SECTION 7

MULE-HIDE PRODUCTS CO., INC.

TPO
Technical Bulletins

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PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST CURRENT INFORMATION

Technical Bulletin # TPO –MA01-2006

Membrane Minimum Fastener Spacing Requirements For Mechanically Attached Systems With 55-MPH Wind Speed Coverage

Issued: January 01, 2006
Revised: Oct-2013

This criteria is limited to buildings of 100' in height or less located in urban or suburban exposure areas. Not applicable for coastal or high wind areas. Maximum design wind speeds of 100-MPH. Contact Mule-Hide Technical Department for Factory Mutual Approved systems or compliance with Building Code Requirements such as Florida Product Approval, Texas Department of Insurance, Miami-Dade, etc.

Chart is based on HDP (#14) Fasteners and 2.4" Seam Plates

Roof Deck	Roof Height	Width of Field Sheet	Fastener Spacing
Steel Roof Decks			
Steel Min 22 gauge	Up to 60'	12'	6" oc
		10'	12" oc
		8'	12" oc
	61' to 100'	12'	6" oc
		10'	6" oc
		8'	6" oc
Steel - 24 gauge Metal Roof Panels	0' to 100'	Pull test required. Contact Mule-Hide for additional information. System may not quality for warranty.	
Steel - 26 gauge Metal Roof Panels	N/A	Not eligible for warranty with direct attachment to decking. Contact Mule-Hide Technical Department.	
Wood Roof Decks			
2X Plank ¾" Plywood	Up to 60'	12'	6" oc
		10'	12" oc
		8'	12" oc
	61' to 100'	12'	6" oc
		10'	6" oc
		8'	12" oc
5/8" Plywood	Up to 60'	10'	12" oc
		8'	12" oc
	61' to 100'	10'	6" oc
		8'	12" oc
1X Plank ½" Plywood	Up to 60'	10'	6" oc
		8'	12" oc
	61' to 100'	8'	6" oc
OSB	N/A	Contact Mule-Hide Technical Department prior to starting work.	

Roof Deck	Roof Height	Width of Field Sheet	Fastener Spacing
Structural Concrete Roof Decks			
2500 psi 2" min pour or precast	Up to 60'	12'	12" oc
		10'	12" oc
		8'	12" oc
	61' to 100'	12'	6" oc
		10'	6" oc
		8'	12" oc
Insulating Concrete (Fasteners must penetrate form deck)			
Steel Form Deck	0' to 100'	Pull test required. Contact Mule-Hide for additional information. System may not quality for warranty.	
Other Roof Decks			
Gypsum Concrete Cementitious Wood Fiber Other	0' to 100'	Pull test required. Contact Mule-Hide for additional information. System may not quality for warranty.	

Notes:
1. HDP Fasteners (#14) are required system fasteners for Mule-Hide Warranties.
2. EHD Fasteners (#15) are required for 'rated assemblies" such as Factory Mutual, Miami-Dade, etc. Contact Mule-Hide Technical Department for additional information.
3. 2.4" Seam Plates are required for all mechanically attached systems.
4. 3" Insulation plates are not approved for use to fasten membrane.
5. Mechanically attached systems are not allowed over Oriented Strand Board (OSB) decks without prior approval by the Mule-Hide Technical Department. Mule-Hide will not issue system warranties on "As-Built" projects where Mule-Hide did not grant approval prior to the start of the work.
6. Refer to Mule-Hide Fastener Guidelines for additional information on fastener use and installation.
7. Refer to Technical Bulletin #TPO-MA02-2006 for perimeter enhancement requirements.

FOR PERIMETER ENHANCEMENT REQUIREMENTS REFER TO TECHNICAL BULLETIN #TPO-MA02-2006

Any information given on this Technical Bulletin is subject to change without notice.
Please visit our website at www.mulehide.com or contact Mule-Hide Technical Department at (800-786-1492) for questions or additional information.

Technical Bulletin # TPO –MA02-2006

Perimeter Enhancement Requirements

Mechanically Attached System
With 55-MPH Wind Speed Coverage

January 01, 2006
Revised Oct-2013

REFER TO TECHNICAL BULLETIN #TPO-MA01-2006 FOR FASTENER SPACING REQUIRMENTS

Limitations	
Contact Mule-Hide for all projects requiring specific Factory Mutual or Building Code compliance such as Florida Product Approval, Texas Department of Insurance, etc.	For buildings 100 ft. or less in height, located in urban, rural or suburban exposure areas. Not applicable for coastal or high wind areas. Maximum design wind speed of 100-MPH.
Building Height	**Minimum Perimeter Enhancement Required**
0 - 34 feet	1 Perimeter sheet (1)(2)
	1 Perimeter enhancement width (3)
35 – 100 ft	2 Perimeter sheets (1)(2) (wind zones up to 100 mph)
	2 Perimeter Enhancement Widths (2) (wind zones up to 100 mph)
Higher than 100 ft. or higher wind zones.	Contact Mule-Hide Tech. Dept.
Projects in exposure D category (coastal areas)	Contact Mule-Hide Tech. Dept.
Roof edges along interior walls or roof edges with 8 ft. or higher walls. (Walls extend above the roof level)	No perimeter enhancement required
FM Approval	
For buildings where FM approved securement is required and for buildings that do not meet the "Limitations" stated above.	Install perimeter enhancements throughout the corner/perimeter areas of the roof. The width of these areas is determined by the lesser of the following two calculations: a. 0.1 x the building width = or b. 0.4 x the building height = In no event shall the perimeter/corners be less than 4 ft.

Notes:

1. **When using Mule-Hide standard sheet widths:**
   a. **8' wide field sheets use 4' wide perimeter sheets**
   b. **10' wide field sheets use 6' wide perimeter sheets**
   c. **12' wide field sheets use 6' wide perimeter sheets.**
2. **If the contractor elects to cut perimeter sheets from scrap membrane, the perimeter sheet dimension MUST be as follows:**
   a. **8' wide field sheet – no less than 4' wide to no larger than 4'-9" wide perimeter sheet**
   b. **10' wide field sheet – no less than 5' wide to no more than 6' wide perimeter sheet**
   c. **12' wide field sheet – no less than 6' wide to no more than 7'-2" wide perimeter sheet**
3. **Perimeter enhancement widths are used when the 10" RUSS and/or plates/fasteners through the membrane methods are utilized for perimeters.**

Technical Bulletin # TPO –MA02-2006 (Continued)

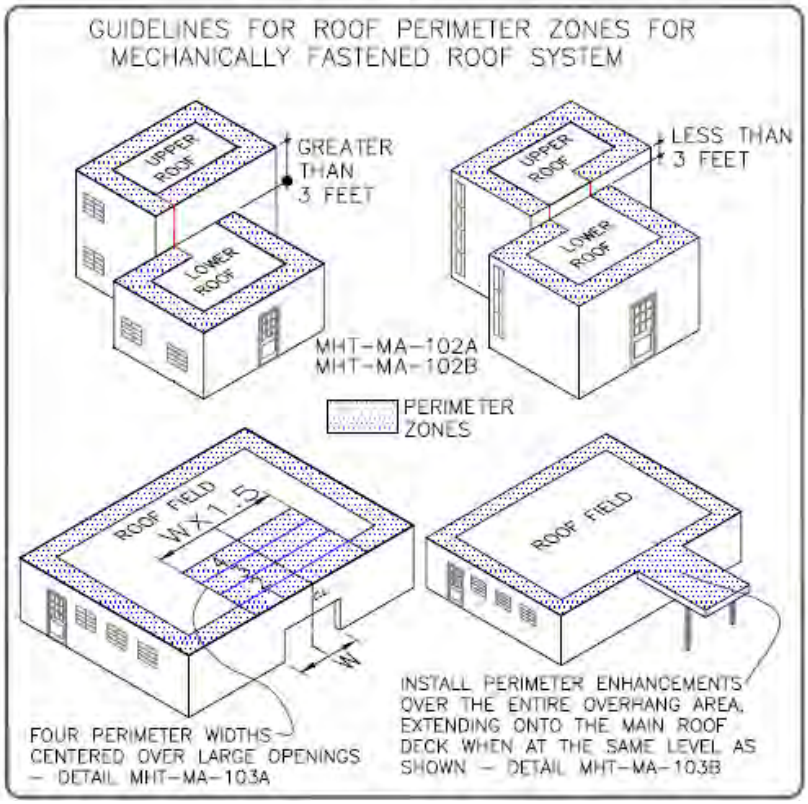
Perimeter Enhancement Width Dimension

Width of Field Sheet	Perimeter Sheet Width (2)	Perimeter Enhancement Width	
		10” RUSS	Plates/Fasteners Through Membrane
4’ (1)	N/A	2’	2’
6’ (1)	N/A	3’	3’
8'	4'	4'	4'
10'	6’	5’	5’
12'	6'	6'	6'

Notes:

1. **The contractor must contact the Mule-Hide Technical Department prior to using 4’ or 6’ wide field sheets to determine minimum perimeter enhancement requirements.**
2. **Based on standard size widths provided by Mule-Hide.**

Perimeter Zone Definition



Contact Mule-Hide Technical Department for FM compliant roof assemblies, fastener spacing, required perimeter enhancements and appropriate fasteners.

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Mule-Hide Technical Bulletin
TPO FA01-2006

Membrane and Insulation Fastener Spacing Requirements - Fully Adhered Systems

Revised Oct-2013

Membrane Attachment:

A. The Mule-Hide membrane shall be mechanically attached at the base of all parapet walls, curbs, peaks, valley and slope intersections where the net change in slope is greater than 2” per foot. Attachment is to be made with the following methods:

1. Mule-Hide HDP or EHD Fasteners and 2.4" Seam Plates through the membrane spaced 12” on center and attached into the roof deck.
2. Mule-Hide 6” Pressure Sensitive RUSS with 2.4” Seam Plates and HDP or EHD Fasteners adhered to the bottom of the membrane with TPO Primer. 6” Pressure Sensitive RUSS is not approved for use in a Fleeceback, Fleeceback Plus, or Self-Adhering system.
3. Mule-Hide A/P Bar with HDP or EHD Fasteners spaced 12” on center attached to either the roof deck or vertical substrate.

B. Fasteners installed in steel decks and plywood decks must penetrate through the deck a minimum 3/4 inch. When installed in wood plank decks, fasteners must penetrate into the deck a minimum of 1 inch. Fasteners installed into concrete decks must penetrate into the deck a minimum of 1 inch. **Contact Mule-Hide for specific fastener type needed for attachment of the insulation and membrane into various deck types.**

Insulation Attachment:

A. Mule-Hide minimum standard insulation attachments: Individual project requirements may require more fasteners than indicated below. It is the contractor’s sole responsibility to ensure that the system being installed is in compliance with the State and local building code. Local building code requirements shall apply when they supersede these minimums. When using multiple layers of insulation or combining different board types, the type and thickness of the top layer of insulation determines the minimum number of fasteners required. For approved insulation, the minimum attachment for the field of the roof is:

	Fasteners per 4' x 8' board		
Insulation Type or Overlay	**Field**	**Perimeter** (1)	**Corner** (2)
Approved Polyisocyanurate - Min 2" thick (top layer)	8	12	16
Approved Polyisocyanurate - Min 1.5" up to 2" thick	12	18	24
HD Fiberboard - Min 1/2" thick- Installed over Approved Insulation	16	24	32
Dens Deck Prime - Min 1/4" thick - Installed over Approved Insulation	12	18	24
OSB - Min 7/16" thick - Installed over Approved Insulation	17	25	32
Approved OSB/Polyisocyanurate Composite - Min 2" thick	17	25	32

Notes:
1. Mule-Hide requires increased attachment in the perimeter areas (50% more fasteners than field)
2. Mule-Hide requires increased attachment in the corner areas (100% more fasteners than field).

C. Buildings higher than 100 feet, located in high wind zones, located along the coastline, or projects that request wind coverage greater than that specified in the warranty (peak gust to 55 mph) will require increased attachment rates and insulation requirements. Contact Mule-Hide Technical Department prior to bidding projects with these requirements for project specific fastener rates and insulation requirements.

D. **Mule-Hide defines the minimum perimeter area as 8' in from the roof edge along all exterior roof edges.**

E. For those contractors wishing to install a roof system according to Factory Mutual guidelines, but not requiring FM compliance, the following calculation for perimeter and corner areas apply:

Perimeter roof areas: Increase fastener density by 50%.
Corner roof areas: Increase fastener density by 100%. The perimeter is defined by the lesser of the following calculations:

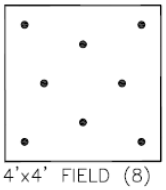
0.1 times the lesser plan dimension (building width) or
0.4 times the height of the building
with a minimum width of 4'.

Contact Mule-Hide Technical Department for attachments that require compliance with Factory Mutual (FM) requirements. Requirements change with deck types, building locations, roof heights, insulation used, etc.

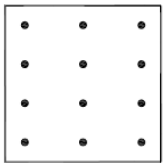
Illustration 1, Typical Fastener layouts Insulation

Fully Adhered

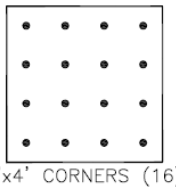
Wood Fiber



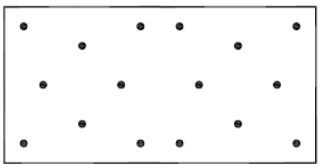
4'x4' FIELD (8)



4'x4' PERIMETERS (12)

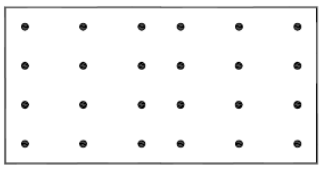


4'x4' CORNERS (16)



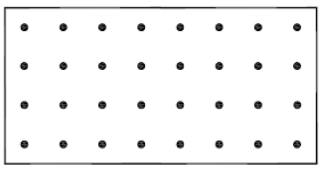
4'x8' FIELD (16)

1 FASTENER PER EVERY 2 SQ. FT.



4'x8'PERIMETERS (24)

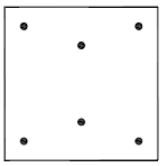
1 FASTENER PER EVERY 1.33 SQ. FT.



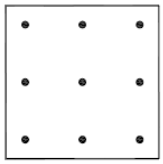
4'x8' CORNERS (32)

1 FASTENER PER EVERY 1 SQ. FT.

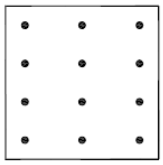
Polyisocyanurate Insulation – 1.5" to less than 2" thick



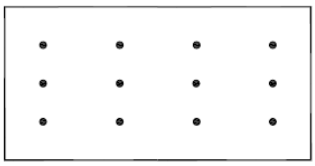
4'x4' FIELD (6)



4'x4' PERIMETERS (9)

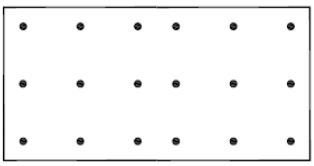


4'x4' CORNERS (12)



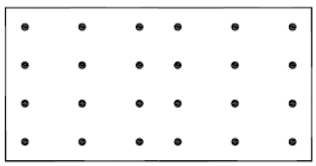
4'x8' FIELD (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



4'x8' PERIMETERS (18)

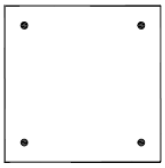
1 FASTENER PER EVERY 1.77 SQ. FT.



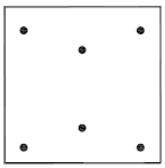
4'x8' CORNERS (24)

1 FASTENER PER EVERY 1.33 SQ. FT.

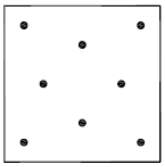
Polyisocyanurate Insulation – 2" thick or greater



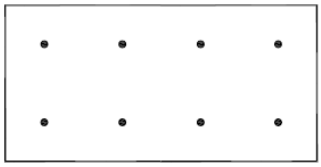
4'x4' FIELD (4)



4'x4' PERIMETERS (6)

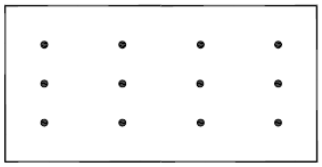


4'x4' CORNERS (8)



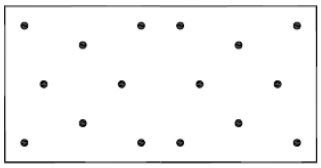
4'x8' FIELD (8)

1 FASTENER PER EVERY 4 SQ. FT.



4'x8' PERIMETERS (12)

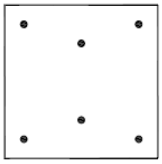
1 FASTENER PER EVERY 2.66 SQ. FT.



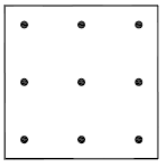
4'x8' CORNERS (16)

1 FASTENER PER EVERY 2 SQ. FT.

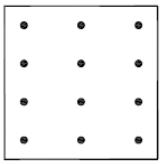
Dens Deck or SecurRock



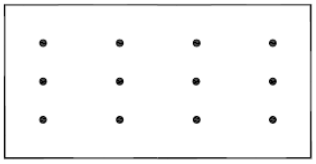
4'x4' FIELD (6)



4'x4' PERIMETERS (9)

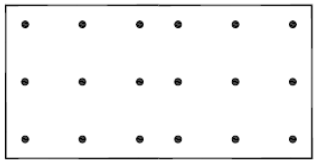


4'x4' CORNERS (12)



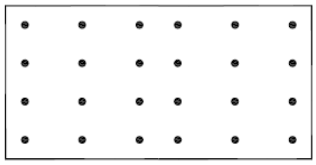
4'x8' FIELD (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



4'x8' PERIMETERS (18)

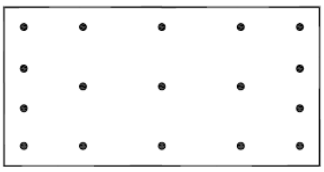
1 FASTENER PER EVERY 1.77 SQ. FT.



4'x8' CORNERS (24)

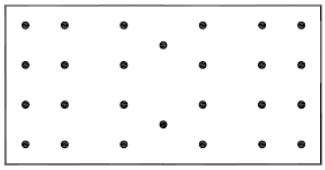
1 FASTENER PER EVERY 1.33 SQ. FT.

OSB



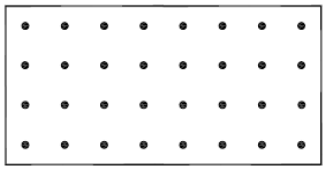
4'x8' FIELD (17)

FASTENER PER EVERY 1.88 SQ. FT.



4'x8' PERIMETERS (26)

1 FASTENER PER EVERY 1.23 SQ. FT.



4'x8' CORNERS (32)

1 FASTENER PER EVERY 1 SQ. FT.

Factory Mutual Perimeter and Corner Enhancements

Since the wind uplift forces are greater in the perimeter and corner areas of a roof, additional membrane/insulation attachment is required in these areas. Factory Mutual defines these requirements in FM Loss Prevention Data Sheet 1-29. In summary, there are two basic methods to address this requirement.

1 Install a FM rated system that meets the wind uplift requirements of each roof area. For example, suppose the FM uplift requirements for your roof are Field = 60, Perimeter = 105, and Corner = 150. You could then:
   a. Locate the 3 FM systems (1-60, 1-105 & 1-150) and install them in their respective location on the roof.
   b. Install a 1-105 system in the Field and Perimeter areas and then install a 1-150 system in the corner areas.
   c. Install a 1-150 system over the entire roof area.

A second method to address the increased uplift pressures in perimeter and corner areas is to use 'Prescriptive Enhancement'. Prescriptive Enhancement allows you to mathematically determine the Perimeter and Corner attachment requirements, based upon the Field attachment rate.

Prescriptive Enhancement can only be used if the project meets one of the following requirements:

1. The building is in a non-hurricane prone region, Ground Roughness = C, the design wind speed does not exceed 90-mph and the roof height does not exceed 75 ft.

2. The building is in a non-hurricane prone region, Ground Roughness = D, the design wind speed does not exceed 90-mph and the roof height does not exceed 30 ft.

3. The Factory Mutual recommended field of roof rating does not exceed Class 1-75.

4. The building is in a non-hurricane prone region and the Factory Mutual recommended field of roof rating does not exceed Class 1-90.

If the project meets one of the above criteria, then Prescriptive Enhancement can be employed.

Roof Perimeter: Increase the Field of roof attachment pattern by 50%, rounding up to the next whole number. However, you must install a minimum of one fastener per every 2 square feet, but no more than 1 fastener per 1 square feet. (minimum of 16 fasteners per 4' x 8' board and maximum of 32 fasteners)

Roof Corner: Install one fastener per every square foot (32 fasteners per 4' x 8' board)

For example, if the field attachment rate is 1 fasteners per 4 square feet (8 fasteners per 4' x 8' board), then a 50% increase of the field rate would be 1 fastener per 2.666 square feet, or 12

fasteners per 4’ x8’ board. However, the minimum is 16. In the corners, the attachment is always 32.

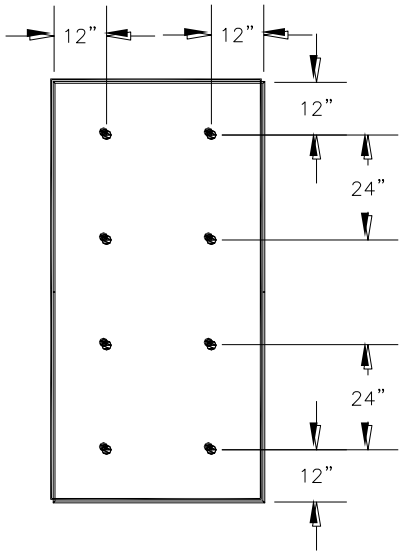
Field attachment = 8 fasteners per 4’ x 8’ board
50% increase would be 12 fasteners, but the minimum requirement of 16 fasteners would prevail.
Perimeter attachment is then 16 fasteners per 4’ x 8’ board.
Corner attachment is 32 fasteners per 4’ x 8’ board as per definition.

Note: See attached details MHT-FM-724, MHT-FM-725, MHT-FM-726, and MHT-FM-727 for examples of Factory Mutual attachment patterns.

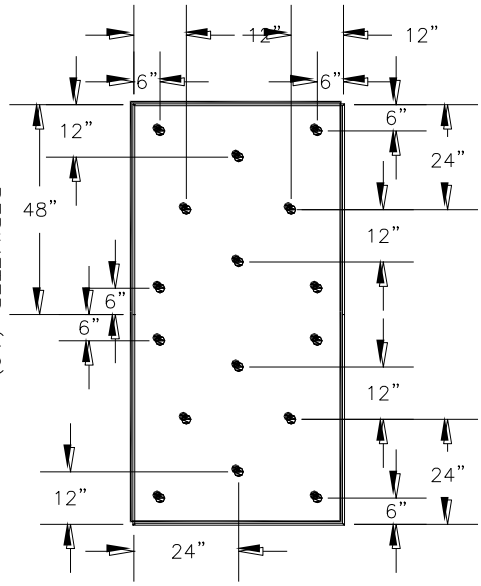
Any information given on this Technical Bulletin is subject to change without notice. Please visit our website at www.mulehide.com or contact the Mule-Hide Technical Department at (800-786-1492) for questions or additional information.

NOTES:

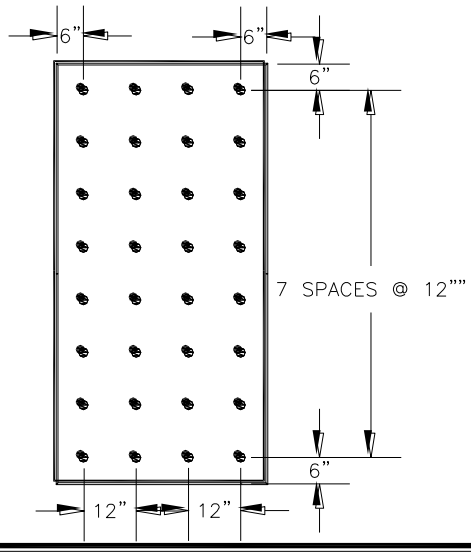
1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
4. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS WITH A MINIMUM OF 1 FASTENER EVERY 2 SQUARE FEET NOT TO EXCEED 1 FASTENER EVERY 1 SQUARE FEET
   - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FEET FOR CORNERS.



FIELD (8)
1 FASTENER PER EVERY 4 SQ. FT.



PERIMETER (16)
1 FASTENER PER EVERY 2 SQ. FT.



CORNERS (32)
1 FASTENER PER EVERY 1 SQ. FT.

MULE-HIDE PRODUCTS CO., INC.

FM - 8 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT

SYSTEMS:

FULLY ADHERED

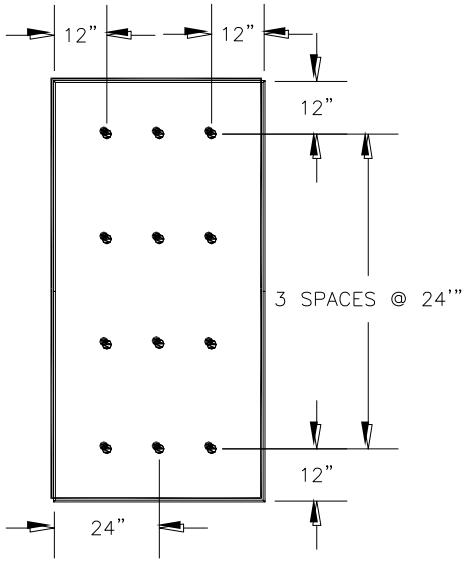
DETAIL NO.:

MHT-FM-724

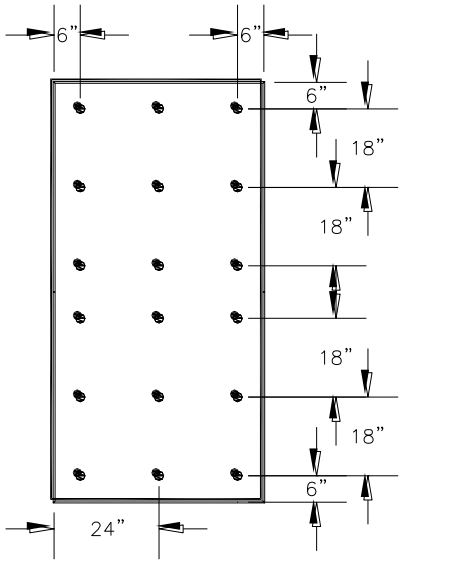
REVISION DATE: 10/2013

NOTES:

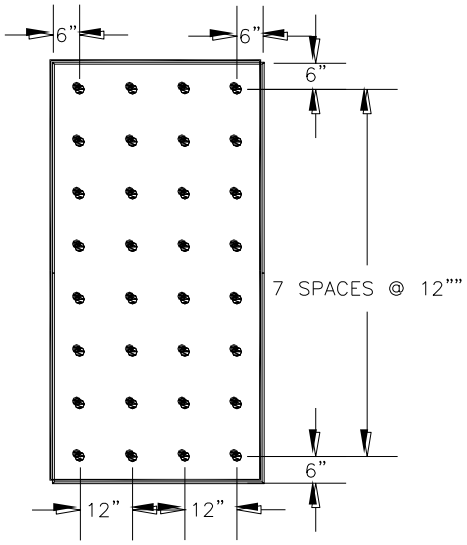
1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
4. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS WITH A MINIMUM OF 1 FASTENER EVERY 2 SQUARE FEET NOT TO EXCEED 1 FASTENER EVERY 1 SQUARE FEET
   - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FEET FOR CORNERS.



FIELD (12)
1 FASTENER PER EVERY 2.66 SQ. FT.



PERIMETER (18)
1 FASTENER PER EVERY 1.77 SQ. FT.



CORNERS (32)
1 FASTENER PER EVERY 1 SQ. FT.

MULE-HIDE PRODUCTS CO., INC.

FM - 12 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT SYSTEMS:

FULLY ADHERED

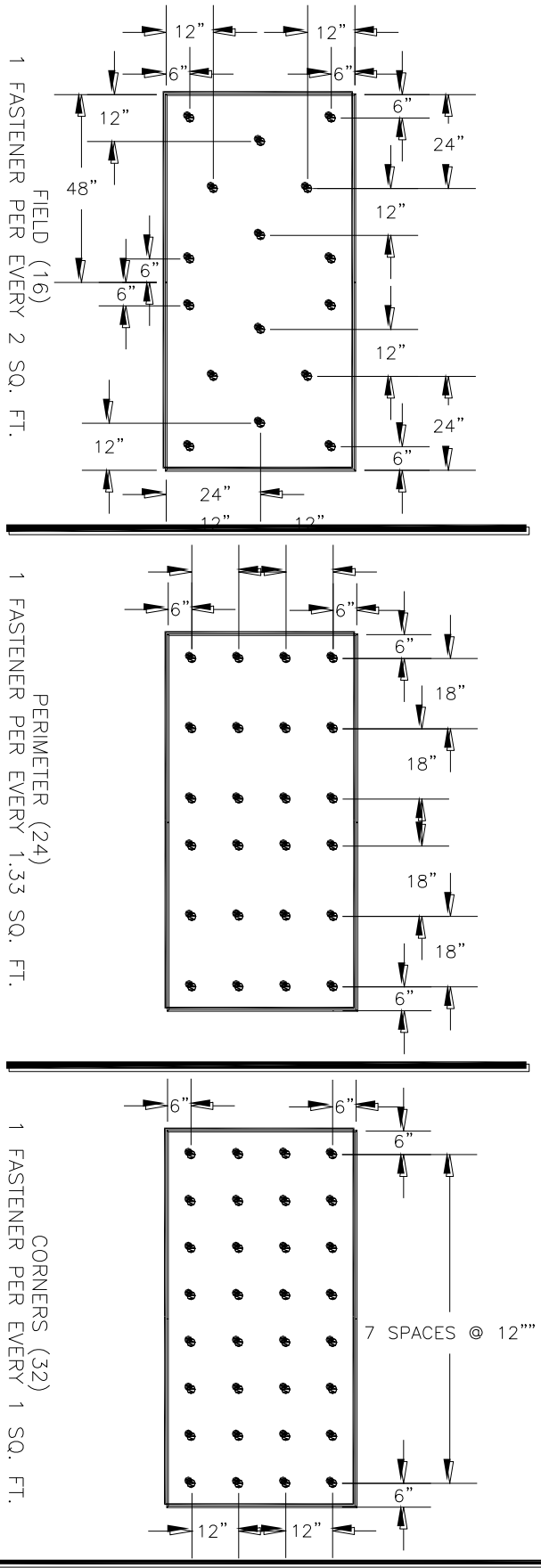
DETAIL NO.:

MHT-FM-725

REVISION DATE: 10/2013

NOTES:

1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
4. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS WITH A MINIMUM OF 1 FASTENER EVERY 2 SQUARE FEET NOT TO EXCEED 1 FASTENER EVERY 1 SQUARE FEET
   - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FEET FOR CORNERS.



MULE-HIDE PRODUCTS CO., INC.

FM - 16 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT

SYSTEMS:

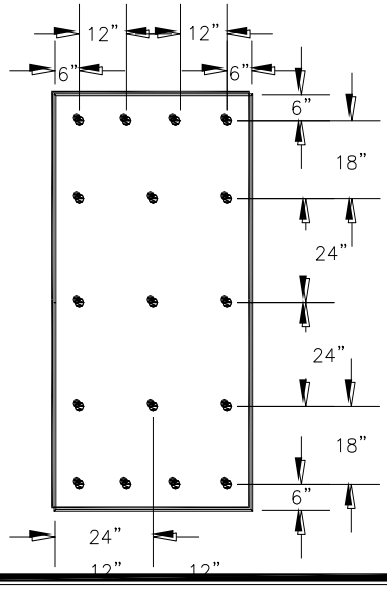
FULLY ADHERED

DETAIL NO.: **MHT-FM-726**

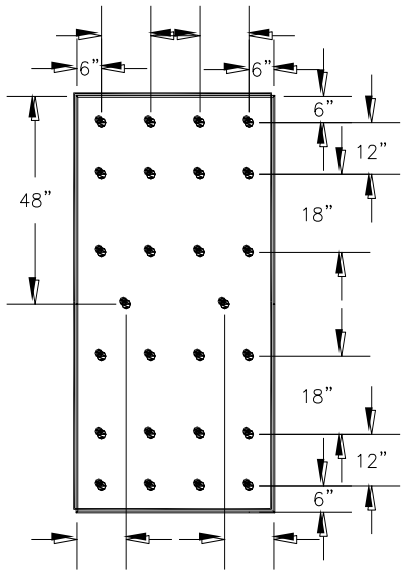
REVISION DATE: 10/2013

NOTES:

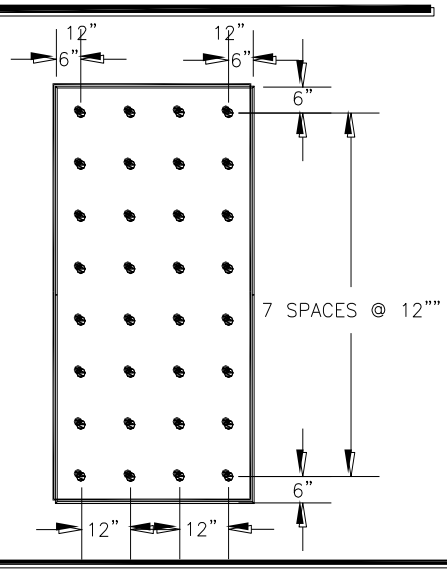
1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
4. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS WITH A MINIMUM OF 1 FASTENER EVERY 2 SQUARE FEET NOT TO EXCEED 1 FASTENER EVERY 1 SQUARE FEET
   - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FEET FOR CORNERS.



FIELD (17)
1 FASTENER PER EVERY 1.88 SQ. FT.



PERIMETER (26)
1 FASTENER PER EVERY 1.23 SQ. FT.



CORNERS (32)
1 FASTENER PER EVERY 1 SQ. FT.

MULE-HIDE PRODUCTS CO., INC.

FM - 17 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT SYSTEMS:

FULLY ADHERED

DETAIL NO.:

MHT-FM-727

REVISION DATE: 10/2013

Technical Bulletin
No. 1001

Attaching flashings to pre-painted metal

June 16, 2010

Most pre-finished metal surfaces are very slick and difficult to adhere to. The best results are obtained when the top (mating) surface of the pre-painted metal is abraded or scuffed up. This can be accomplished using a hand drill with a wire wheel, or by using steel wool.

The proper steps for bonding to pre-finished metal are as follows:

1. Verify that the metal is properly secured in place.
2. Abrade or scuff up the area to be bonded. *Caution* - Do not abrade the metal surface beyond the area to be bonded. Leaving abraded surfaces exposed to the elements may result in premature aging.
3. Prime the surface to be bonded (Tape primers for Single-Ply membranes, ASTM D-41 Asphalt primer for SAMB membranes and asphalt products.
4. Bond the membrane to the primed surface following an approved Mule-Hide Detail.

Please visit our website at www.mulehide.com or contact Mule-Hide Products at (608) 365-3111 for questions or additional information.

Technical Bulletin

No. 1002

TPO 20-year warranty Requirements
Use of Cover Tape to strip in flanges of perimeter sheet metal.

Aug 10, 2010

Mule-Hide TPO Cover Tape and EPDM Cured Cover Tape may now be used on 20-Year TPO 'Standard' and 'Premium' Roof Warranties. Use is limited to covering flanges of perimeter sheet metal.

Please see attached details for use:

MHT-UN-106B when using TPO Cover Tape

MHT-UN-106C when using EPDM Cured Cover Tape.

This change will allow pre-finished edge metal to be more easily incorporated in to a 20-year TPO warranted system.

Notes:
Extended wind speed warranties may require the use of TPO coated metal and heat welded stripping.

Please visit our website at www.mulehide.com or contact Mule-Hide Products at (608) 365-3111 for questions or additional information.

NOTES:

1. CLEAN THE EXISTING MEMBRANE (AND METAL IF APPLICABLE) WITH WEATHERED MEMBRANE CLEANER. PRIME THE MEMBRANE USING TAPE PRIMER. ONCE THE PRIMER IS PROPERLY DRIED, THE TPO PRESSURE–SENSITIVE COVER STRIP IS APPLIED AND ROLLED USING A 2" WIDE ROLLER.

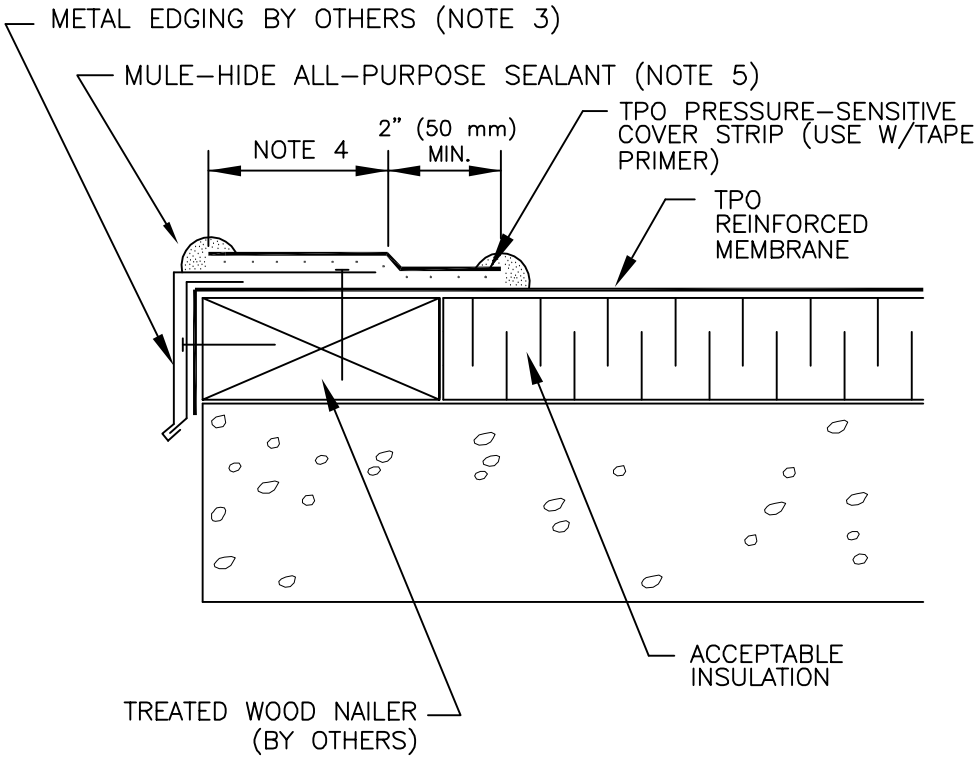
2. TREATED WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.

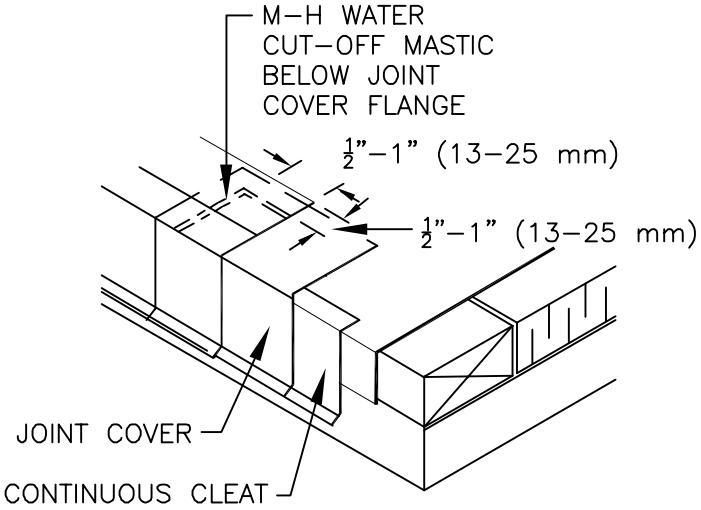
3. FASTENERS AND FASTENER PATTERN AS RECOMMENDED BY METAL EDGE MANUFACTURER.

4. DECK FLANGE MUST BE TOTALLY COVERED BY TPO PRESSURE–SENSITIVE COVER STRIP WITH MINIMUM 2" (50 mm) COVERAGE PAST NAIL HEADS.

5. APPLY MULE–HIDE ALL–PURPOSE SEALANT ALONG BOTH EDGES OF TPO COVER TAPE AND ACROSS ENDLAPS.

HEAT COVER STRIP AT SPLICE INTERSECTIONS PRIOR TO ROLLING TO CONFORM TO STEP–OFFS





NOTE:

THIS DETAIL APPROVED FOR 20–YEAR SYSTEM WARRANTIES.

071002

MULE-HIDE PRODUCTS CO., INC. 2009	***DRIP EDGE TPO PS COVER STRIP***	***DETAIL NO.:***
	SYSTEMS: TPO ALL	***MHT-UN-106B***

®

NOTES:

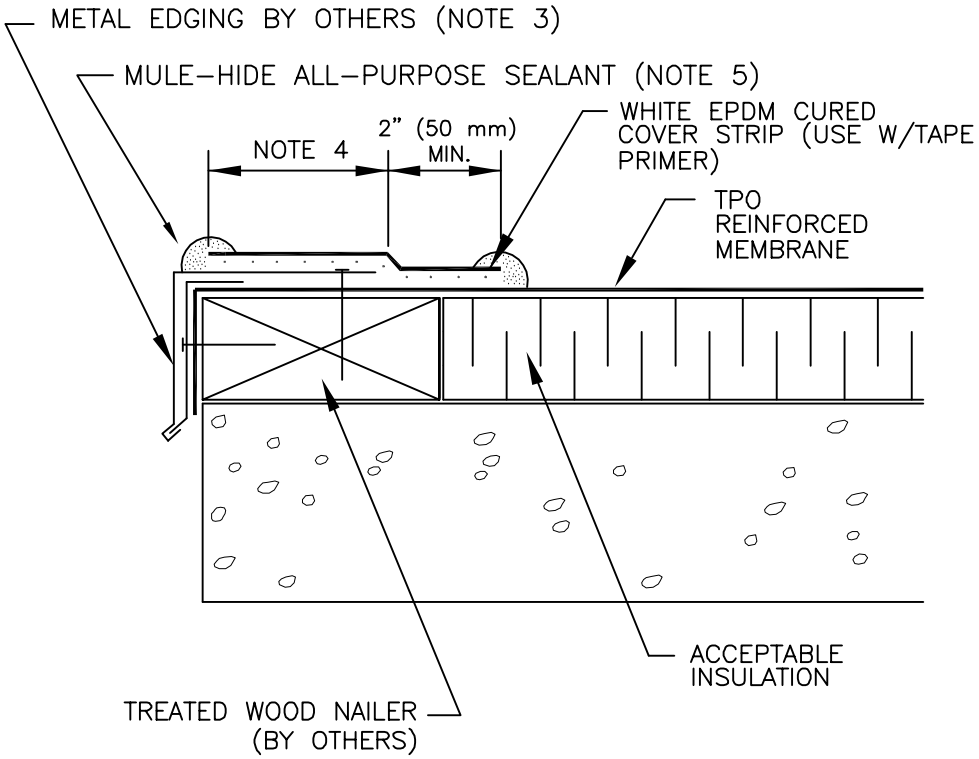
1. CLEAN THE EXISTING MEMBRANE (AND METAL IF APPLICABLE) WITH WEATHERED MEMBRANE CLEANER. PRIME THE MEMBRANE USING TAPE PRIMER. ONCE THE PRIMER IS PROPERLY DRIED, THE WHITE EPDM COVER STRIP IS APPLIED AND ROLLED USING A 2" WIDE ROLLER.

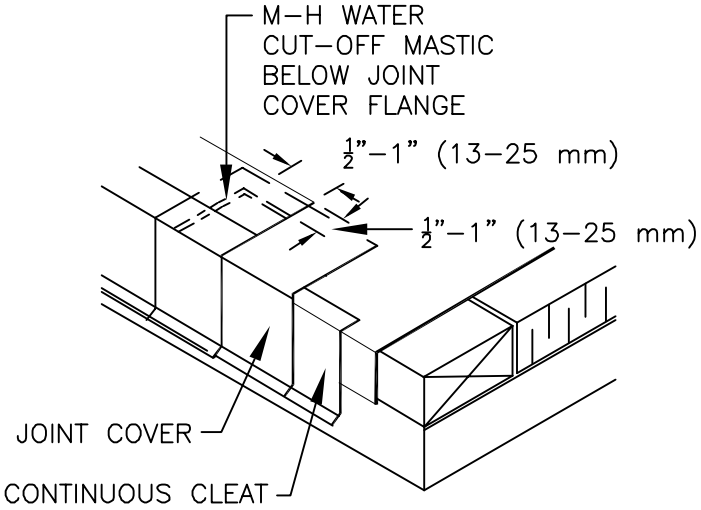
2. TREATED WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.

3. FASTENERS AND FASTENER PATTERN AS RECOMMENDED BY METAL EDGE MANUFACTURER.

4. DECK FLANGE MUST BE TOTALLY COVERED BY WHITE EPDM CURED COVER STRIP WITH MINIMUM 2" (50 mm) COVERAGE PAST NAIL HEADS.

5. APPLY MULE-HIDE ALL-PURPOSE SEALANT ALONG BOTH EDGES OF WHITE EPDM CURED COVER TAPE AND ACROSS ENDLAPS.





NOTE:

THIS DETAIL APPROVED FOR 20-YEAR SYSTEM WARRANTIES.

071002

MULE-HIDE PRODUCTS CO., INC. 2009	***DRIP EDGE WHITE EPDM CURED COVER STRIP***	***DETAIL NO.:***
	SYSTEMS: TPO ALL	***MHT-UN-106C***

®

Technical Bulletin
No. 1003

Use of Pactiv GreenGuard Roof Insulation In Mule-Hide Roofing Systems

October 22, 2010

Pactiv offers several roof insulations that may be used in Mule-Hide roofing systems. The Pactiv insulation is an extruded polystyrene product and care must be taken when using this material over coal tar pitch. The following is a brief summary of how these insulations may be utilized in a Mule-Hide system.

Insulation	**Sizes**
PB6 Series	Supplied as fanfold bundles, 4' x 50', 3/8" thick
PB38 Series	Supplied as 4' x 8' sheets, 3/8" thick

Warranties – Pactiv insulations may be used for Standard 10, 15, or 20 year warranties when following our guidelines and Pactiv recommendations. (Not for use with Mule-Hide Premium Warranties)

Ballasted Systems

Membrane	Insulation	Installation
EPDM TPO	PB6, PB6FA or PB6FA90	Loosely laid in place*
	PB38, PB38FA or PB38FA90	
PVC	NONE	Ballasting not permitted

*Note: Insulation may be spot attached with adhesive to facilitate installation. Mechanical attachment of insulation is not allowed under a ballasted system.

Mechanically Attached Systems

Membrane	Insulation	**Attachment** (Min fasteners required) (4)
TPO(1) (Light Colored)	PB6, PB6FA or PB6FA90	**2** per 2' x 4' panel – FM pattern - Fig 2
	PB38, PB38FA or PB38FA90	**4** per 4' x 8' board – FM pattern – Fig 1
EPDM(2) (Dark Colored)	PB6, PB6FA or PB6FA90	**3** per 2' x 4' panel – FM pattern – Fig 4
	PB38, PB38FA or PB38FA90	**8** per 4' x 8' board – FM pattern – Fig 3
PVC(3) (Light Colored)	PB6W	**2** per 2' x 4' panel – FM pattern - Fig 2

(1) TPO (White, Tan, Gray)
(2) Reinforced EPDM
(3) PVC (White, Tan, Gray)
(4) See fastening patterns attached to this Tech Bulletin.

Fully Adhered Systems
Pactiv FA and FA90 products have a special facer that allows certain membranes to be adhered to them.

Insulation	Uplift[5] (MDP)	Insulation Attachment			
		Field	Perimeter	Corner	Detail[6]
PB6FA – fanfold	FM 1-60	4 per 2' x 4'	6 per 2' x 4'	8 per 2' x 4'	Fig 5
PB38FA – 4' x 8'	(-30 psf)	16 per 4' x 8'	24 per 4' x 8'	32 per 4' x 8'	MHFM-216
PB6FA90 - fanfold	FM 1-90	3 per 2' x 4'	5 per 2' x 4'	8 per 2' x 4'	Fig 6
PB38FA90 – 4' x 8'	(-45 psf)	12 per 4' x 8'	18 per 4' x 8'	32 per 4' x 8'	MHFM-212

(5) The maximum attainable wind classification under the ANSI/FM 4474 Appendix C test procedure. ANSI/FM 4474, associated FM Loss Prevention Data Sheets and building codes require a 2 to 1 margin of safety be applied to the windstorm classification for comparison to roof cladding design pressures. The maximum design pressures associated with these assemblies are:
FM 1-90 = -45 psf (maximum design pressure)
FM 1-60 = -30 psf (maximum design pressure)

(6) See fastening patterns attached to this Tech Bulletin.

Membrane	Adhesives
EPDM	Solvent Based Bonding Adhesive Low VOC Bonding Adhesive (**Not** for use with Acrylic Water Based Bonding Adhesive) [7]
TPO	TPO Bonding Adhesive Low VOC Bonding Adhesive (**Not** for use with WBBA-2000 Adhesive) [7]
PVC	**Not** approved at this time

(7) These adhesives have not been tested with Pactiv Insulation.

Follow GreenGuard application instructions, available at www.green-guard.com

Always check with local code bodies to ensure that this assembly meets local building code requirements. Not for use in high wind uplift areas. Contact Mule-Hide Technical Department for additional information.

Any information given on this Technical Bulletin is subject to change without notice. Please visit our website at www.mulehide.com or contact Mule-Hide Products at (608) 365-3111 for questions or additional information.

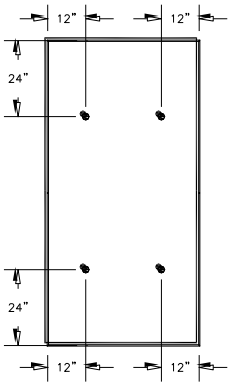


FIGURE 1
4' X 8' INSULATION BOARDS

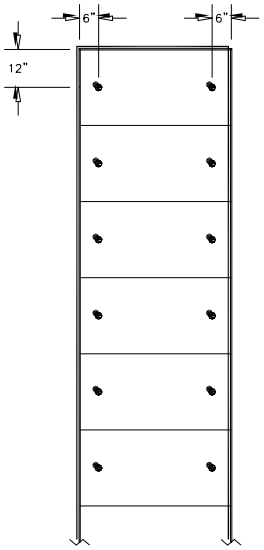


FIGURE 2
4' X 50' FANFOLD INSULATION

FASTENING PATTERN FOR GREENGARD® ROOFING RECOVERY BOARDS USED UNDER MECHANICALLY ATTACHED LIGHT–COLORED ROOF MEMBRANES

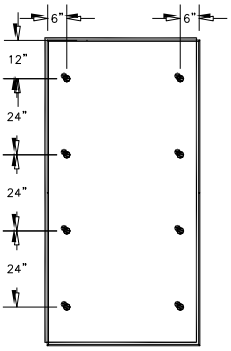


FIGURE 3
4' X 8' INSULATION BOARDS

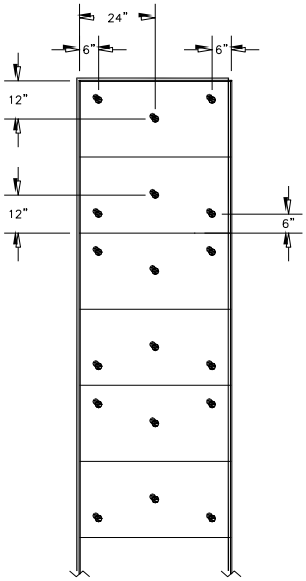
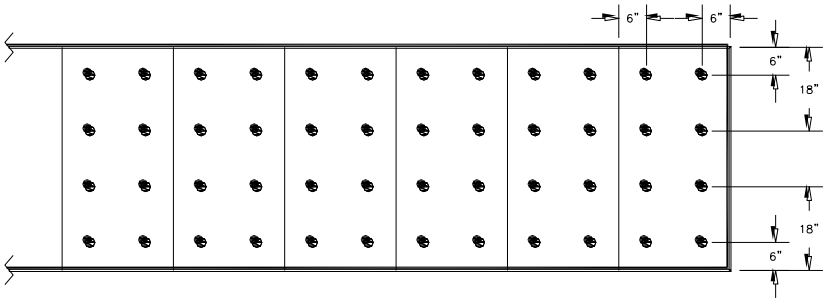
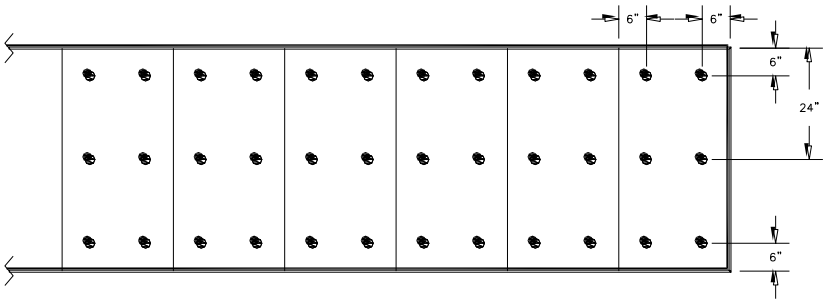


FIGURE 4
4' X 50' FANFOLD INSULATION

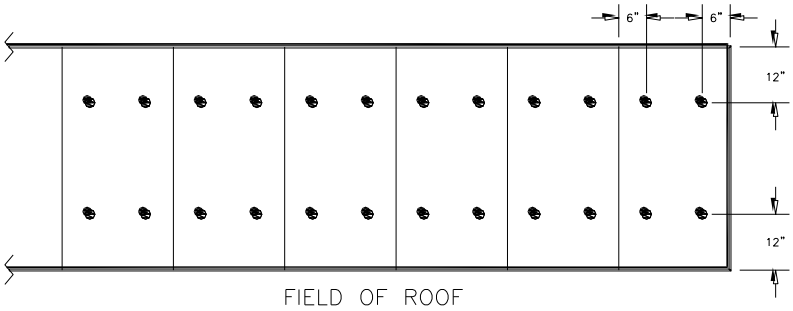
FASTENING PATTERN FOR GREENGARD® ROOFING RECOVERY BOARDS USED UNDER MECHANICALLY ATTACHED DARK–COLORED ROOF MEMBRANES



CORNERS



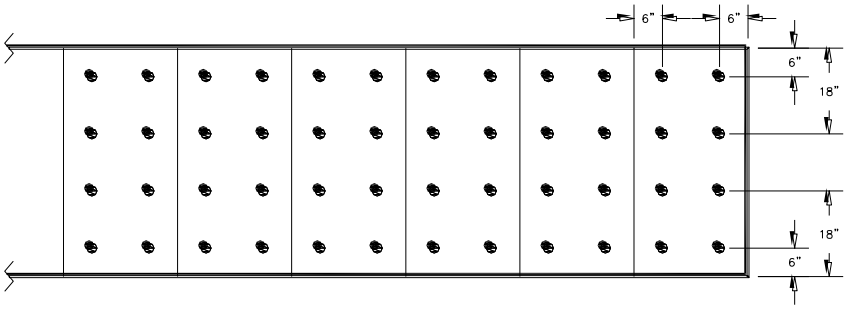
PERIMETERS



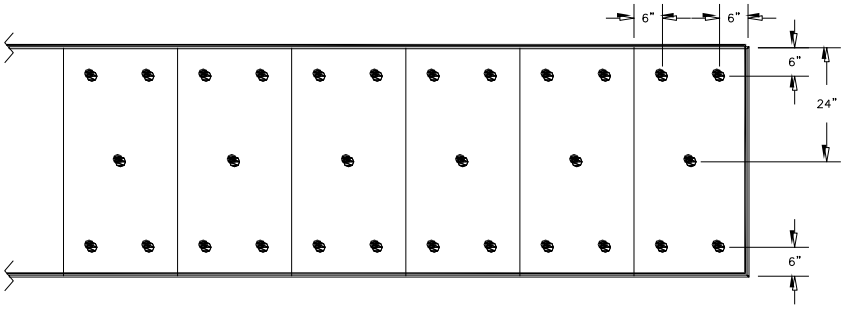
FIELD OF ROOF

FIGURE 5
4' X 50' PB6FA FANFOLD INSULATION

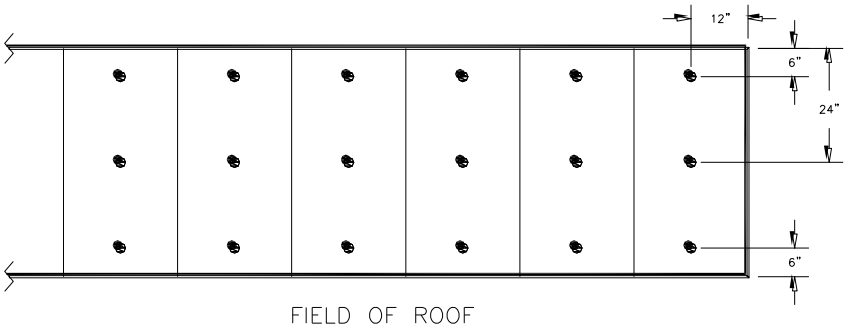
FASTENING PATTERN FOR GREENGARD® PB6FA ROOFING RECOVERY BOARDS USED UNDER FULLY ADHERED ROOF MEMBRANES TO ACHEIVE FM I-60



CORNERS



PERIMETERS



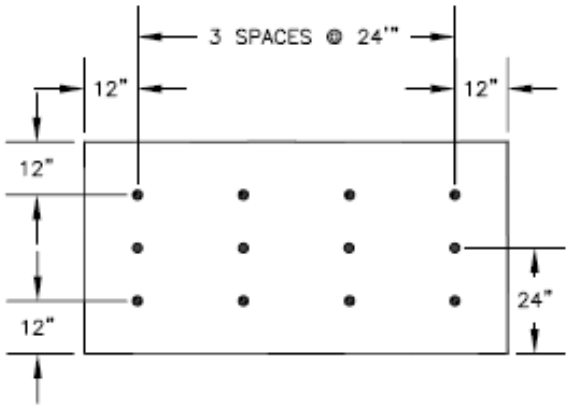
FIELD OF ROOF

FIGURE 6
4' X 50' PB6FA90 FANFOLD INSULATION

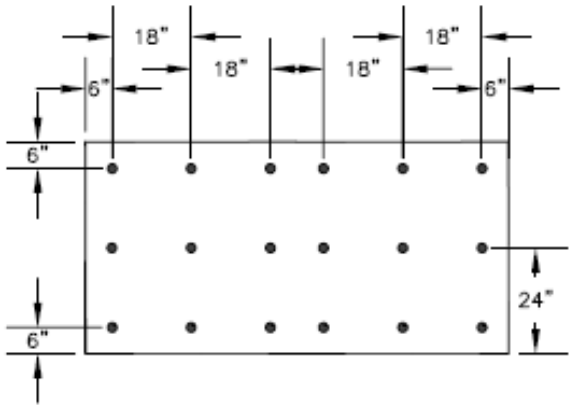
FASTENING PATTERN FOR GREENGARD® PB6FA90 ROOFING RECOVERY BOARDS USED UNDER FULLY ADHERED ROOF MEMBRANES TO ACHEIVE FM I-90

NOTES:

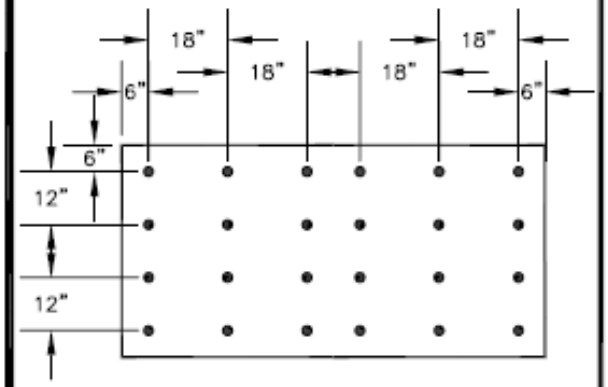
1. 12 FASTENERS PER 4' X 8' BOARD IN THE FIELD IS APPROVED FOR 1-1/2" TO 2" THICK POLYISOCYANURATE INSULATIONS WHEN USED AS THE TOP LAYER OR ¼" DENS DECK INSTALLED AS A COVER BOARD.
2. PERIMETER AND CORNER DIMENSIONS ARE TO BE A MINIMUM OF 8' WIDE UNLESS THE PROJECT REQUIRES FACTORY MUTUAL COMPLIANCE. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR FACTORY MUTUAL REQUIREMENTS.
3. MULE-HIDE FASTENERS AND 3" STRESS PLATES MUST BE USED FOR INSULATION ATTACHMENT.
4. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
5. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS
   - 100% FOR CORNERS



FIELD (12)
1 FASTENER PER EVERY 2.66 SQ. FT.



PERIMETER (18)
1 FASTENER PER EVERY 1.77 SQ. FT.

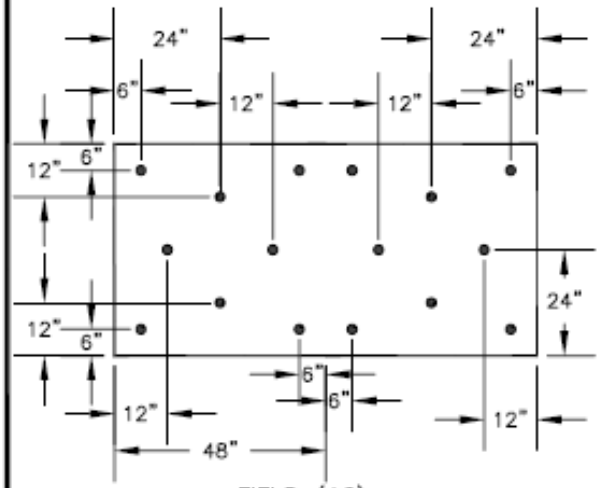


CORNERS (24)
1 FASTENER PER EVERY 1.33 SQ. FT.

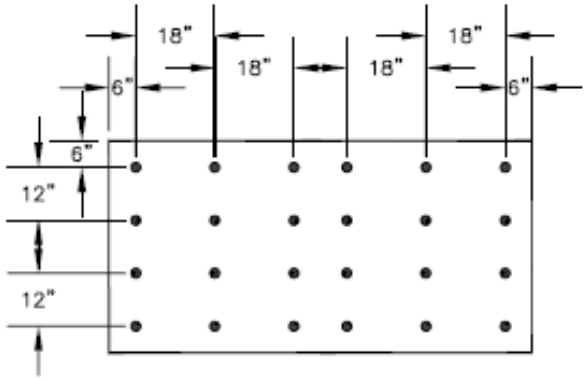
MULE-HIDE PRODUCTS CO., INC.	**INSULATION ATTACHMENT 12 FASTENERS PER 4' X 8' IN FIELD** **SYSTEMS:** **FULLY ADHERED**	**DETAIL NO.:** **MHT-FA-721** REVISION DATE: 10/2013

NOTES:

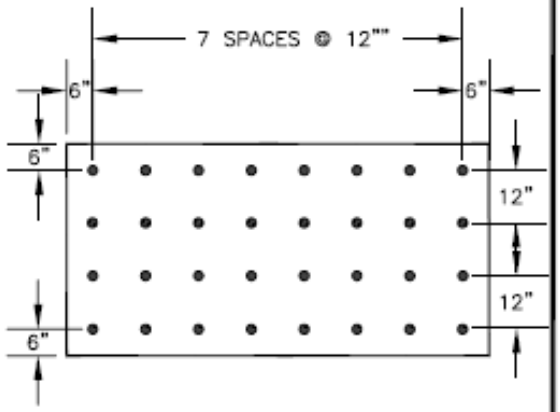
1. 16 FASTENERS PER 4' X 8' BOARD IN THE FIELD IS MULE-HIDE'S STANDARD FOR FULLY ADHERED TPO ROOFING SYSTEMS.
2. PERIMETER AND CORNER DIMENSIONS ARE TO BE A MINIMUM OF 8' WIDE UNLESS THE PROJECT REQUIRES FACTORY MUTUAL COMPLIANCE. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR FACTORY MUTUAL REQUIREMENTS.
3. MULE-HIDE FASTENERS AND 3" STRESS PLATES MUST BE USED FOR INSULATION ATTACHMENT.
4. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
5. FASTENER DENSITY INCREASES BASED ON THE FOLLOWING:
   - 50% FOR PERIMETERS
   - 100% FOR CORNERS



FIELD (16)
1 FASTENER PER EVERY 2 SQ. FT.



PERIMETER (24)
1 FASTENER PER EVERY 1.33 SQ. FT.



CORNERS (32)
1 FASTENER PER EVERY 1 SQ. FT.

MULE-HIDE PRODUCTS CO., INC.	**INSULATION ATTACHMENT 16 FASTENERS PER 4' X 8' IN FIELD**	**DETAIL NO.:**
	SYSTEMS:	**MHT-FA-722**
	FULLY ADHERED	REVISION DATE: 10/2013

Mule-Hide Products Co., Inc. National Support Center | 1195 Prince Hall Drive, Beloit, WI 53511-5481 | tel. 608.365.3111 | fax. 608.365.7852

Technical Bulletin
No. 1101

Mule-Hide Membranes and Adhesives - Cold Weather Installation

Revised Oct-2013

During periods of cold weather, special storage and application methods must be used to facilitate the installation of our roofing materials. For best results, roofing materials should be stored between 60ºF and 80ºF prior to application. As the products cool and the properties and application deteriorate, restore products to room temperature.

Listed below are some tips for installing single ply membranes during periods of cold weather (40ºF or less). As a rule, roofing materials become stiffer and more difficult to work with as temperatures decrease. Proper storage and installation of all your roofing materials is crucial to the successful outcome of your project.

EPDM – EPDM membrane is available in large sheet sizes that are folded. During periods of cold weather, these folded sheets are more difficult to relax and install. Mule-Hide recommends the use of smaller, non-folded sheets for installation during cold weather. Allow extra time for the sheet to relax during colder weather.

EPDM flashing products may require supplemental warming from a heat gun. Be careful to keep the heat gun away from flammable materials such as cleaners, tape primers and adhesives.

TPO & PVC – Remove the outer wrapping and un-roll the membrane. Flip the membrane over so that the back side is up, facing the sunlight. This will allow the darker, back side of the membrane to absorb warmth from the sun while relaxing. Only un-wrap as much material as will be used during that day. Allow extra time for the sheet to relax.

Welding techniques and parameters must also be adjusted for cold weather applications. In general, welding speeds need to be decreased. It is imperative that test welds be conducted at start up and after the automatic welder has been shut down to assure that a proper weld is being made. It is also important to conduct test welds with hand welders also, due to the slower speeds needed to affect a proper weld.

SAMB (Self Adhering Modified Bitumen) - In order to perform properly, Mule-Hide SAMB materials require a minimum application temperature of 40°F and rising for 48 continuous hours. This applies to the roofing materials and approved substrate. During installation, the membrane must be promptly rolled with a minimum 75# roller. Failure to abide by these requirements may result in poor adhesion or cracking issues. During periods of colder weather, the Mule-Hide SAMB materials should always be stored at room temperature (60° to 80° F) until just prior to use. Materials that are not stored at room temperature (or not used within 4 hours) should be restored to room temperature prior to use.

Adhesives & Sealants

Acrylic Water Based Bonding Adhesive & WBBA-2000

Water based adhesives must not be allowed to freeze either during storage or application. These adhesives must be stored in original unopened containers at temperatures between 60ºF and 90ºF prior to application. In general, these products should be installed when temperatures are 45ºF and above and must not be allowed to freeze within a minimum of 48 hours of application. Once subjected to freezing temperatures the product will not perform and must be disposed off. Consult the appropriate Product Data Sheets for specific information on the adhesive being installed.

Mule-Hide Bonding Adhesive (EPDM), Mule-Hide TPO Bonding Adhesive, Mule-Hide PVC Bonding Adhesive, Low-VOC Bonding Adhesive, Low-VOC PVC Bonding Adhesive, Low-VOC Bonding Adhesive 1168 (CA only)

Solvent based adhesive and sealants must be stored in original unopened containers at temperatures between 60ºF and 90ºF for 24 hours prior to use. Storage at temperatures over 90ºF may alter product shelf life. Mix product thoroughly until all settled pigments are dispersed and adhesive is uniform in color. Mule-Hide recommends a minimum of 5 minutes of stirring with a variable speed drill and mixing paddle. Products stored at cold temperatures and then restored to room temperatures may experience separation of solvents. Always remix products thoroughly prior to use.

Working in low temperatures will also result in longer drying times for solvent based products. Failure to allow the products to properly flash off will result in solvent blistering of the membrane. To determine when the adhesive or primer has flashed off, form a fist and press your knuckles into the surface and give your wrist a quarter turn and lift. If surface is tacky but does not string, the surfaces are ready to mate together.

In addition to extended drying times, there is an increased likelihood of condensation forming on the surface of the adhesive. If condensation forms, the surfaces cannot be mated and work must stop until conditions improve. Wait until conditions improve and allow the adhesive to dry completely. Make sure the surface is completely dry before reapplying another coat of adhesive or primer.

Low-VOC Adhesives - Opened containers of Low-VOC adhesives must be used within 48 hours. Stir adhesive occasionally while using. Adhesive will begin to thicken after this point, making it difficult to control applied thickness. In hot weather, do not leave sealed containers on roof for prolonged periods of time. In cold weather, keep material at room temperature until ready to use.

Coverage rates are average and will vary based on job site conditions. Porous or slightly rough surfaces may require the use of a prime coat followed by a finish coat of adhesive. The performance of the roofing system will be diminished if proper amounts of adhesive are not applied.

Any information given on this Technical Bulletin is subject to change without notice. Please visit our website at www.mulehide.com or contact Mule-Hide Products at (608) 365-3111 for questions or additional information.

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Technical Bulletin
No. 1301

Mule-Hide edge metal requirements for warranted projects

February 11, 2013

Sheet metal not covered by warranty
Sheet metal by others – Sheet metal that is provided by others is not covered under our Mule-Hide warranties, and cannot be used on projects that require extended wind speed coverage.

Sheet metal covered by warranty[3]
Mule-Hide coated metal (TPO & PVC) – Mule-Hide coated metal that is properly formed (by others) and installed according to our published details, may be covered under our system warranties, but cannot be used for projects that require extended wind speed coverage.

Sheet metal covered by warranty and eligible for extended wind speed coverage[3]
Mule-Hide pre-manufactured Edge Metal – Mule-Hide pre-manufactured Edge Metal that is properly installed according to our details, is covered under our Mule-Hide System Warranties and is to be used for projects that require extended wind speed coverage.

Description	Warranted	Extended Wind Speed
Sheet Metal by Others	No	No
Mule-Hide Coated Metal	Yes[1,3]	No
Mule-Hide pre-manufactured Edge Metal	Yes[3]	Yes[2,3]

Notes:
1. Mule-Hide Coated Metal must be properly formed (by others) and installed according to our published details.
2. Contact the Mule-Hide Technical Department for information regarding the availability of extended wind speed coverage, appropriate products and specific system requirements.
3. Rain carrying sheet metal such as collector heads, gutters, downspouts and accessories are explicitly excluded from any warranty coverage.

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Technical Bulletin
No. 1302

Use of InsulFoam Roof Insulation In Mule-Hide Roofing Systems

September 2013

InsulFoam roof insulations may be used in Mule-Hide roofing systems and will qualify for a Premium warranty if purchased from Mule-Hide. The InsulFoam products include Expanded and Extruded Polystyrene insulations and care must be taken when using these materials over coal tar pitch. The following is a brief summary of how these insulations may be utilized in a Mule-Hide system.

Warranties – InsulFoam insulations may be used for either Standard or Premium, 10, 15, or 20 year warranties when following Mule-Hide guidelines and InsulFoam recommendations. Must provide proof of purchase (copy of the distributor's invoice showing Mule-Hide SKU numbers) when applying for a Premium Warranty.

Fully Adhered – All fully adhered systems require the use of an approved cover board.

Mechanically Attached

TPO

1. Minimum 1.25 density InsulFoam
2. R-Tech insulation or fanfold with polymeric facer side up

PVC

1. Minimum 1.25 density InsulFoam with slip sheet or cover board
2. R-Tech insulation or fanfold with polymeric facer side up

EPDM

1. Cover board required over InsulFoam
2. R-Tech insulation or fanfold with polymeric facer side up

Ballasted

TPO & EPDM

1. Minimum 1.00 density InsulFoam*
2. R-Tech insulation or fanfold with polymeric facer side up*
   *cover board recommended for high traffic areas

PVC Ballasting not permitted with PVC membranes

Notes:

1. Local building codes must be consulted for the acceptance of installing polystyrene insulations directly over metal decking.
2. Polystyrene insulation cannot be installed directly over coal-tar pitch surfaces or existing PVC membranes. For coal-tar pitch, a min 1-½" thick layer of insulation with a min R value of 5 is required as separation.
3. PVC membranes require separator sheets between the PVC membranes and polystyrene products unless using R-Tech board with polymeric facer side up.

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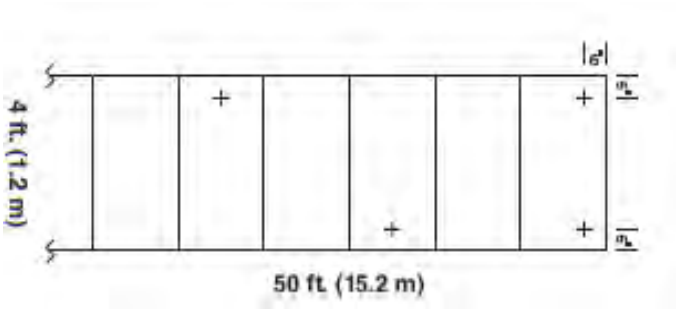
Insulation Attachment

Fully Adhered Systems **–** Attachment will vary depending upon type and thickness of cover board, type of roof deck and wind uplift requirements. Contact the Mule-Hide Technical Department for acceptable attachment patterns.

Mechanically Attached Systems

4' x 4' boards – Secure with four fasteners per board
4' x 8' boards – Secure with eight fasteners per board

FanFold – Attach with two fasteners at each end panel and then install one fastener at every other panel (see drawing)



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Technical Bulletin
No. 1303

Use of Structodek High Density Fiberboard Insulation Cover Board with Primed Red Coating In Mule-Hide Roofing Systems

October 2013

The use of Structodek HD with Primed Red Coating high density wood fiberboard, as manufactured by Blue Ridge Fiberboard, Inc., is approved for use in Mule-Hide warranted roofing systems using either EPDM, TPO & PVC single ply roofing membranes or our self-adhering modified bitumen membranes.

This product is coated two-sides with a red primer that is compatible with all of our single ply adhesives (solvent and water based) as well as our self-adhering modified bitumen membranes.

Structodek HD is to be installed in a conventional manner using either fasteners or insulation adhesives. Attachment rates will vary depending upon project requirements.

Attached is a copy of the data sheet for the Structodek HD board for reference.

Any information given on this Technical Bulletin is subject to change without notice. Please visit our website at www.mulehide.com for the most current information or contact the Mule-Hide Technical Department at (800) 786-1492 for questions or additional information.

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CELOTEX
BLUE RIDGE™
FIBERBOARD

STRUCTODEK® HIGH DENSITY

FIBERBOARD ROOF INSULATION
COVER BOARD WITH PRIMED RED COATING

DESCRIPTION

The proprietary, patent pending, non-asphaltic Primed Red Coating integrated on the surface of STRUCTODEK HD possesses unique bonding characteristics that ultimately result in superior adhesion capabilities with the current membrane & adhesive technology on the market today. The non-asphaltic Primed Red Coating is compatible with all single-ply membranes including PVC, TPO, EPDM, and CSPE without concern of premature membrane degradation that is often associated with asphalt emulsion coated fiberboard products. Additionally the Primed Red Coating, unlike asphalt emulsion coated products, has proven to be compatible with traditional, low VOC and water-based adhesives as well as many foam adhesives. The Primed Red Coating allows adhesives & foams to "key" into the STRUCTODEK HD surface while at the same time deterring excessive adhesive absorption. The unique Primed Red Coating allows for a solid membrane bond while still providing optimal square foot per gallon of adhesive coverage thus insuring a quality & cost effective membrane installation.

While STRUCTODEK HD with Primed Red Coating was designed with the single-ply application in mind it contains many of the same great attributes as STRUCTODEK HD with the traditional non-asphaltic black coating. Accordingly it also works well with asphaltic based systems (BUR), coal tar, and cold-process adhesive products. Additionally, STRUCTODEK HD with Primed Red Coating has also been successful in peel-and-stick applications without the typical need for an additional primer in many instances. The rigid and strong, yet lightweight nature of STRUCTODEK HD with Primed Red Coating is better than heavier alternatives and will keep the roof load below the specified maximum weight. Structodek HD with Primed Red Coating is offered coated on 2 sides and available in 4'x4' and 4'x8' panels.

USES

STRUCTODEK HD with Primed Red Coating can be used as an insulation board, cover board, or re-roof/recover board. The product is a high-density roofing board designed for low-slope single-ply, as well as traditional roof system applications.

SPECIFICATIONS

- ASTM C 208, Type II, Grade 1 and Grade 2
- CAN/ULC-S706-09 Type II, Classes 1 and 2
- UL Classified to Canadian Std CAN/ULC-S107 and US Std UL 790
- FM Approved Class 1 – FM Approval Standard 4450/4470
- Canadian Evaluation CCMC #13186-L
- NOA 10-0120.04; Miami-Dade County, FL; Expiration date 09/18/13

MASTERFORMAT NUMBER AND TITLE

07 22 16 - Roof Board Insulation

FEATURES/BENEFITS

- Compatible with PVC, TPO, EPDM, CSPE single-ply membranes as well as more traditional systems.
- Compatible with most low VOC, water-based and traditional adhesives.
- Superior adhesion without excess adhesive absorption.
- Compatible with most direct peel-and-stick applications.
- BUR compatible - easily handles hot asphalt.
- Approved in thousands of FM RoofNav® & UL Class A rated roof system assemblies.
- Green, non-asphaltic coating – contributes to LEED credits.
- Hail resistant, structurally rigid, easily handles heavy foot traffic and wheeled loads.
- Possesses SOUNDSTOP® sound deadening technology.
- Contributes to thermal insulation with R-values of 1.3 per ½".
- Lightweight, fiberglass free, cuts with a standard utility knife.
- Compressive strength exceeds the Canadian standard at 10% deformation for ½" thickness.
- Coated 2 sides Primed Red provides optimal surface bonding characteristics ideal for use in single and multiple layer roof systems.
- Waxes & other moisture resistant components are added early in the manufacturing process providing superior core and edge protection. The integral moisture resistant components protect the edges in stock panel size (4'x4' or 4'x8') and, more importantly, also protects the edges when the product is cut on the jobsite.
- Cost effective solution- a value engineered champion.

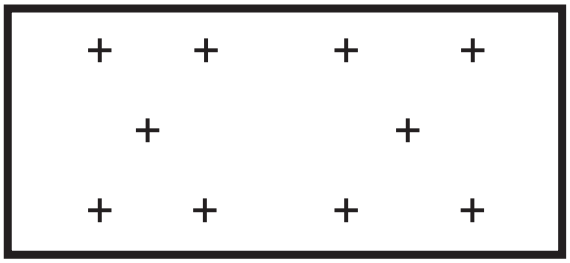
PRECAUTIONS

Do not expose to open flame or excessive heat. May smoulder if ignited. If ignited, extinguish completely. Do not apply flame directly to material when installing a modified bitumen system. Material must be kept dry at all times; in storage and during application. Apply only as much STRUCTODEK HD with Primed Red Coating in one day as can be covered by completed roofing system that day. Do not use as an underlayment for shingles. In re-roofing applications, all wet areas in old roof should be cut out and replaced. Before material is installed, remove all loose and protruding gravel. STRUCTODEK HD with Primed Red Coating must not be used in close proximity to chimneys, heater units, fireplaces, steam pipes, or other surfaces which could provide long-term exposure to excessive heat (maximum 212◦ F) without adequate thermal protection. Consult appropriate heating appliance manufacturer's instructions before installation.

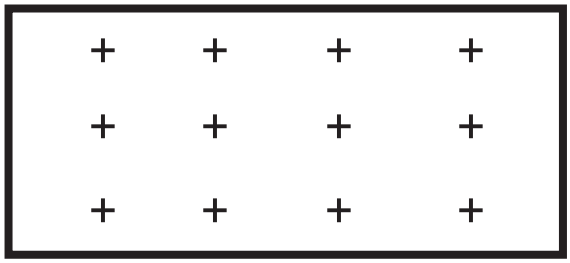
LEED INFORMATION

May help contribute to LEED credits:

- MR Credit 2: Construction Waste Management
- MR Credit 4: Recycled Content
- MR Credit 5: Regional Materials
- MR Credit 6: Rapidly Renewable Materials
- IEQ Credit 4.4: Low-Emitting Materials – Composite Wood and Agrifiber Products



10 FASTS/BD.



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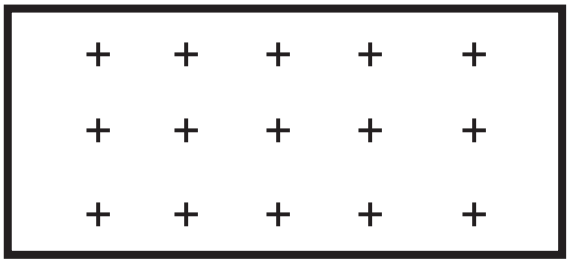

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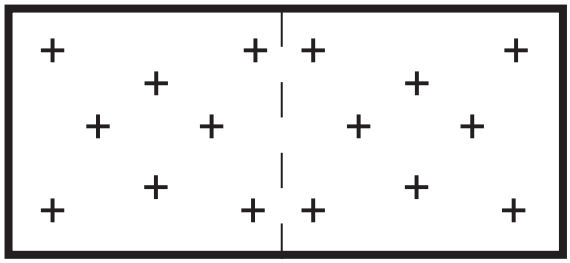

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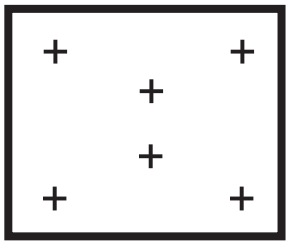

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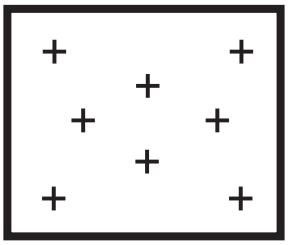

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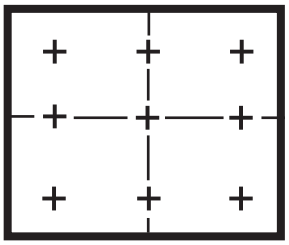

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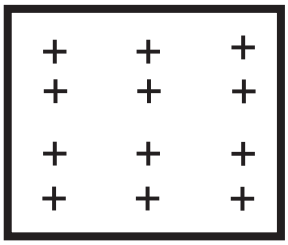

12 FASTS/BD.

Typical FM fastening patterns for 1-60 & 1-90. Actual fastening patterns will vary based upon specific membrane manufacturer's FM system assembly, please refer to membrane manufactures specific fastening requirements as listed in FM's RoofNav system.

Limited Warranty: BLUE RIDGE FIBERBOARD, INC. warrants at the time and place we make shipment, our material will be of good quality and will confirm with our published specifications in force on the date of acceptance of the order. Read complete warranty. Copy furnished upon request.

Disclaimer: The information contained herein is included for illustrative purpose only, and to the best of our knowledge, is accurate and reliable. BLUE RIDE FIBERBOARD, INC. cannot however under any circumstance make any guarantee of results or assume any obligation or liability in connection with the use of this information. As BLUE RIDGE FIBERBOARD, INC. has no control over the use to which others may put its product, it is recommended that the products be tested to determine if suitable for specific application and/or our information is valid in a particular circumstance. Responsibility remains with the architect or engineer, contractor and owner for the design, application and proper installation of each product. Specifier and user shall determine the suitability of products for specific application and assume all responsibilities in connection therewith.

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JULY 2013

Technical Bulletin
No. 1304

Revised LTTR Values
For
Polyisocyanurate Roof insulation
(Long Term Thermal Resistance)

October 2013

On January 1, 2014 a new test method for predicting Long Term Thermal R (LTTR) values for Polyisocyanurate roofing products will go into effect. The net effect is that the published LTTR values for polyiso roof insulation will be decreased. All other physical properties will remain the same. The new test method is an attempt to predict the R value of polyiso after 15 years of use.

Q: What is the effective date of the changes?
A: The new test method goes into effect January 1, 2014.

Q: Will any other physical properties change?
A: No. This is merely a different method of determining the LTTR of the product.

Q: Will all Polyiso products and manufacturers be affected?
A: This change will affect all polyiso material and all manufacturers who are members of PIMA.

Q: Does this mean that all Polyiso LTTR values will decrease?
A: Yes, based on the new test method, LTTR values will go down.

Q: How do I price a project that will ship in 2014?
A: If the quote is based on R value then the new LTTR values should be used. Note that the NRCA recommends that designers specify Polyiso by thickness. If the quote is based on thickness then no change is needed.

Q: What if I have already quoted a project for 2014?
A: You should ask to be re-quoted if the quote was based on R value.

Q: How will this affect tapered polyiso insulation?
A: These R values will also decrease beginning in 2014.

Q: What if I have a project that shipped in 2013 and now needs additional material?
A: You should clarify with the designer whether or not they wish to have the new material quoted based on the 2014 LTTR values. Keep in mind that the thickness will change.

Q: What do I do with existing inventory?
A: Inventory purchased prior to January 1, 2014 can be sold with the 2013 R-Values displayed. For instance, if you have bundles of 1.5” ISO with a 2013 label, they can be sold as meeting the 2014 LTTR of 8.5 for 1.5” ISO.

Q: How do the new R Values compare to the present ones?
A: Please see R value comparison on next page.

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Nominal Thickness*** (Inches)	(mm)	**Poly ISO 1** 2013 LTTR*	2014 LTTR**	Metal Deck Max. Flute Spanability (Inches)
1.0	25	6.0	5.6	2 ⅝
1.5	38	9.0	8.5	4 ⅜
1.6	41	9.6	9.1	4 ⅜
1.7	43	10.3	9.6	4 ⅜
2.0	51	12.1	11.4	4 ⅜
2.5	64	15.3	14.4	4 ⅜
2.7	69	16.6	15.6	4 ⅜
3.0	76	18.5	17.4	4 ⅜
3.3	84	20.4	19.2	4 ⅜
3.5	89	21.7	20.5	4 ⅜
3.6	91	22.4	21.1	4 ⅜
4.0	102	25.0	23.6	4 ⅜

*Long Term Thermal Resistance Values are based on ASTM C1289 and CAN/ULC S770 which provides for a 15-year time weighted average.
**LTTR (Long Term Thermal Resistance) determined in accordance with *updated* 2014 ASTM C1289 Standard.
***Other thicknesses available upon special request.

Nominal Thickness*** (Inches)	(mm)	**Poly ISO 2™** 2013 LTTR*	2014 LTTR**	Metal Deck Max. Flute Spanability (Inches)
1.0	25.4	6.0	5.6	2 ⅝
1.5	38.1	9.0	8.5	4 ⅜
2.0	50.8	12.1	11.4	4 ⅜
2.5	63.5	15.3	14.4	4 ⅜
3.0	76.2	18.5	17.4	4 ⅜
3.1	78.8	19.1	18.0	4 ⅜
3.3	83.8	20.4	19.2	4 ⅜
4.0	101.6	25.0	23.6	4 ⅜

*LTTR (Long Term Thermal Resistance) values were determined in accordance with CAN/ULC-S770 and ASTM C1289, Annex A1. All test samples were third-party selected and tested by an accredited material testing laboratory. The LTTR results were reviewed and authorized by FM Approvals and certified by the PIMA Quality Mark Program.
**LTTR (Long Term Thermal Resistance) determined in accordance with *updated* 2014 ASTM C1289 Standard.
***Other thicknesses available upon special request.

Any information given on this Technical Bulletin is subject to change without notice. Please visit our website at www.mulehide.com for the most current information or contact the Mule-Hide Technical Department at (800) 786-1492 for questions or additional information.

Mule-Hide Products Co., Inc. National Support Center | 1195 Prince Hall Drive, Beloit, WI 53511-5481 | tel. 608.365.3111 | fax. 608.365.7852