrane.

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 metal 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 primed metal cant and face-nailing the membrane 8" on center prior to installing the snap-on fascia.
5. Galvanized-based metal edging may be flashed in using EverGuard® TPO Cover Strip after priming both the metal and the TPO membrane for up to 15-year guarantees. Allow approximately 3" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. Caulk all corners, tape overlaps and T-joints per published standard EverGuard® details. 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.

G. 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 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 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:
   - 54"– Adhered Flashing
8. Metal cap flashings shall have continuous cleats or be face-fastened 12"oc on both the inside and outside of the walls.
9. Freedom™ membrane may be used up to 54" in height over appropriate substrates after priming with TPO primer or EverGuard® Surface Seal. Porous surfaces may require a double coat of primer.

H. 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 or EverGuard® Preformed Split Pipe Boots.
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 four fasteners per penetration.

I. 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 strips heat welded to both the roof membrane and the metal flanges.
3. Alternately, for guarantees up to 15 years, galvanized metal pans with fully soldered corners may be used for penetration boxes. The flanges of the pan must be primed with EverGuard® Primer and then stripped in with Freedom™ membrane and caulked.
4. 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.

J. Curbs

1. Flash primed curbs with Freedom™ membrane flashing adhered to the curb substrate, or with coated metal flashing nailed 4" on center to wood nailers.
2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the curb surface and membrane flashing. 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.

K. Expansion Joints

1. Install EverGuard® TPO Pre-Fabricated Expansion Joint Covers at all flat type and raised curb/wall type expansion joint conditions. Flange welding requirements are 1-1/2" for robot type welders and 2" for hand welding.
2. The Freedom™ membrane must be mechanically attached at the base with screws and plates a minimum of 12" o.c.
3. Expansion joint bellows must be twice the width of the expansion joint opening to allow for proper expansion/contraction.

L. Roof Drains

1. Roof drains, as well as EverGuard® TPO retrofit 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 drains, are acceptable.
2. Roof drains must be provided with a min. 36" x 36" sumped area, if possible. 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.
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 tapered sumps up to 4" in 12", the Freedom™ membrane is cut just short of the drain flange. A separate smooth reinforced membrane drain flashing sheet is fully adhered and heat welded to the top of the deck sheet, and set into the drain bowl in a full bed of EverGuard® Water Block, and secured. If installing a self-adhered (RS) system and a minor sump occurs, one solution is the run the target piece of Freedom™ membrane up onto the flat plane of the roof. Clean and prime the deck sheet and after allowing the primer to flash, mate the target piece and deck sheet together. Next, cut strips of Freedom™ sheet 6" wide and install them over the existing seam. Be sure to clean and prime the deck membrane first, and then install the stripping and roll it into place. Be sure to overlap the corners and don't forget to prime these corners before installing the cover strip. If the sump is too severe and the target sheet wrinkles (does not fully adhere), then a retrofit drain will be required per specifications.
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. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide reinforced membrane strip heat welded to the membrane.
7. Tighten the drain compression clamping ring in place.

M. Scuppers

1. Coated metal roof edge scuppers must be provided with a min. 4" wide flange nailed to wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.
2. Coated metal wall scuppers must be provided with 4" wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ fasteners 6" on center, a minimum of 2 fasteners per side.
4. All corners must be reinforced with EverGuard® TPO Universal Corners.
5. Strip in scupper with flashing membrane target sheet.
6. Alternately, when installing a Freedom™ RS membrane system, a standard galvanized roof edge scupper with fully soldered seams may be utilized. Priming of the metal and membrane substrates shall be done before roof edge scupper is installed.
7. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to the membrane on the wall face and roof deck and terminated on the out side wall face with a termination bar, Water Block, and caulk.
8. In lieu of the above field or shop fabricated scuppers, GAF has available pre-fab scuppers that are custom made. Contact your GAF Territory Manager for details.

N. 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 in direct contact with 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.

O. Wood Support Blocking

1. 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® TPO membrane or EverGuard® Walkway Rolls.

P. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of EverGuard® Walkway Rolls.

Q. Lightning Suppression Clips

1. Embed lightning suppression clips in EverGuard® Caulking applied to a protective layer of 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® TPO Flashing membrane heat welded to the roof membrane. Install walkway rolls at all roof access locations including ladders, hatchways, stairways and doors, and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

3.12 Traffic Protection

A. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install walkway rolls at other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkway rolls must be spaced 2" to allow for drainage between the pads.

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

D. TPO walkway rolls 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.

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 (see section 3.10.B), 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