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Attachment Tables for TPO & PVC

-System Guidelines-

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1 Campus Drive, Parsippany, NJ 07054 | 973.628.3000 | Toll Free 877.423.7663 | gaf.com

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ADHERED SYSTEMS

TABLE 1 - INSULATION FASTENER & PLATE (TABLE 1 OF 3)

For insulation attachment, use Table 1 to determine the proper fastener and plate and Tables 2 & 3 to determine the number of fasteners per board.

Deck Type	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)
Steel[1] (Min. 22 gauge)	#12	3" (76 mm) Steel	3/4" (19 mm) through the deck
	HD #14		
Wood (Plywood, OSB and Plank)	#12	3" (76 mm) Steel	3/4" (19 mm) through the deck
	HD #14		
	XHD #15		
Structural Concrete (Min. 2,500 psi)	HD #14	3" (76 mm) Steel	1" (25 mm) thread into the deck
	CD-10		1" (25 mm) shank into the deck
Gypsum Concrete and Cementitious Wood Fiber (Tectum)	Polymer GypTec™	3" (51 mm) GypTec™	1 1/2" (38 mm) thread into the deck
	LD (Lite Deck)	3" (76 mm) LD (Lite Deck)	

[1] 24-26 gauge decks require a GAF Field Services Manager's or Director's approval. GAF does not approve the use of metal panels as roof decks.

ADHERED SYSTEMS

TABLE 2 - INSULATION ATTACHMENT (TABLE 2 of 3)

STANDARD ATTACHMENT FOR APPROVED STEEL, CONCRETE, WOOD, GYPSUM & CEMENTITIOUS WOOD FIBER DECKS

For insulation attachment, use Table 1 to determine the proper fastener and plate and Tables 2 & 3 to determine the number of fasteners per board.

Insulation Type	Board Size	Thickness	Standard Attachment Fasteners per Board		
			Field	Perimeter	Corner
EnergyGuard™ Polyiso	4′ x 4′ (1.2 m x 1.2 m)	.5″ - 1.4″ (13 - 35 mm)	8	12	16
	4′ x 4′ (1.2 m x 1.2 m)	1.5″ - 1.9″ (38 - 48 mm)	5	8	10
	4′ x 4′ (1.2 m x 1.2 m)	2″ (51 mm) minimum	4	6	8
	4′ x 8′ (1.2 m x 2.4 m)	.5″ - 1.4″ (12 - 35 mm)	16	24	32
	4′ x 8′ (1.2 m x 2.4 m)	1.5″ - 1.9″ (38 - 48 mm)	10	15	20
	4′ x 8′ (1.2 m x 2.4 m)	2″ (51 mm) minimum	8	12	16
EnergyGuard™ HD Polyiso	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	8	12	16
EnergyGuard™ Barrier Polyiso	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	8	12	16
USG SECUROCK® Brand Gypsum-Fiber Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ (6 mm) minimum	8	12	16
	4′ x 8′ (1.2 m x 2.4 m)	5/8″ (15 mm) minimum	6	9	12
DensDeck® Prime Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ (6 mm) minimum	8	12	16
Blue Ridge STRUCTODEK® HD Fiberboard	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	16	24	32

ADHERED SYSTEMS

TABLE 3 - INSULATION ATTACHMENT (TABLE 3 of 3)

*90 PSF UPLIFT RESISTANCE FOR APPROVED **STEEL & CONCRETE DECKS***

For insulation attachment, use Table 1 to determine the proper fastener and plate and Tables 2 & 3 to determine the number of fasteners per board.

Insulation Type	Board Size	Thickness	Attachment Fasteners/Board (For 90 psf Uplift Resistance)		
			Field	Perimeter	Corner
EnergyGuard™ Polyiso	4′ x 4′ (1.2 m x 1.2 m)	1.5″ - 1.9″ (38 - 48 mm)	8	12	16
	4′ x 4′ (1.2 m x 1.2 m)	2″ (51 mm) minimum	4	6	8
	4′ x 8′ (1.2 m x 2.4 m)	1.5″ - 1.9″ (38 - 48 mm)	16	24	32
	4′ x 8′ (1.2 m x 2.4 m)	2″ (51 mm) minimum	8	12	16
EnergyGuard™ HD Polyiso	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	16	24	32
EnergyGuard™ Barrier Polyiso	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	16	24	32
USG SECUROCK® Brand Gypsum-Fiber Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ (6 mm) minimum	10	15	20
	4′ x 8′ (1.2 m x 2.4 m)	5/8″ (15 mm) minimum	6	9	12
DensDeck® Prime Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ (6 mm) minimum	10	15	20
	4′ x 8′ (1.2 m x 2.4 m)	1/2″ (13 mm) minimum	8	12	16

MECHANICALLY ATTACHED SYSTEMS

TABLE 1 - INSULATION FASTENER & PLATE (TABLE 1 OF 5)

For insulation attachment, use Table 1 to determine the proper fastener and plate and Table 2 to determine the number of fasteners per board.

Deck Type	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)
Steel (22-18 gauge)	#12	3" (76 mm) Steel	3/4" (19 mm) through the deck
	HD #14		
Steel[1] (24-26 gauge)	HD #14	3" (76 mm) Steel	3/4" (19 mm) through the deck
	XHD #15		
Wood (Plywood, OSB and Plank)	#12	3" (76 mm) Steel	3/4" (19 mm) through the deck
	HD #14		
	XHD #15		
Structural Concrete (Min. 2,500 psi)	HD #14	3" (76 mm) Steel	1" (25 mm) thread into the deck
	CD-10		1" (25 mm) thread into the deck
Lightweight Insulating Concrete[1] (LWIC over 22-24 ga. Standard Form Deck)	#12	3" (76 mm) Steel	3/4" (19 mm) thread through the steel form
	#14		
	XHD #15		
Gypsum Concrete and Cementitious Wood Fiber (Tectum)	Polymer GypTec™	3" (51 mm) GypTec™	1 1/2" (38 mm) thread into the deck
	LD (Lite-Deck)	3" (76 mm) LD (Lite Deck)	

[1] 24-26 gauge decks require a GAF Field Services Manager's or Director's approval. Refer to GAF's A Guide to Metal Roof Retrofit in Commercial Low-slope Roof Assemblies for installations over existing metal roofs.

MECHANICALLY ATTACHED SYSTEMS

TABLE 2 - INSULATION ATTACHMENT (TABLE 2 OF 5)

For insulation attachment, use Table 1 to determine the proper fastener and plate and Table 2 to determine the number of fasteners per board.

Insulation Type	Board Size	Thickness	Number of Fasteners per Board		
			Field	Perimeter	Corner
EnergyGuard™ Polyiso or EnergyGuard™ HD Polyiso or EnergyGuard™ Barrier Polyiso	4′ x 4′ (1.2 m x 1.2 m)	Any	4	4	4
	4′ x 8′ (1.2 m x 2.4 m)	.5″ - 1.2″ (13-30 mm)	6	6	6
	4′ x 8′ (1.2 m x 2.4 m)	≥ 1.3″ (33 mm)	5	5	5
Perlite	4′ x 4′ (1.2 m x 1.2 m)	Any	4	4	4
Blue Ridge STRUCTODEK® HD Fiberboard	4′ x 4′ (1.2 m x 1.2 m)	Any	4	4	4
	4′ x 8′ (1.2 m x 2.4 m)	Any	6	6	6
Extruded or Expanded Polystyrene[1]	4′ x 4′ (1.2 m x 1.2 m)	Any	4	4	4
	4′ x 8′ (1.2 m x 2.4 m)	.5″ - 1.2″ (13-30 mm)	6	6	6
	4′ x 8′ (1.2 m x 2.4 m)	≥ 1.3″ (33 mm)	5	5	5
Fanfold[1]	2′ x 4′ (610 mm x 1.2 m)	3/8″ (10 mm)	2-1-2-1-2	2-1-2-1-2	2-1-2-1-2
USG SECUROCK® Brand Gypsum-Fiber Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ - 5/8″ (6-15 mm)	6	6	6
DensDeck® Roof Board	4′ x 8′ (1.2 m x 2.4 m)	1/4″ - 5/8″ (6-15 mm)	6	6	6

[1] Smooth PVC must have a 3/6 oz. (85/170 gr.) polymat separator sheet. Fleece-back PVC is acceptable.

MECHANICALLY ATTACHED SYSTEMS

TABLE 3 - 10’ (3.05 m) WIDE TPO & PVC MEMBRANE ATTACHMENT (TABLE 3 of 5)

Deck Type	Minimum Pull-Out Values (lbf)	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)	Standard Attachment	90 psf[1] Attachment
Steel 22 gauge (standard 33 ksi)	450	XHD #15	2 3/8″ (61 mm) Barbed XHD	3/4″ (19 mm) through the deck	12″ (305 mm) o.c.	6″ (152 mm) o.c.
			2″ (51 mm) Double Barbed XHD			
			2 3/4″ (70 mm) Barbed SXHD			
	350	HD #14	2 3/8″ (61 mm) Barbed XHD	3/4″ (19 mm) through the deck	6″ (152 mm) o.c.	--
			2″ (51 mm) Double Barbed XHD			
Steel 22 gauge (high strength 80 ksi)	750	SXHD #21	2 3/4″ (70 mm) Barbed SXHD	3/4″ (19 mm) through the deck	12″ (305 mm) o.c.	12″ (305 mm) o.c.
	450	XHD #15	2 3/8″ (61 mm) Barbed XHD	3/4″ (19 mm) through the deck	12″ (305 mm) o.c.	6″ (152 mm) o.c.
			2″ (51 mm) Double Barbed XHD			
Steel[2] (24-26 gauge)	350	HD #14 XHD #15	2 3/8″ (61 mm) Barbed XHD	3/4″ (19 mm) through the deck	6″ (152 mm) o.c.	--
			2″ (51 mm) Double Barbed XHD			
			2 3/4″ (70 mm) Barbed SXHD			
2″ (51 mm) Nominal Wood Plank	800	HD #14 XHD #15	2 3/8″ (61 mm) Barbed XHD	1″ (25 mm) into the deck	12″ (305 mm) o.c.	6″ (TPO) (152 mm) o.c. or 9″ (PVC) (229 mm) o.c.
			2″ (51 mm) Double Barbed XHD			
1″ (25 mm) Nominal Wood Plank	450	HD #14 XHD #15	2 3/8″ (61 mm) Barbed XHD	1″ (25 mm) into the deck	12″ (305 mm) o.c.	--
			2″ (51 mm) Double Barbed XHD			

TABLE 3 (Continued)

Deck Type	Minimum Pull-Out Values (lbf)	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)	Standard Attachment	90 psf[1] Attachment
3/4" (19 mm) Plywood Or OSB	525	HD #14 XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	12" (305 mm) o.c.	6" (152 mm) o.c.
			2" (51 mm) Double Barbed XHD			
15/32" (13 mm) Plywood[3] Or 7/16" (13 mm) OSB[3]	400	HD #14 XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	12" (305 mm) o.c.[3]	--
			2" (51 mm) Double Barbed XHD			
	300	HD #14 XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	9" (229 mm) o.c.[3]	--
			2" (51 mm) Double Barbed XHD			
	200	HD #14 XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	6" (152 mm) o.c.[3]	--
			2" (51 mm) Double Barbed XHD			
Structural Concrete (Min. 2,500 psi)	700	HD #14	2 3/8" (61 mm) Barbed XHD	1" (25 mm) into the deck	12" (305 mm) o.c.	6" (152 mm) o.c.
			2" (51 mm) Double Barbed XHD			
	900	CD-10	2 3/8" (61 mm) Barbed XHD	1" (25 mm) into the deck	12" (305 mm) o.c.	6" (152 mm) o.c.
			2" (51 mm) Double Barbed XHD			
			2 3/4" (70 mm) Barbed SXHD			12" (305 mm) o.c.
Lightweight Insulating Concrete (22 gauge Standard Form)	450	XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the form	12" (305 mm) o.c.	6" (152 mm) o.c.
			2" (51 mm) Double Barbed XHD			
	350	HD #14	2 3/8" (61 mm) Barbed XHD		6" (152 mm) o.c.	--
			2" (51 mm) Double Barbed XHD			

TABLE 3 (Continued)

Deck Type	Minimum Pull-Out Values (lbf)	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)	Standard Attachment[3]	90 psf[1] Attachment
Lightweight Insulating Concrete[2] (24-26 gauge Standard Form)	350	HD #14 XHD #15	2 3/8" (61 mm) Barbed XHD 2" (51 mm) Double Barbed XHD	3/4" (19 mm) through the form	6" (152 mm) o.c.	--
Gypsum Concrete	400	Polymer GypTec™	2" (51 mm) GypTec™	1 1/2" (38 mm) into the deck	9" (229 mm) o.c.	6" (152 mm) o.c.
Cementitious Wood Fiber (Tectum)	300	Polymer GypTec™	2" (51 mm) GypTec™	1 1/2" (38 mm) into the deck	6" (152 mm) o.c.	--

[1] 90 psf is the attachment pattern to provide 90 lbf/ft (5.3 kPa) of uplift pressure resistance and may equate to FM I-90. Refer to the current FM Approval Guide.

[2] 24-26 gauge decks require a GAF Field Services Manager's or Director's approval. GAF does not approve the use of metal panels as roof decks.

[3] Standard pattern limited to:

- 40' (12.19 m) max height, Exposure B, Enclosed building in a non-special/high wind region or
- 30' (9.14 m) max height, Exposure C, Enclosed building in a non-special/high wind region.
- For buildings exceeding these specifics, please contact GAF for assistance (e.g., coastal and mountain regions).

Note: When designing for higher uplift pressures, please consult the current FM Approval Guide/ROOFNAV.

MECHANICALLY ATTACHED SYSTEMS

TABLE 4 - 12' (3.66 m) WIDE TPO MEMBRANE ATTACHMENT OVER STEEL DECKS (TABLE 4 of 5)

Deck Type	Minimum Pull-Out Values (lbf)	Drill-Tec™ Fastener Type	Drill-Tec™ Plate Type	Penetration (min.)	Standard Attachment	90 psf[1] Attachment
Steel 22 gauge (standard 33 ksi)	450	XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	12" (152 mm) o.c. **(Min. 60 mil)**	--
			2" (51 mm) Double Barbed XHD		12" (152 mm) o.c. **(Min. 60 mil)**	--
			2 3/4" (70 mm) Barbed SXHD		12" (305 mm) o.c.	--
	750	SXHD #21	2 3/4" (70 mm) Barbed SXHD	3/4" (19 mm) through the deck	12" (305 mm) o.c.	6" (152 mm) o.c.
Steel 22 gauge (high strength 80 ksi)	450	XHD #15	2 3/8" (61 mm) Barbed XHD	3/4" (19 mm) through the deck	12" (305 mm) o.c.	6" (152 mm) o.c.
			2" (51 mm) Double Barbed XHD			
			2 3/4" (70 mm) Barbed SXHD			
	750	SXHD #21	2 3/4" (70 mm) Barbed SXHD	3/4" (19 mm) through the deck	12" (305 mm) o.c.	6" (152 mm) o.c.

[1] 90 psf is the attachment pattern to provide 90 lbf/ft (5.3 kPa) of uplift pressure resistance and may equate to FM I-90. Refer to the current FM Approval Guide.

General Comments/Requirements

1. This attachment table can only be used for projects that are:

- Maximum roof slope = 2:12
- Maximum building height = 45 feet (18.3 m)
- Exposure B

MECHANICALLY ATTACHED SYSTEMS

TABLE 5 - METAL RETROFIT ATTACHMENT (TABLE 4 of 5)

Maximum Purlin & Fastener Row Spacing	Purlin Type	Minimum Pull-Out Values (lbf)	Drill-Tec™ Purlin Fastener & TPO or PVC XHD Plate Maximum Spacing (o.c.)		
			Field	Perimeter	Corner
Up to 5′ (1.52 m) [every purlin]	Min. 16 gauge	800	12″ (305 mm)	10″ (254 mm)	8″ (203 mm)
	Min. 14 gauge	1000	18″ (457 mm)	12″ (305 mm)	9″ (229 mm)
	Min. 12 gauge	1000	18″ (457 mm)	12″ (305 mm)	9″ (229 mm)
Up to 10′ (3.05 m) [every other purlin]	Min. 16 gauge	800	6″ (152 mm)	10″ (254 mm)	8″ (203 mm)
	Min. 14 gauge	1000	9″ (229 mm)	12″ (305 mm)	9″ (229 mm)
	Min. 12 gauge	1000	9″ (229 mm)	12″ (305 mm)	9″ (229 mm)

General Comments/Requirements

1. This attachment table can only be used for projects that are:

- Maximum roof slope = 2:12
- Maximum building height = 40 feet (18.3 m)
- Maximum enhanced wind speed coverage available: up to 72 mph, on eligible projects only.

2. The attachment capacity of the purlins to the secondary structure must be greater than the attachment capacity of the metal panels to the purlins, especially when an “every other purlin” attachment method is used.

3. Fastener pull-out testing in accordance with ANSI/SPRI FX-1 2016 Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners is recommended. Minimum 1″ (25 mm) Drill-Tec™ Purlin Fastener embedment is required. Fastener pullout tests shall be conducted on the purlins with approved fasteners. Roof sections with low pullout results will require additional pullout tests or additional purlins.

4. Install fasteners into every purlin in perimeter and corner zones.

5. Refer to the *EverGuard® TPO/PVC Mechanically Attached and Drill-Tec™ RhinoBond® Retrofit Roofing Systems Over Metal Roofs Guide* for further information.

DRILL-TEC™ RHINOBOND® SYSTEMS

TABLE 1 - STEEL & CONCRETE DECK ATTACHMENT (TABLE 1 of 5)

Deck Type	MinImum Pull-Out Value (lbf)	Drill-Tec™ Fastener	Drill-Tec™ Plate	Minimum Penetration	Fastening Pattern 4' x 8' (2.4 m x 1.2 m) Boards (Field, Perimeter, Corner)		
					Standard Attachment	90 psf Uplift	120 psf Uplift
Steel 22 gauge (standard 33 ksi)	450	#15 XHD	RhinoBond® TPO or PVC XHD	3/4" (19 mm) through the deck	6, 9, 12	6, 10, 15	--
	600	#21 SXHD		1" (25 mm) through the deck	6, 9, 12	6, 10, 15	--
Steel 22 gauge (high strength 80 ksi)	450	#15 XHD	RhinoBond® TPO or PVC XHD	3/4" (19 mm) through the deck	6, 9, 12	6, 10, 15	8, 15, 20
	750	#21 SXHD		1" (25 mm) through the deck	6, 9, 12	6, 10, 15	8, 15, 20
Structural Concrete (Min. 2,500 psi)	700	#14 HD	RhinoBond® TPO or PVC XHD	1" (25 mm) into the deck	6, 9, 12	6, 10, 15	8, 15, 20
	900	CD-10		1" (25 mm) into the deck	6, 9, 12	6, 10, 15	8, 15, 20
Lightweight Insulating Concrete (LWIC over 22 gauge Standard Form)	450	#15 XHD	RhinoBond® TPO or PVC XHD	3/4" (19 mm) through form	6, 9, 12	--	--
	350	#14 HD		3/4" (19 mm) through form	6, 9, 12	--	--
Lightweight Insulating Concrete (LWIC over 24-26 gauge Standard Form)	350	#15 XHD	RhinoBond® TPO or PVC XHD	3/4" (19 mm) through form	6, 9, 12	--	--
	350	#14 HD		3/4" (19 mm) through form	6, 9, 12	--	--

General Comments/Requirements

1. The Drill-Tec™ RhinoBond® Attachment System is not acceptable over gypsum or cementitious wood fiber, but it is acceptable over structural or lightweight insulating concrete decks. However, other methods of attachment may be more appropriate, depending on the project type. Contact your local GAF Field Services Area Manager for possible alternatives.

2. Confirm quality and condition of roof decking by visual inspection, if possible, and by fastener pull-out testing. Remove and replace all deteriorated decking.

3. The Drill-Tec™ RhinoBond® TPO or PVC XHD Plate is used to attach rigid insulation to roof decks. The special coating on the plates allows for EverGuard® TPO or PVC membranes to be welded to each plate using the RhinoBond® magnetic induction welding tool. Drill-Tec™ RhinoBond® Plates are different in type and color: TPO plates are yellow, while the PVC plates are black in color. The appropriate plate must be used with the appropriate membrane type.

4. When installing Drill-Tec™ RhinoBond® Fasteners into lightweight insulating concrete that is poured over structural concrete, the fastener must penetrate a minimum of 1" (25 mm) into the structural concrete deck. A 7/32" (5.5 mm) pre-drilled hole is required for Drill-Tec™ CD-10 fasteners. A 3/16" (4.8 mm) pre-drilled hole is required for Drill-Tec™ HD #14 fasteners.

5. Supplemental fastening of insulation using Drill-Tec™ fastener and insulation plate must be either plastic or a different shape to differentiate from RhinoBond® plate when additional fastening is required.

6. 24-26 gauge decks require a GAF Field Services Manager's or Director's approval. Refer to GAF's A Guide to Metal Roof Retrofit in Commercial Low-slope Roof Assemblies for installations over existing metal roofs.

DRILL-TEC™ RHINOBOND® SYSTEMS

TABLE 2 - METAL RETROFIT ATTACHMENT (TABLE 2 of 5)

Maximum Purlin & Fastener Row Spacing	Purlin Type	Drill-Tec™ Purlin Fastener & Drill-Tec™ RhinoBond® TPO or PVC XHD Plate Maximum Spacing (o.c.)		
		Field	Perimeter	Corner
Up to 5′ (1.52 m) [every purlin]	Min. 16 gauge	24″ (610 mm)	10″ (254 mm)	8″ (203 mm)
	Min. 14 gauge	24″ (610 mm)	12″ (305 mm)	9″ (229 mm)
	Min. 12 gauge	24″ (610 mm)	12″ (305 mm)	9″ (229 mm)

General Comments/Requirements

1. This attachment table can only be used for projects that are:

- Maximum roof slope = 2:12
- Maximum building height = 40 feet (18.3 m)
- Maximum enhanced wind speed coverage available: up to 72 mph, on eligible projects only.

2. Membrane must be attached to the Drill-Tec™ RhinoBond® TPO or PVC XHD Plates that are installed directly into the structural purlins with the appropriate Drill-Tec™ Purlin Fasteners. The special coating on the plates allows for EverGuard® TPO or PVC membranes to be welded to each plate using the RhinoBond® magnetic induction welding tool. Drill-Tec™ RhinoBond® Plates are different in type and color: TPO plates are yellow, while the PVC plates are black in color. The appropriate plate must be used with the appropriate membrane type.

3. The attachment capacity of the purlins to the secondary structure must be greater than the attachment capacity of the metal panels to the purlins.

4. Fastener pull-out testing in accordance with ANSI/SPRI FX-1 2016 Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners is recommended. Minimum 1″ (25 mm) Drill-Tec™ Purlin Fastener embedment is required. Fastener pullout tests shall be conducted on the purlins with approved fasteners. Roof sections with low pullout results will require additional pullout tests or additional purlins.

5. Fasteners should be offset 12″ (305 mm) between rows.

6. Supplemental fastening of insulation using Drill-Tec™ fasteners and insulation plates either plastic or a different shape to differentiate from RhinoBond® plates may be required.

7. Refer to the EverGuard® TPO/PVC Mechanically Attached and Drill-Tec™ RhinoBond® Retrofit Roofing Systems Over Metal Roofs Guide for further information.

DRILL-TEC™ RHINOBOND® SYSTEMS

TABLE 3 - WOOD DECK ATTACHMENT (TABLE 3 of 5)
INSULATED ASSEMBLIES

Deck Type	Drill-Tec™ Fastener	Drill-Tec™ Plate	Minimum Pull-Out Value (lbf)	Max. Building Height	Fasteners Per 4′ x 8′ (1.2 m x 2.4 m) Insulation Board		
					Field	Perimeter	Corner
Wood (Plywood, OSB and Plank)	HD #14 XHD #15	RhinoBond® TPO or PVC XHD	200	60′ (18 m)	8	12	12
	HD #14 XHD #15	RhinoBond® TPO or PVC XHD	300	60′ (18 m)	6	10	10

General Comments/Requirements

1. Confirm quality and condition of roof decking by visual inspection, and by fastener pull-out testing. Remove and replace all deteriorated decking.

2. The Drill-Tec™ RhinoBond® TPO or PVC XHD Plate is used to attach rigid insulation to roof decks. The special coating on the plates allows for EverGuard® TPO or PVC membranes to be welded to each plate using the RhinoBond® magnetic induction welding tool. Drill-Tec™ RhinoBond® Plates are different in type and color: TPO plates are yellow, while the PVC plates are black in color. The appropriate plate must be used with the appropriate membrane type.

3. Fasteners shall be of sufficient length to penetrate through the plywood or OSB sheathing a minimum of 3/4″ (19 mm) and 1″ (25 mm) embedment into the wood plank deck. Fasteners shall not be driven through the joints of the wood plank.

4. Fastener selection is based on the actual/specific deck performance matched with the fastener being used.

5. This attachment table can only be used for projects that are:
- Exposure Category B or C
- Enclosed building in a non-special/high wind region, e.g., mountains, coastal
- For buildings exceeding these specifics, please contact GAF for assistance

6. No individual pullout value can be less than the absolute minimum listed for the given fastening pattern. If the individual pullout values do not meet the minimum pull-out values, alternative fastening is required.

7. If your project does not meet these requirements, you must contact GAF for further information.

DRILL-TEC™ RHINOBOND® SYSTEMS

TABLE 4 - WOOD DECK ATTACHMENT (TABLE 4 of 5)

UNINSULATED ASSEMBLIES WITH VERSASHIELD® SOLO™ FIRE RESISTANT SLIP SHEET

Deck Type	Drill-Tec™ Fastener	Drill-Tec™ Plate	Minimum Pull-Out Value (lbf)	Max. Building Height	Fastener Grid Layout (Spacing shows plate/fastener location o.c. and then row spacing)		
					Field	Perimeter	Corner
Wood (Plywood, OSB and Plank)	HD #14 XHD #15	RhinoBond® TPO or PVC XHD	200	60′ (18 m)	24″ o.c. rows spaced 24″ apart	16″ o.c. rows spaced 24″ apart	16″ o.c. rows spaced 24″ apart
	HD #14 XHD #15	RhinoBond® TPO or PVC XHD	300	60′ (18 m)	32″ o.c. rows spaced 24″ apart	18″ o.c. rows spaced 24″ apart	18″ o.c. rows spaced 24″ apart

General Comments/Requirements

1. Confirm quality and condition of roof decking by visual inspection, and by fastener pull-out testing. Remove and replace all deteriorated decking.

2. The Drill-Tec™ RhinoBond® TPO or PVC XHD Plate is used to attach rigid insulation to roof decks. The special coating on the plates allows for EverGuard® TPO or PVC membranes to be welded to each plate using the RhinoBond® magnetic induction welding tool. Drill-Tec™ RhinoBond® Plates are different in type and color: TPO plates are yellow, while the PVC plates are black in color. The appropriate plate must be used with the appropriate membrane type.

3. Fasteners shall be of sufficient length to penetrate through the plywood or OSB sheathing a minimum of 3/4″ (19 mm) and 1″ (25 mm) embedment into the wood plank deck. Fasteners shall not be driven through the joints of the wood plank.

4. Fastener selection is based on the actual/specific deck performance matched with the fastener being used.

5. This attachment table can only be used for projects that are:

- Exposure Category B or C
- Enclosed building in a non-special/high wind region, e.g., mountains, coastal
- For buildings exceeding these specifics, please contact GAF for assistance

6. No individual pullout value can be less than the absolute minimum listed for the given fastening pattern. If the individual pullout values do not meet the minimum pull-out values, alternative fastening is required.

7. If your project does not meet these requirements, you must contact GAF for further information.

DRILL-TEC™ RHINOBOND® SYSTEMS

TABLE 5 - WOOD JOISTS ATTACHMENT (TABLE 5 of 5)

Membranes	Drill-Tec™ Fastener	Drill-Tec™ Plate	Fastener Embedment	Fastener Spacing Along Wood Joists	Wood Joist Spacing	Uplift (psf)
EverGuard® TPO, EverGuard Extreme® TPO, EverGuard® PVC, EverGuard® PVC KEE	HD #14	RhinoBond® TPO or PVC XHD	1" (25 mm) into 2" x 8" (51 x 203 mm) support [1.5" (38 mm) through plywood or OSB decking joint and into lumber]	12" (305 mm)	96" (2.44 m)	60
				24" (610 mm)	48" (1.22 m)	75
				36" (914 mm)	24" (610 mm)	105
				24" (610 mm)	24" (610 mm)	150
				18" (452 mm)	24" (610 mm)	165

General Comments/Requirements

1. Drill-Tec™ RhinoBond® test results with fasteners driven into 2" x 8" (51 X 203 mm) wood joists over 1/2" (12 mm) plywood or OSB. GAF does not take responsibility for the fastening of the wood substrate to the structure below.

2. Membrane must be attached to the Drill-Tec™ RhinoBond® TPO or PVC XHD Plates that are installed directly into the structural wood joists with Drill-Tec™ #14 Fasteners. The special coating on the plates allows for EverGuard® TPO or PVC membranes to be welded to each plate using the RhinoBond® magnetic induction welding tool. Drill-Tec™ RhinoBond® Plates are different in type and color: TPO plates are yellow, while the PVC plates are black in color. The appropriate plate must be used with the appropriate membrane type.

3. Fastener pull-out testing in accordance with ANSI/SPRI FX-1 2016 Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners is recommended. Minimum 1" (25 mm) Drill-Tec™ Fastener embedment is required. Fastener pullout tests shall be conducted in the wood joists with approved fasteners. Roof sections with low pullout results will require additional pullout tests or additional wood joists.

4. Supplemental fastening of insulation using Drill-Tec™ fasteners and insulation plates either plastic or a different shape to differentiate from Drill-Tec™ RhinoBond® plates may be required.