

Custom Seal PVC Codes Manual

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GUIDELINES FOR COMPLIANCE TO FACTORY MUTUAL REQUIREMENTS

These guidelines are designed to aid you in the process of meeting Factory Mutual requirements when they are specified. Custom Seal published specifications are the minimum requirements necessary to obtain the applicable Custom Seal warranty. Factory Mutual requirements are not covered in Custom Seal specifications and are considered to be above and beyond the provisions of the Custom Seal warranty. It is not the responsibility of Custom Seal Roofing Systems to ensure that all Factory Mutual requirements have been satisfied. This is the responsibility of the roofing contractor and the specifying party.

All materials used in the roofing systems must be FM approved and have been tested together as part of a complete roofing assembly. Individual components may be FM approved but may not have been tested together as part of an Approved roofing assembly. Approved assemblies are listed in the current Factory Mutual Approval Guide.

If the building is insured by Factory Mutual, the local FM office must be contacted for specific system requirements regardless of the published approvals.

All fasteners used for the securement of the insulation and membrane must penetrate the top flutes of the steel deck. (Exception: Recover) Standard metal decks cannot be less than 22 gauge. Some assemblies require a Grade E steel deck, please refer to the current FM Approval Guide for more information.

In addition to the assembly requirements listed in this manual and the current published FM Approval Guide, other criteria are required to obtain FM ratings and will require that additions be made to the standard system. The following is a short overview of the Factory Mutual requirements.

INSULATION FASTENING/ATTACHMENT

As per FM Loss Prevention Data Sheets 1-28¹ & 1-29² and the September 1999 Approval Guide³, the fastening requirements for mechanically attached and fully adhered insulation attachment are as follows:

Mechanically Attached Insulation/Mechanically Attached Single Ply Membrane

- FM requires a minimum of 4 fasteners and plates for the securement of insulation boards with any one dimension over 4 ft. (1 fastener and plate per 8 sq ft)³
(Note Custom Seal requires a minimum of 5 fasteners and plates per 4 ft by 8 ft board)
- FM **DOES NOT** require an increase in insulation board fastener density in the perimeter or corner areas over the field fastening rate²
- Use of vapor or air barrier requires insulation fastening at 1 every 2 sq ft with 50% increase in perimeter and 75% increase in the corner areas²
- Recover maximum 1 in thick insulation²
- Corner and perimeter width is defined as either 10% of the building lesser plan dimension or 40% of the building eave height, which ever is less, but never less than 4 ft

Mechanically Attached Insulation/Fully Adhered Single Ply Membrane

- See insulation attachment tables in Approval Guide for Approval (note brackets "()" indicate 1-90 fastener density)³
- Insulation fastener density must be increased by 50% in the perimeter areas and 75% in the corner areas
- Corner and perimeter width is defined as either 10% of the building lesser plan dimension or 40% of the building eave height, which ever is less, but never less than 4 ft

INSULATION FASTENING/ATTACHMENT (cont.)

Fully Adhered Insulation/Fully Adhered Single Ply Membrane

- For use over structural concrete with Approved insulation (see Approval Guide).
- Insulation adhesive application rate must be increased by at least 70% in the perimeter and 160% in the corners.
- Corner and perimeter width is defined as either 10% of the building lesser plan dimension or 40% of the building eave height, which ever is less, but never less than 4 ft.

MEMBRANE ATTACHMENT

Additional membrane attachment is required by FM Loss Prevention Data Sheet 1-29 in the perimeter and corner areas. The perimeter and corner width is defined as either 10% of the building lesser plan dimension or 40% of the building eave height, which ever is less, but never less than 4 ft.

The increase in fastening of the membrane for the perimeter area is accomplished by reducing distance between fastening rows by using half sheets. The fastening rate for the half sheets is the same as the field of the roof.

The increase in the corner areas can be accomplished by either of the following ways:

- Overlap all half sheets in the corners. (see Fig. 1)
- Additional anchor bars or plates in between the half sheet rows in the corner areas. If anchor bars or discs are used they must be covered with an approved cover strip. (see Fig 2)

Example:

Building Height = 15.3 m (50 ft)

$$15.3 \text{ m} \times 0.4 = 6.1 \text{ m}$$

$$(\underline{50 \text{ ft} \times 0.4 = 20 \text{ ft}})$$

Lesser Plan Dimension = 45.7 m X 27.5 m
(150 ft X 90 ft)

$$27.5 \text{ m} \times 0.1 = 2.8 \text{ m}$$

$$(\underline{90 \text{ ft} \times 0.1 = 9 \text{ ft}})$$

In this example, 2.8 m (9 ft) is the lesser perimeter width based on $90 \text{ ft} \times 0.1 = 9 \text{ ft}$. If the system requires increased attachment of the insulation in the perimeter and corner areas (example – air barrier under insulation), the perimeter area would be rounded up to the next full board, which is 12 ft or 16 ft depending on layout. The corner area will be 12 ft by 12 ft (round up). (See Figure 3 for insulation board layout). The number of half sheets required will depend on the width of the half sheet. Divide the perimeter width by the half sheet width to determine the number of half sheets required in the perimeter of a building. (Note - Always round up perimeter to a whole number of half sheets.) In the example, if the half sheets were fastened at 3 ft o.c. fastening rows, it would require 3 half sheets, = 9 ft. If the half sheets are 4 ft o.c. then it will also require 3 half sheets, =12 ft.

- Membrane corner layout with perimeter sheets overlapping

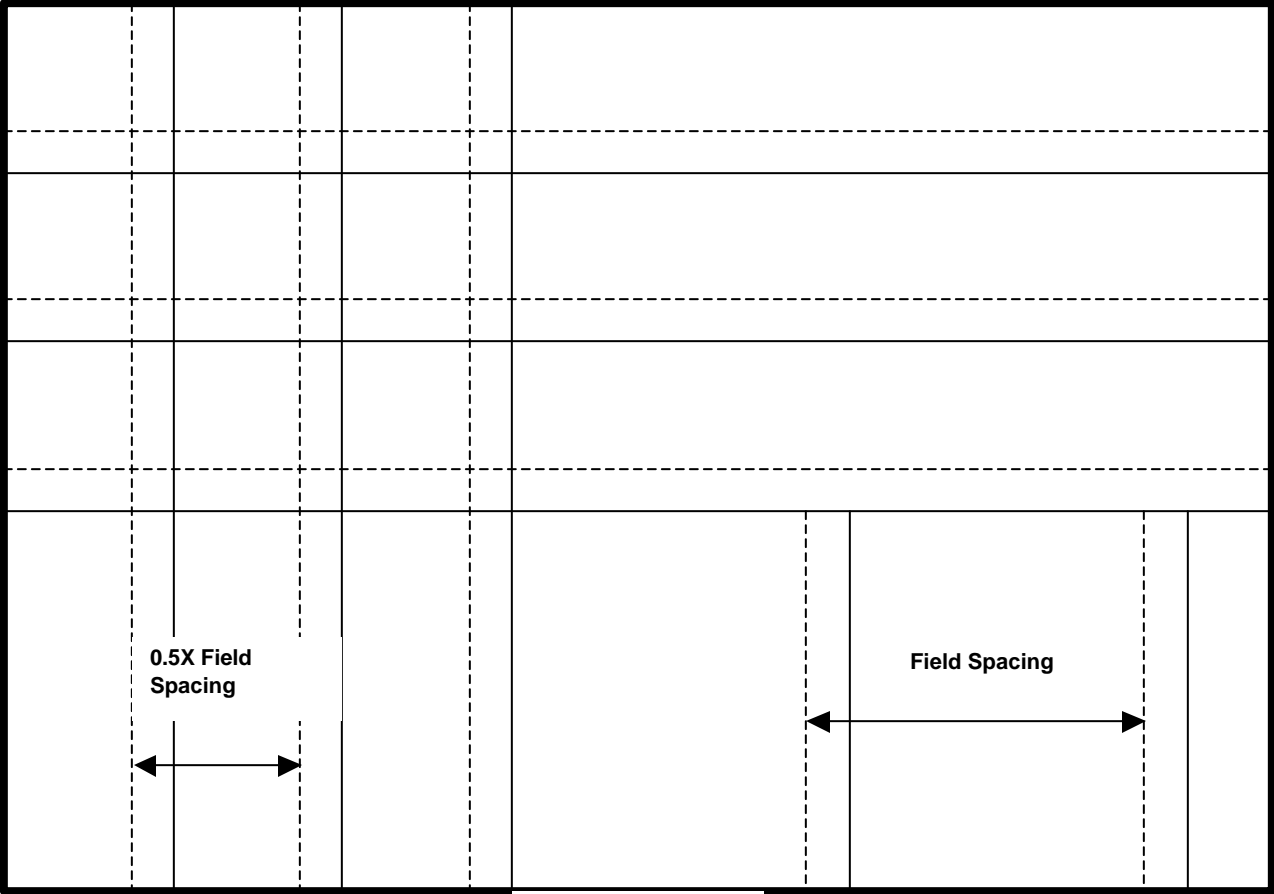
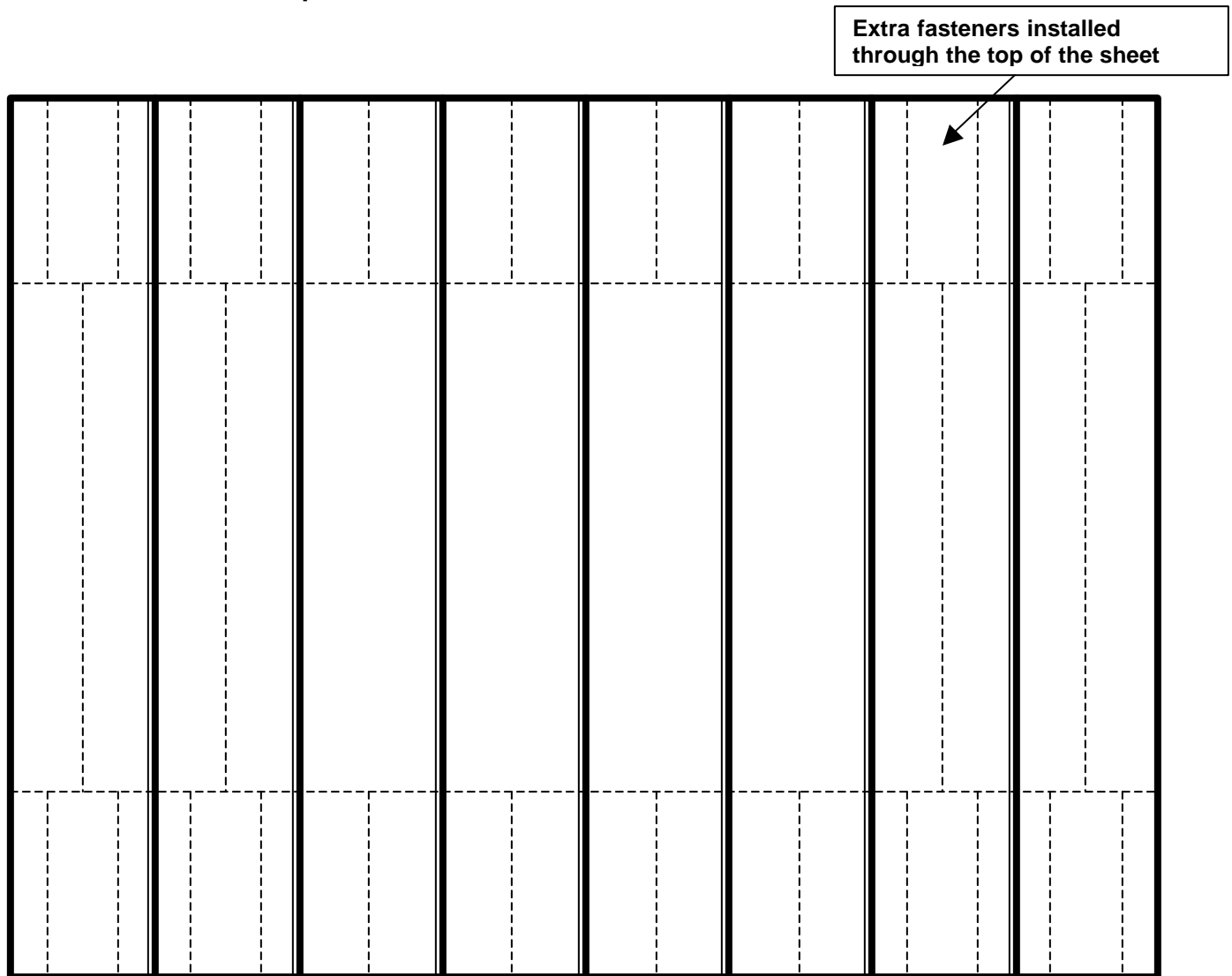


Figure 1

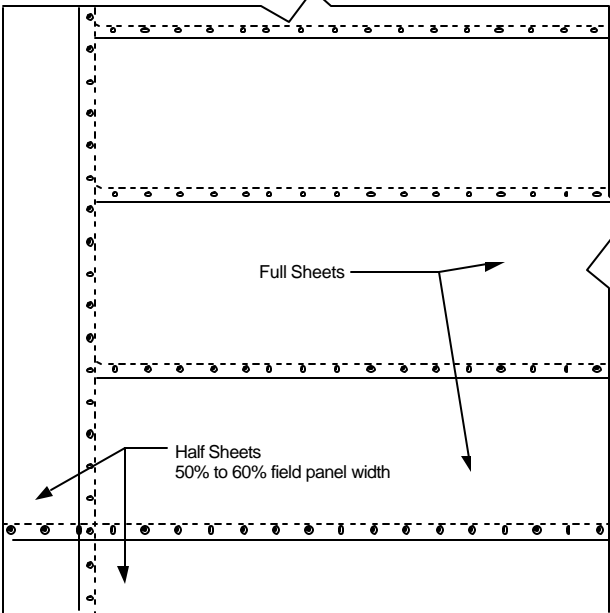
IF TWO LAYERS OF MEMBRANE ARE INSTALLED IN THE CORNER AREAS, ALL FASTENERS MUST SECURE THE TOP LAYER.

- **Corner layout with increased fasteners through the top of the sheet**



- All roof cover fasteners should engage the top flanges of the steel deck.
- Battens or plates and fasteners must be installed perpendicular to steel deck flutes.
Exception: for class 1-90 and below, fastener rows or batten bars can be installed parallel to the building edge within the defined perimeter width if the distance between fastener rows in this area is ≤ 3 ft.
- Perimeter enhancement is achieved by installing batten bars or rows of fasteners and plates in the configuration shown in the above detail and located so as to reduce the area of roof secured by the integral seam fastener assemblies by 50% in the designated perimeter area of the roof and by 60% in the designated corner areas of the roof.

For Use On Roofs 0' To 50' Above Ground Level



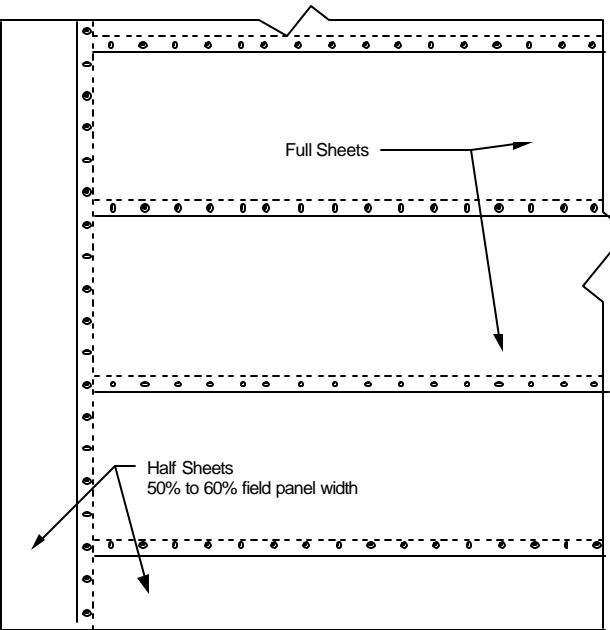
All Custom Seal PVC Mechanically Attached Systems require half sheet perimeter securement. A half sheet width of up to 60% of the width of the field panels may be used. Half sheet securement is equal to the membrane securement used in the field of the roof. See the Mechanically Attached PVC Code Matrix for fastener and spacing requirements. If the project must meet Factory Mutual criteria refer to detail 42.04-3 and contact Factory Mutual for review.

Half sheets are required at all exterior edges of the roof system and at the upper level edges of transitions in surface height greater than 3'

If the building being roofed has any of the following conditions contact Custom Seal Technical for assistance in determining half sheet requirements:

- A) Large wall openings totalling 10% or more of any wall area.
- B) Canopies open below the roof deck.
- C) In the immediate vicinity of large bodies of water or coastline.
- D) Building height in excess of 75'.

For projects requiring a warranty wind speed in excess of 54mph contact Custom Seal Technical Department for perimeter securement requirements - additional half sheets and / or fasteners and seam plates may be required.

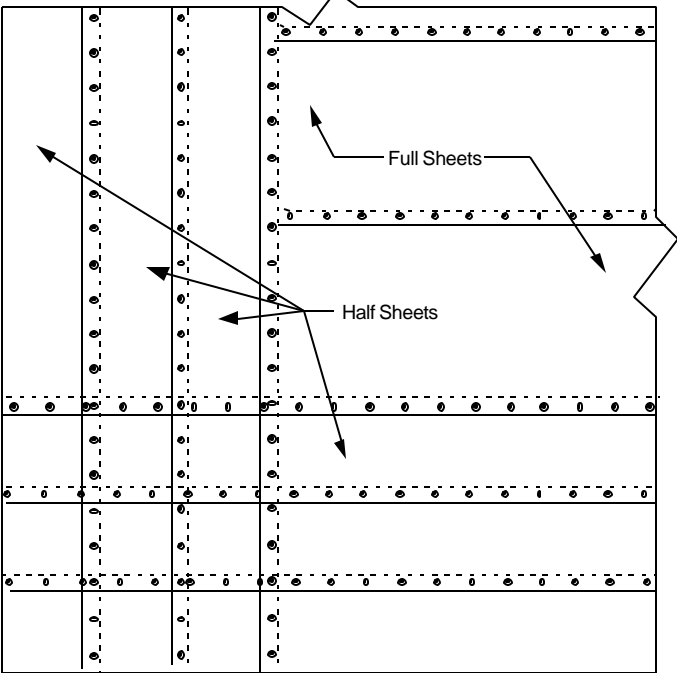


**Perimeter Securement Layout
For Std. Warranty 50' High or Less**

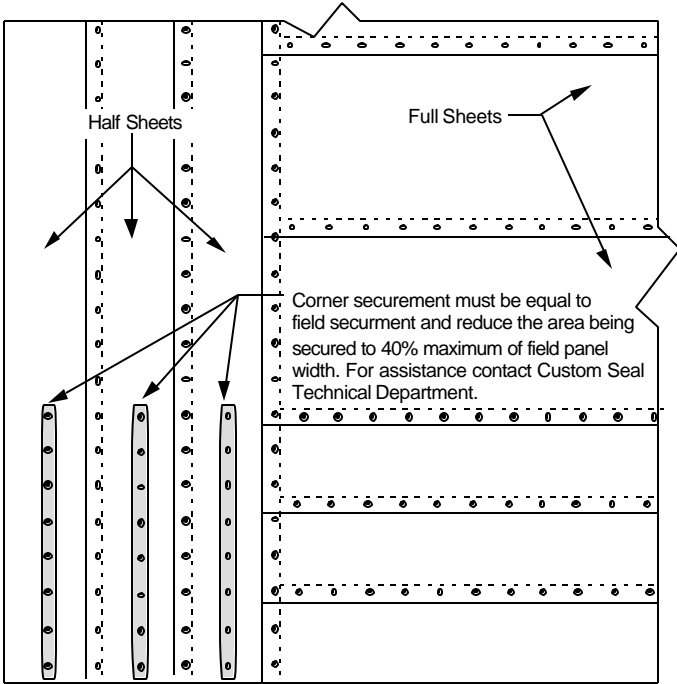
Detail #: 42.04-1

**PVC Systems
Mechanically Attached Only** 10/01

For Use On Roofs Requiring Factory Mutual Rating Compliance



The width of the enhanced perimeter and corner securement areas on a Mechanically attached PVC roof system is determined by multiplying the building height by .4 or the lesser building dimension by .1 whichever is less. The perimeter area must be roofed with half sheets (half sheets up to 60% of the field sheet width are acceptable) secured at the same rate as the full width field sheets of membrane. The corner areas must be further enhanced as shown by criss crossing the half sheets in the corners. Caution: When installing to Factory Mutual requirements all fasteners used to enhance the corner areas must penetrate the uppermost layer seam assembly.

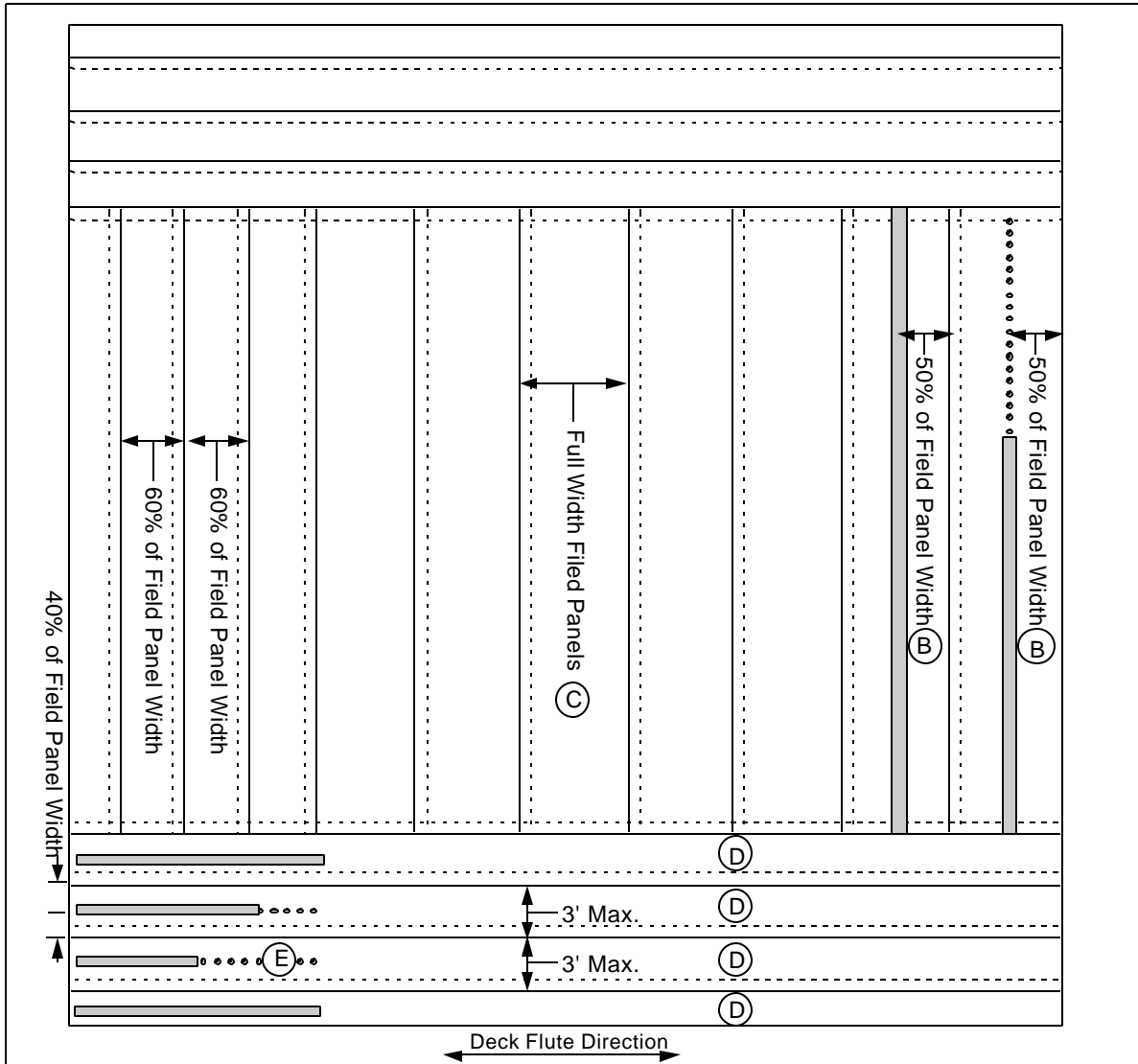


As an option, corner enhancement may be accomplished by installing additional rows of securement through the half sheets and then striping in those rows of securement with PVC membrane following Custom Seal specification.

**Perimeter Securement Layout
For Factory Mutual Rated Systems**

Detail #: 42.04-3

**PVC Systems
Mechanically Attached Only** 10/01



- A. In order to meet FMRC compliance, all roof covering fasteners must engage the top flute of the steel deck.
- B. Batten Bars or fastener and seam plate rows, when used as a means of achieving perimeter securement (splitting full panels into half sheets), should be positioned as required to reduce the width between rows of fasteners by half and then be stripped in with a batten of appropriate material installed in accordance with manufacturer specification.
- C. Full width field panels must be installed perpendicular to steel deck flutes to facilitate proper securement into the top flanges of the steel deck.
- D. Perimeter half sheets must not exceed 3' in width between rows of securement when installed parallel to the steel deck flutes. When run perpendicular to the flutes the half sheet panel width may be sized up to 60% the width of the FMRC approved field sheet width.
- E. Corner areas must be further enhanced with additional fasteners to reduce the panel size down to 40% of field panel width between rows of fasteners. Corner areas are perimeter securement width squared.

Perimeter width is equal to the lesser of 10% of building height or 40% of the lessor building dimension.



Mechanical Securement Pattern for Half Sheets Run Parallel to Deck Flutes

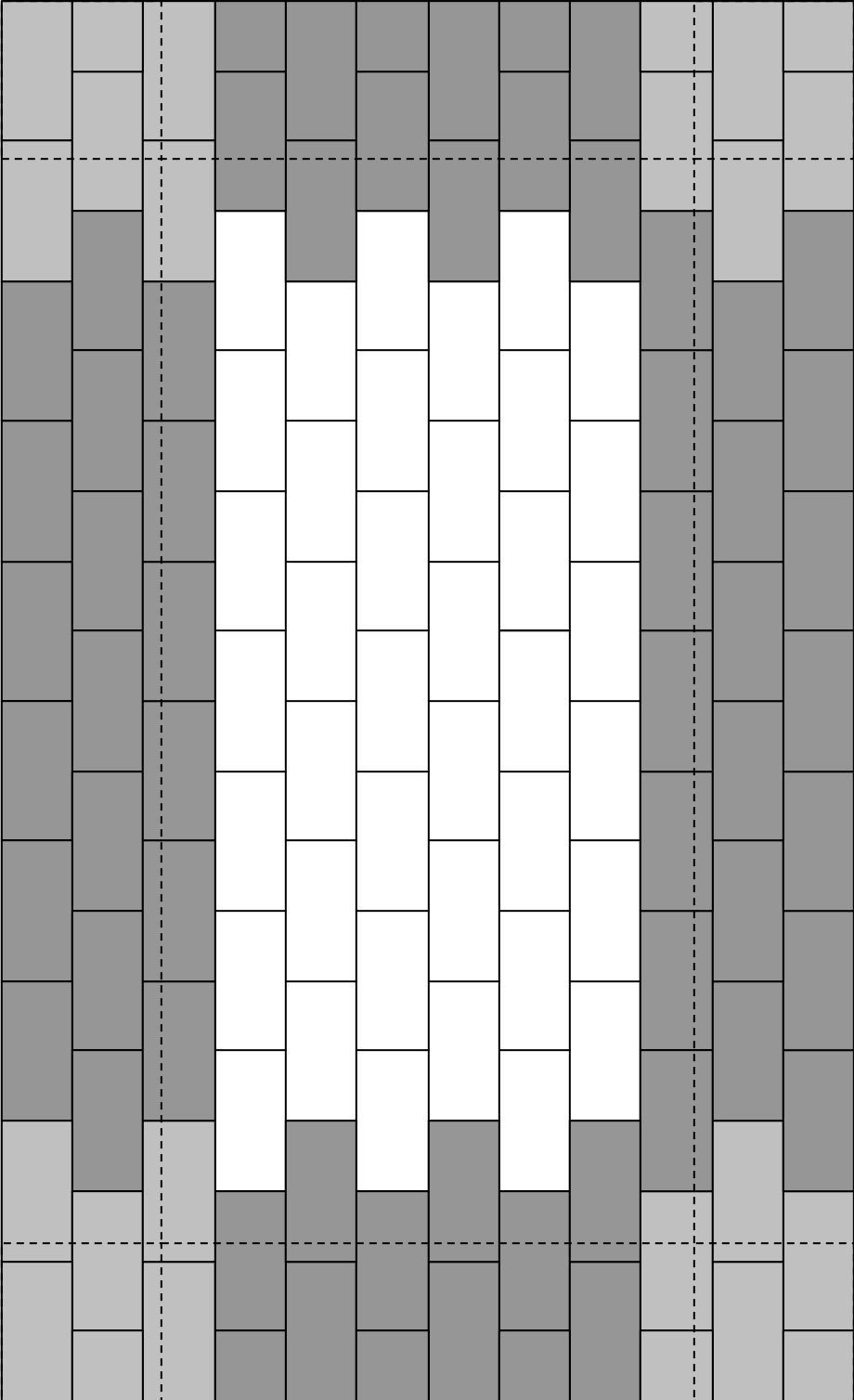
Detail #: MAS Layout

For FM 1-90 or Less MAS Systems

02/03

Figure 3

- Insulation perimeter layout for 9 ft wide perimeter and corner area.
- All insulation boards are 4 ft by 8 ft.
- All corner areas are light gray
- All perimeter areas are dark gray



FACTORY MUTUAL TEST METHOD AND CRITERIA

TEST METHOD

Factory Mutual Research approves roof constructions that have passed FM tests related to combustibility, wind resistance, hail resistance, water leakage, resistance to foot traffic and corrosion resistance. All of these tests are incorporated in FM Approval Standard #4470.

1. Combustibility testing is done via two methods, external (above the deck) and fuel contribution (below the deck) sometimes referred to as calorimeter testing.
 - Above the deck or external combustibility testing is per to ASTM E108 (similar to UL 790 as described in the UL portion of this manual).
 - Below the deck or calorimeter testing is where the complete roof assembly is exposed to an internal fire source for a period of 30 minute intervals. The fuel contribution from the roof assembly is accurately measured at 3, 5, 10 and 30 minute intervals. FM has predetermined fuel contribution levels that cannot be exceeded at any time during this test.
2. Wind resistance testing is done on one of two test tables depending on the system type and rating expected.
 - Fully adhered systems tested for 1-60, 1-75 and 1-90 are tested on the 1.5 m X 2.7 m (5 ft. X 9 ft.) table.
 - All mechanically attached systems (1-60, 1-90, 1-120, etc. and fully adhered systems above 1-90 are tested on the 3.7 m X 7.3 m (12 ft. X 24 ft.) table.
 - A test assembly, on either table, is comprised of a roof deck, insulation, fasteners and a roof membrane. The test assembly is subjected to air pressure from below in 15 psf increments starting at 30 psf for 1 minute at each pressure until failure occurs. Failure can occur in many ways including fasteners pulling out, membranes rupturing, or seam failure.
 - Structural concrete deck systems are tested on a dynamometer with a 2 ft by 2 ft assembly.
3. Water leakage is tested by subjecting a field seam to a ponded water situation for 7 days. If any leakage is observed the sample failed this test.
4. Resistance to foot traffic is simulated by placing a 91 kg (200 pound) load a minimum of 5 times on the same area. If cracking, puncturing or tearing is observed, the sample fails this test.
5. Corrosion resistance of all metal components (screws, bars, etc.) is tested in a cabinet where they are exposed to sulfuric acid for 15 days. Sulfur dioxide is used to simulate acid rain. The most common cabinet that is used is called a Kesternich cabinet. A failure of this test occurs when more than 15% rust develops after 15 days.
6. Hail damage is simulated by subjecting the sample to impact testing.
 - A rating of Class I-SH (Severe Hail Damage Resistant) is achieved by dropping a 1.75 in. diameter steel ball weighing 0.79 lb. From a height of 17 ft 9.5 in. 10 times. No damage is a pass.
 - A rating of Class I-MH (Moderate Hail Damage Resistant) is achieved by dropping a 2 in. diameter weighing 1.625 lb. From a height of 5 ft. 10 times. No damage is a pass.

GUIDELINES FOR COMPLIANCE TO UNDERWRITERS LABORATORIES REQUIREMENTS

DECK TYPE

Combustible Decks

- Wood Plank
- Plywood
- Oriented Strand Board (OSB)
- Chip Board
- Wafer Board

Noncombustible Decks

- Steel
- Aluminum
- Structural Concrete (PIP, precast, plank or channel slab, T's, etc.)
- Lightweight cementitious (Gypsum, minimum 2" Tectum, etc.)

GENERAL REQUIREMENTS

- The minimum thickness of OSB, plywood, etc. is 7/16".
- UL Classified gypsum wallboard, any thickness, may be included in any roofing system without adversely effecting the Classification.
- 1/4" Dens-Deck may be used in lieu of 1/2" gypsum wallboard.
- Insulations may be attached to the deck with fasteners, hot mopping asphalt or UL Classified adhesive.

RECOVER/REROOF

- Classified insulated systems may be installed over existing Classified insulated systems when:
 1. The new system is Classified for use with the existing roof insulation type (glass fiber, perlite, wood fiber, polyisocyanurate, etc.) and
 2. The total thickness of insulation in both systems does not exceed the maximum specified for the new system being applied.

NONCOMBUSTIBLE DECKS

- For installations over noncombustible decks, any UL Classified insulated system utilizing minimum 1" thick insulation (glass fiber, polyisocyanurate or perlite) may be used over any existing insulated system regardless of the type of its insulation provided that the total thickness of insulation in both systems does not exceed the maximum approved for the new system being applied. Classification is determined by the new construction system.
- Insulated roof systems may be utilized over any type of existing roof system and maintain its new construction rating when the roof deck is noncombustible.
- Insulated roof systems Classified for use over noncombustible deck may be used over any type of Class A, B or C existing roof systems. The resultant Class will be the lesser rating of the existing system or the new construction (recover) system.

COMBUSTIBLE DECKS

- Insulated roof systems Classified for use over combustible decks can be used over any type of existing roof system and maintain its new construction rating.

UNDERWRITERS LABORATORIES EXTERNAL FIRE TEST METHOD AND CRITERIA

TEST METHOD

When external fire resistance is required, most specifiers use UL 790 as the procedure of choice. UL 790 is similar to ASTM E 108 and is composed of three (3) components. These components are the "Spread of Flame Test", the "Intermittent Flame Test", and the "Burning Brand Test".

UL 790 rates roof coverings as having either class "A", "B", or "C" fire ratings. Class "A" is the best rating and is defined as being "Effective against severe fire exposures". The type of roof deck upon which the membrane and insulation roofing assembly is to be applied determines the number and type of tests required. The deck types are classified as combustible or noncombustible. The combustible decks are wood, plywood and cementitious wood fiber (Tectum). Tectum is considered a combustible deck when it is less than 50 mm (2 inches) in thickness. Noncombustible decks are metal, concrete (structural and lightweight), Gypsum and Tectum that is at least 50 mm (2 inches) thick.

SPREAD OF FLAME TEST CRITERIA

- Class "A" (10 Minutes Exposure) - 1.8 m (6 Ft.) Maximum flame spread.
- Class "B" (10 Minutes Exposure) - 2.4 m (8 Ft.) Maximum flame spread.
- Class "C" (4 Minutes Exposure) - 4 m (13 Ft.) Maximum flame spread.

In all cases, there can be no lateral flame spread that burns off of the sides of the test deck. In addition, the deck cannot be exposed upon completion of the test.

INTERMITTENT FLAME TEST CRITERIA

- Class "A" - 15 Cycles (2 minutes on, 2 minutes off)
- Class "B" - 8 Cycles (2 minutes on, 2 minutes off)
- Class "C" - 3 Cycles (2 minutes on, 2 minutes off)

There cannot be any sustained flaming on the underside of the deck during or after the test.

BURNING BRAND TEST CRITERIA

- Class "A" - 2000 grams (Approx. 4.5 Pounds)
- Class "B" - 500 grams (Approx. 1.1 Pounds)
- Class "C" - 9.25 grams (Approx. 0.3) Pounds)

There cannot be any sustained flaming on the underside of the deck during or after the test.

NOTE: While only UL classified components can be included in a test assembly, only the assembly has the listed fire rating. The individual components do not have that rating and any substitutions will void the rating.

UL P-ASSEMBLIES (UL 263. ASTM E-119)

The resistance of a building to internal sources of fire has been extensively tested and classified at Underwriters Laboratories. Classification of wall, floor/ceiling and roof/ceiling assemblies can be divided into different series based on the fire protection used in the assembly.

P-ASSEMBLY INDEX

Assembly	Protection Used
P000 – P099	Concealed grid suspended ceiling
P200 – P299	Exposed grid suspended ceiling
P400 – P499	Metal lath (plaster) ceiling
P500 – P599	Gypsum board ceiling
P600 – P699	Miscellaneous fireproofing
P700 – P799	Sprayed cementitious fireproofing
P800 – P899	Sprayed fiber fireproofing
P900 – P999	Unprotected concrete or composite decks

P-ASSEMBLY LISTINGS (BXUV)

P215	P407	P710	P810	P907	P918
P216	P410	P711	P814	P908	P919
P225	P508	P712	P815	P909	P920
P227	P510	P717	P816	P910	P921
P230	P511	P719	P818	P911	P922
P231	P513	P732	P819	P912	P923
P242	P514	P801	P902	P913	
P246	P519	P802	P903	P914	
P251	P701	P803	P904	P915	
P405	P708	P804	P905	P916	
P406	P709	P805	P906	P917	

It should be noted that the roof membrane forms only a small part of the total roof/ceiling assembly. In order for a structure to qualify for a particular P-Assembly or Roof Deck Construction, **all** materials used to construct the assembly (including roof decking, ceiling materials, light fixtures, duct work and structural support members) must be **UL Classified** and installed as described in the appropriate UL Directories.

Other Code Approvals

Model Code Approvals

BOCA
Dade County

Report No. 91-15
Report No. 00-0918.01
Report No. 00-0918.02
Report No. 00-0918.03
Report No. 00-0918.04
Report No. 00-0918.06
Report No. 00-1024.04
Report No. 95108B

SBCCI

**UL LISTINGS
CUSTOM SEAL (PVC)
MECHANICALLY ATTACHED SYSTEM**

UL Classification: **Class "A"**
 Deck Type: **Noncombustible**
 System Type: **Custom Seal (PVC) Mechanically Attached**
 Membrane: **Custom Seal (PVC) 1.2 mm or 1.5 mm (.048" or .060")**

¹INSULATION	THICKNESS	MAX. SLOPE
^{2,4,6} Gypsum Board	13 mm (1/2") (min)	Unlimited
Johns Manville "E'NRG'Y-2" or "2A"	Any	17% (2")
RMax "Multi-Max FA"	Any	17% (2")
Temple-Eastex "Tempo Standard"	Any	17% (2")
Firestone "Iso-95 + GL"	Any	17% (2")
Celotex "Star AP", "Thermax Hy-Tec 2", "Thermax Hy-Tec Plus 2", or "Top R-II"	Any	17% (2")
Atlas Energy "AC Foam II"	Any	17% (2")
Homasote "Ultra/M" or "Ultra M II"	Any	17% (2")
³ Wood Fiberboard	Any	17% (2")
Perlite	Any	17% (2")
Apache "Pyrox"	Any	17% (2")
⁵ Custom Seal Polyester Felt	Up to 9 oz/yd ²	17% (2")
Custom Seal Iso	Any	17% (2")
Atlas FR10 or FR11 over O.C. "Foamular"	Any	17% (2")
⁷ O.C. "FanFold", "DuraPink", "DuraPink FA" "DuraPink Plus"	25 mm (1") (Max)	2% (1/4")
⁷ Tenneco "AMOCOR" PB6, PB6W, PG38 or 39	13 mm (1/2") (Max)	2% (1/4")
⁷ DOW "Styrofoam Recover Mate"	13 mm (1/2") (Max)	2% (1/4")

- ¹ All insulations must be UL classified.
- ² The following insulations may be placed under the Gypsum board without affecting the rating: Any thickness, perlite, glass fiber, polyisocyanurate, urethane, wood fiber, urethane composite, polyisocyanurate composite.
- ³ The following insulations may be placed under the wood fiberboard without affecting the rating: Any thickness, polystyrene, polyisocyanurate, polyurethane, perlite/polyisocyanurate composite, perlite, wood fiber or glass fiber.
- ⁴ 6.4 mm (1/4") Georgia-Pacific "Dens-Deck" may be used as an alternate.
- ⁵ This may be used as a separation between the deck and the RM membrane. It is optional for this approval.
- ⁶ This may be used as a cover board over an existing BUR or PUF roof
- ⁷ This listing may be used over any Class "A" smooth or gravel surfaced (gravel maint. @ 400lbs/sq) BUR

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**UL LISTINGS
CUSTOM SEAL (PVC)
MECHANICALLY ATTACHED SYSTEM**

UL Classification: **Class "A"**
 Deck Type: **Combustible**
 System Type: **Custom Seal (PVC) Mechanically Attached**
 Membrane: **Custom Seal (PVC) 1.2 mm or 1.5 mm (.048" or .060")**

¹INSULATION	THICKNESS	MAXIMUM SLOPE
^{2,3,4} Gypsum Board	13 mm (1/2") (min)	Unlimited
Rmax "Multi-Max FA"	4" min.	2% (1/4")
Celotex "Hy-Therm AP"	4" min.	2% (1/4")
Johns Manville "E'NRG'Y-2"	4" min.	2% (1/4")
Atlas "AC Foam II" or Atlas "AC Foam III"	4" min.	2% (1/4")
Two (2) Layers of Atlas FR50 Slip Sheet	N/A	4% (1/2")

1. All insulations must be UL classified.
 2. The following insulations may be placed under the Gypsum board without affecting the rating: Any thickness, perlite, glass fiber, polyisocyanurate, urethane, wood fiber, urethane composite, polyisocyanurate composite.
 3. 6.4mm (1/4") Georgia-Pacific "Dens-Deck" may be used as an alternate.
 4. The following insulations may be placed over the Gypsum Board with out affecting the rating: Perlite, Glass fiber, Urethane Composite, Polyisocyanurate Composite, any thickness.
-

**UL LISTINGS
CUSTOM SEAL (PVC)
MECHANICALLY ATTACHED SYSTEM**

UL Classification: **Class "B"**
 Deck Type: **Combustible & Noncombustible**
 System Type: **Custom Seal (PVC) Mechanically Attached**
 Membrane: **Custom Seal (PVC) 1.2 mm or 1.5 mm (.048" or .060")**

¹ INSULATION	THICKNESS	MAXIMUM SLOPE
G-3 72# Cap Sheet	---	8% (1")
Johns Manville "E'NRG'Y-2A" or "2G"	7.6 cm (3") (min)	16% (2")
RMax "Ply-1"	7.6 cm (3") (min)	16% (2")
Firestone "Iso-95 + GL"	7.6 cm (3") (min)	16% (2")
Celotex "Star AP", "Thermax Hy-Tec II", "Hy-Tec", "Hy-Tec Plus 2" or "Top-R II"	7.6 cm (3") (min)	16% (2")
Atlas "AC Foam II"	7.6 cm (3") (min)	16% (2")
Custom Seal Iso	7.6cm (3") (min)	16% (2")
Atlas FR50 Slip Sheet	N/A	4% (1/2")
² Any UL Labeled Polyisocyanurate	2.5 cm (1") (min.)	2% (1/4")
2 layers of JM E'NRG'Y-2 or Custom Seal ISO 1	3.8 cm (1.5") (min.) both layers	2% (1/4")

¹ All insulations must be UL classified.

² This system may be used only over a 3-ply BUR with gravel maintained @ 400lbs/sq.

**UL LISTINGS
CUSTOM SEAL (PVC)
MECHANICALLY ATTACHED SYSTEM**

UL Classification: **Class "C"**
 Deck Type: **Combustible & Noncombustible**
 System Type: **Custom Seal (PVC) Mechanically Attached**
 Membrane: **Custom Seal (PVC) 1.2 mm or 1.5 mm (.048" or .060")**

¹ INSULATION	THICKNESS	MAXIMUM SLOPE
² Plywood	12 mm (15/32") (min)	8% (1")

¹ All insulations must be U.L. Classified

² Combustible deck must be 2" T & G min.

**FM APPROVALS
CUSTOM SEAL PVC
MECHANICALLY ATTACHED SYSTEM**

Rating	Membrane	Fastener Rows	Fastener Spacing	Weld Type	Weld Width	Lap Width	Fastener	Plate or Bar	Steel Deck Type	Max. Deck Span
1-150	PVC	70.25"	6"	2X	0.75" Inside, 1" outside	4.5"	#15 XHD	Bar	E	6'
1-120	PVC	142.5"	6"	2X	1" inside, 1" outside	4.5"	#15 XHD	Metal Bar	E	5.5'
1-120	PVC	70.5"	6"	2X	1.5" each	4.5"	SFS #14-10	Metal Bar	E	6'
1-105	PVC	142.5"	6"	2X	1" inside, 1" outside	4.5"	#15 XHD	Metal Bar	E	6'
1-90	PVC	70"	12"	1X	1.75"	5"	#15 Washer Head	Buildex 2-3/8" Barbed	E	6'
1-90	PVC	70"	12"	1X	1.75"	5"	#15 XHD	2-3/8" XHD Barbed	E	6'
1-90	PVC	48"	12"	1X	2"	4.5"	Olympic HD	2" RM Disc	C	6'
1-90	PVC	70.5"	6"	1X	2"	4.5"	#14 Custom Seal	2" RM Disc or Metal Bar	C	6'
1-90	PVC	70"	12"	1X	2"	5"	#15XHD	2-3/8" XHD Barbed	E	6'
1-60	PVC	142.5"	12"	2X	1" inside, 1" outside	4.5"	#15 XHD	Metal Bar	E	6'
1-60	PVC	70.25"	18"	1X	1.75"	5"	#15 Washer Head	Buildex 2-3/8" Barbed	E	6'
1-60	PVC	70.25"	18"	2X	1" inside, 1.25" outside	4.5"	#15 XHD	Metal Bar	E	6'
1-60	PVC	70.5"	12"	1X	2"	4.5"	#14 Custom Seal	2" RM Disc or Bar	C	6'

Note

- Insulations Approved include: Minimum 1.3" thick AC Foam II, Hy-Tec, E"NRG"Y-2, PSI-25, HC1, UltraGard, Hy-Therm AP, Hy-Therm(a) AP, ISO-95+GL, Pyrox, Millox, Multi-Max FA, Ultra/M-II AEF, minimum 1.4" Custom Seal Iso, minimum 1.9", Custom Seal NB or minimum 3/4" Celotherm, ConPerl, GAFTEMP Permalite, Fesco Board, or minimum 1" Esgard, Celotex Fiberboard, GAFTEMP Fiberboard, Huebert Fiberboard or Owens-Corning Specialty & Foam Products Insulation system (see Owens-Corning listing) is presecured to the deck. Custom Seal PVC secured to the deck.
- **Custom Seal #15 Washer Head (WH) fastener and Polymer Batten Bar can be substituted for #15 XHD and Metal Anchor Bar**
- Per Loss Prevention Data Sheet 1-29 only 4 fasteners and plates are required to secure the insulation to the deck under a mechanically attached single ply roof cover. Custom Seal requires a minimum of 5 fasteners and plates per 4' x 8' insulation board. (no increase is necessary in the perimeter and corner) Systems with an air or vapor barrier under the insulation must be attached at 1 fastener and plate every 2 sq ft.

- Maximum thickness of insulation in a recover system must be 1" or less. Greater than 1" will effect the Class 1 rating.

**UL LISTINGS
CUSTOM SEAL (PVC)
FULLY ADHERED SYSTEMS**

UL Classification: **Class "A"**
 Deck Type: **Noncombustible**
 System Type: **Custom Seal Fully Adhered** (Custom Seal PVC Bonding Adhesive)
 Membrane: **Custom Seal (PVC)** 1.2 mm or 1.5 mm (.048" or .060")

¹INSULATION	THICKNESS	MAXIMUM SLOPE
High Density Wood Fiberboard, Perlite or Glass Fiber	Any	17% (2")
^{2,3} Gypsum Board	13 mm (1/2") (min)	Unlimited
Atlas "AC Foam II"	Any	8% (1")
Apache "White Line"	Any	8% (1")
Apache "Pyrox" or "Tapered Pyrox"	Any	17% (2")
Celotex "Hy-Therm AP", "Hy-Tech Blackore", "Energy Lok", "Hy-Tec Select Blackore", "Hy-Therm Tapered", "Hy-Tec BT Blackore"	Any	4% (1/2")
Firestone "Iso-95 + GL"	Any	17% (2")
Manville "Ultra Gard" or "Ultra Gard SP"	Any	8% (1")
Manville "E'NRG'Y 2" or "2A"	Any	17% (2")
RMax "Multi-Max FA" or "Ply I"	Any	17% (2")
Temple-Eastex "Tempro Standard"	Any	17% (2")
Celotex "Thermax Hy-Tex 2", "Thermax Hy-Tec", "Thermax Hy-Tec Plus 2", "Top R-II", or "Star AP"	Any	17% (2")
Homasote "Ultra/M", "Ultra M II"	Any	17% (2")
Custom Seal Iso	Any	17% (2")

- 1 All insulations must be UL classified.
- 2 The following insulations may be placed under the Gypsum board without affecting the rating: Any thickness, any UL Classified except EPS.
- 3 6.4 mm (1/4") Georgia-Pacific "Dens-Deck" may be used as an alternate.

**UL LISTINGS
CUSTOM SEAL (PVC)
FULLY ADHERED SYSTEMS**

UL Classification: **Class "A"**
 Deck Type: **Noncombustible**
 System Type: **Custom Seal Fully Adhered
(Custom Seal PVC Water Based Bonding Adhesive)**
 Membrane: **Custom Seal (PVC) 1.2 mm or 1.5 mm (.048" or .060")**

¹ INSULATION	THICKNESS	MAXIMUM SLOPE
High Density Wood Fiberboard, Perlite or Glass Fiber	Any	24% (3")
^{2,3} Gypsum Board	13 mm (1/2") (min)	Unlimited
Atlas "AC Foam II" or "AC Foam III"	Any	24% (3")
Apache "Pyrox" or "Tapered Pyrox"	Any	24% (3")
Firestone "Iso-95 + GL"	Any	24% (3")
Manville "E'NRG'Y 2" or "2A"	Any	24% (3")
Custom Seal Iso	Any	24% (3")
⁴ Woodfiber	13 mm (1/2") (min)	32% (4")
⁵ Woodfiber	13 mm (1/2") (min)	24% (3")

- ¹ All insulations must be UL classified.
- ² The following insulations may be placed under the Gypsum board without affecting the rating:
 Polyisocyanurate, polystyrene, perlite, or woodfiber board any thickness.
- ³ 6.4 mm (1/4") Georgia-Pacific "Dens-Deck" may be used as an alternate.
- ⁴ Any thickness polyisocyanurate must be used under the woodfiber for this rating.
- ⁵ Any thickness polystyrene must be used under the woodfiber for this rating.

**UL LISTINGS
CUSTOM SEAL (PVC)
FULLY ADHERED SYSTEMS**

UL Classification: **Class "A"**
 Deck Type: **Combustible**
 System Type: **Custom Seal Fully Adhered**
 Membrane: **Custom Seal (PVC)**
 1.2 mm or 1.5 mm (.048" or .060")

¹INSULATION	THICKNESS	MAXIMUM SLOPE
^{2,3} Gypsum Board	13 mm (1/2") (min)	Unlimited
^{3,4} Gypsum Board	13 mm (1/2") (min)	25% (3")

- ¹ All insulations must be UL classified.
- ² The following insulations may be placed under the Gypsum board without affecting the rating: Any thickness, any classified insulation (except EPS).
- ³ 6.4 mm (1/4") Georgia-Pacific "Dens-Deck" may be used as an alternate.
- ⁴ The following insulations may be placed under the Gypsum Board without affecting the rating: Any Thickness, Any Classified.

**UL LISTINGS
CUSTOM SEAL (PVC)
FULLY ADHERED SYSTEMS**

UL Classification: **Class "C"**
 Deck Type: **Noncombustible**
 System Type: **Custom Seal Fully Adhered**
 Membrane: **Custom Seal (PVC)**
 1.2 mm or 1.5 mm (.048" or .060")

¹INSULATION	THICKNESS	MAXIMUM SLOPE
² APA Rated OSB	7/16" min.	1/2"

- ¹ All insulations must be UL classified.
- ² The following insulations may be placed under the OSB board without affecting the rating: Any thickness, any classified insulation (except EPS).

**FM APPROVALS
CUSTOM SEAL PVC
FULLY ADHERED SYSTEM**

Rating	Deck	Insulation	Insulation Thickness Minimum	Insulation Attachment	Field	Perimeter	Corner	Fastener
1-60	2,5	Georgia Pacific Dens-Deck	1/4"	MA	16	24	28	A,B,C,D,E
1-60	2,5	Multi-Max FA, Custom Seal ISO 2	1.4"	MA	11	17	20	A,B,C,D,E,G(y)
1-90	2,5	Ultra/M-II AEF	1.4"	MA	16	24	28	A,B,C,G
1-90	2,5	E"NRG"Y-2	1.4"	MA	16	24	28	B,C,G(y)
1-90	2,5	PSI-25	1.4"	MA	16	24	28	B,C,G(y)
1-90	2,5	Custom Seal Iso1, HC1	1.4"	MA	16	24	28	B,C,G(y)
1-90	2,5	Custom Seal Iso	1.5"	MA	16	24	28	A,B,C,D,E,G,H
1-90	2,5	AC Foam II	1.5"	MA	16	24	28	A,B,C,D,E,G,H
1-90	2,5	Georgia Pacific Dens-Deck	1/4"	MA	18	27	32	A,B,C,D,E
1-90	2,5	Hy-Therm AP	1.5"	MA	16	24	28	A,B,C,D,E,G,H

Note

- Polyisocyanurate insulation may be attached to concrete deck using Custom Seal Insulation Adhesive applied at approximately 3/4" wide ribbons at 12" on center and covered with Custom Seal RM roof cover adhered per note below. Meets Class 1-90
- Polyisocyanurate insulation may be attached to concrete deck using Custom Seal Insulation Adhesive applied at approximately 3/4" wide ribbons at 12" on center and covered with a layer of Celotex 1/2" FM90 High Density Fiberboard adhered to the Polyisocyanurate using Custom Seal Insulation Adhesive applied at approximately 3/4" wide ribbons at 12" on center and covered with Custom Seal RM roof cover adhered per note below. Meets Class 1-75
- RM is adhered to substrate using Custom Seal PVC Bonding Adhesive or Custom Seal PVC Waterbased Adhesive applied to the substrate and roof cover at the recommended coverage rate.

**FM APPROVALS
CUSTOM SEAL (PVC)
FULLY ADHERED TABLE FASTENER NOTES**

	1 Cementitious Woodfiber	2 Structural Concrete	3 Gypsum (recover only)	5 Steel
A – CFI, Construction Fasteners		<ol style="list-style-type: none"> 1. Dekfast Stainless Steel with 3" Round Plate 2. #14 Dekfast with Lock or Hex plate 3. Dekfast #15 Heavy, #15HS with Lock Hex Plate 4. Dekspike with Hex Plate 		<ol style="list-style-type: none"> 1. Dekfast Stainless Steel with 3" Round Plate 2. #12, #14 Dekfast or Omega with Lock or Hex Plate 3. Dekfast #15 Heavy, #15HS with Lock or Hex Plate 4. HWH Dekfast with #12 Hex Plate
B – GEF, Custom Seal		<ol style="list-style-type: none"> 1. Custom Seal #14, #15 with Steel Square or Round 		<ol style="list-style-type: none"> 1. Custom Seal #12, #14, #15 with Custom Seal Steel Square or Round
C – ITW, Buildex		<ol style="list-style-type: none"> 1. #14-10 or #15 Roofgrip with Recessed, Flat Bottom, King-Con with Flat Bottom or Gearlok Plate 		<ol style="list-style-type: none"> 1. AccuTrac or Hextra with Recessed, Accutrac or Gearlok Plate 2. #12, ¼", #14-10 or #15 Roofgrip with Recessed, Flat Bottom, Gearlok Plate 3. Hextra Plus Pre-assembled system 4. Roofgrip Plus Pre-assembled System

<p>D – OMG, Olympic</p>	<ol style="list-style-type: none"> 1. NTB Magnum 2" with NTB Plastic Plate 2. NTB Magnum 1" with NTB Plate 3. Lite-Deck or GTL with Lite-Deck Plate 	<ol style="list-style-type: none"> 1. Hex Head #12, #14, Olympic Heavy Duty, CD-10 or Fluted Nail with Standard, G-2 or Olympic Plate 	<ol style="list-style-type: none"> 1. NTB Magnum 2" with NTB Plastic Plate 2. NTB Magnum 1" with NTB Plate 3. Lite-Deck or GTL with Lite-Deck Plate 4. Iron-Lok or Strap Toggle with Standard, G-2 or Olympic Plate 	<ol style="list-style-type: none"> 1. Olympic #10, Olympic Standard, Olympic Heavy Duty, Stainless #12, Hex Head #12, #14, Iron-Lok or Strap Toggle with Standard, G-2 or Olympic Metal or Plastic Plate 2. Olympic Standard or Olympic Heavy Duty with LGP
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**FM APPROVALS
CUSTOM SEAL (PVC)
FULLY ADHERED TABLE FASTENER NOTES (cont.)**

	1 Cementitious Woodfiber	2 Structural Concrete	3 Gypsum (recover only)	5 Steel
E – GEN, Custom Seal		1. #14HD with 3" Round Insulation Plate		1. #14HD with 3" Round Insulation Plate
F – RPC, Powers	1. Powerlite with Powerlite 3" Insulation plate	1. RawlSpike, T-Spike, Lok/Bolt, Drive Speed-Lock Toggle Bolt or Zamac Nailin with Rawl 3" Insulation plate	1. Powerlite with Powerlite 3" Insulation Plate	1. Rawl #12, #14 or Speed-Lock Toggle Bolt with Rawl 3" Insulation Plate
G – SFS, Stadler		1. #14-10 Insul-Fixx with Insul-Fixx S IF-3"-S Type II Nbore (Metal ES) or P; #14 System ES-1		1. Isofast IF2C, Isofast IF2C-S with Isofast IFC/IW-70x70 2. Isofast IF2C, Isofast IF2C-S, Isofast IG or Isofast IG-S with Isofast IF/IG-70x70 3. Isofast IF2 with IF-3"-S Type 1 or Isofast IF/IFT-70x70 4. #12-11 or #14-10 Insul-Fixx with Insul-Fixx S, IF-3"-S Type II Bore (Metal ES) or P 5. System ES-1 #12 or #14
H – TRU, Tru-Fast	1. TL with TL 3" Insulation Plate	1. Tru-Fast Ultra S.S., HD, DL, CF or CF Tap Grip with MP-3 or Plastic Plate	1. TL with TL 3" Insulation Plate	1. Tru-Fast TP, DP, Ultra S.S., HD or DL with MP-3 or Plastic Plate 2. Tru-Fast DP-H with MP-3 3. Tru-Fast PA System