

# Technical Guide

"The name trusted in roofing since 1906"



## FASTENER GUIDELINES

### Fastener Overview

- A. Mule-Hide offers a variety of fasteners and plates to:
  - Attach roof insulation
  - Attach mechanically fastened roofing membranes
  - Secure All Purpose Bar and termination bars

Mule-Hide fasteners must be used when mechanically attaching the roof insulation and roof membrane, or when attaching our All Purpose Bar on all warranted projects. On a job-to-job basis, the Mule-Hide Technical Department may accept the use of non-Mule-Hide fasteners for attachment of Mule-Hide accepted insulation. Any non-Mule-Hide fastener and plate must obtain written approval by the Mule-Hide Technical Department prior to job start-up. Your local Mule-Hide Territory Manager can assist you in contacting the Mule-Hide Technical Department to inquire about any proposed non-Mule-Hide fastener.

The following fastener guidelines apply:

### Technical Specifications - Drill Point Fasteners (#12 Insulation fasteners)

A.	<u>Technical Specifications</u>	<u>Minimum Performance</u>
	Material	C-1022 Phillips Cold Heading Wire
	Thread OD	0.209 to 0.218 diameter
	Point	Double Flute Self-Drilling
	Corrosion Coating	Cathodic Epoxy Electrocoat
	Average Pull-out	600 lbs. - 3/4" plywood 480 lbs. - 22 gauge steel

### Technical Specifications - HDP Fasteners (#14 membrane or insulation fasteners)

A.	<u>Technical Specifications</u>	<u>Minimum Performance</u>
	Material	C-1022 Phillips Cold Heading Wire
	Thread OD	.233 - .241 diameter
	Point	Double Flute Self-Drilling
	Corrosion Coating	Cathodic Epoxy Electrocoat
	Average Pull-out	710 lbs. - 3/4" plywood 575 lbs. - 22 gauge steel

### Technical Specifications - EHD Fasteners (#15 membrane or insulation fasteners)

A.	<u>Technical Specifications</u>	<u>Minimum Performance</u>
	Material	C-1022 Phillips Cold Heading Wire
	Thread OD	.275 - .285 diameter
	Point	Double Flute Self-Drilling
	Corrosion Coating	Cathodic Epoxy Electrocoat
	Average Pull-out	810 lbs. - 3/4" plywood 725 lbs. - 22 gauge steel

Note: Additional information is available on our website at [www.mulehide.com](http://www.mulehide.com)

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### Physical Characteristics - Drill Point & Heavy Duty Fasteners

#### A. Drill Point Fasteners (#12 Insulation fasteners)

Screw Length*	Thread Length*	Pieces / Box*	Weight / Box*
1 5/8	Full	1000	12#
2 1/4	Full	1000	16#
2 7/8	Full	1000	19#
3 1/4	2 7/8	1000	22#
3 3/4	2 7/8	1000	25#
4 1/2	4	1000	29#
5	4	1000	32#
6	4	1000	37#
7	4	500	21#
8	4	500	24#

\*Approximate Values - Other sizes available as special order

#### B. HDP Fasteners (#14 membrane or insulation fasteners)

Screw Length*	Thread Length*	Pieces / Box*	Weight / Box*
1 1/2	Full	1000	13#
2	Full	1000	16#
3	2 7/8	1000	24#
4	3 7/8	1000	31#
5	3 7/8	1000	38#
6	3 7/8	1000	44#
7	3 7/8	500	26#
8	3 7/8	500	30#

\*Approximate Values - Other sizes available as special order

#### C. EHD Fasteners (#15 membrane or insulation fasteners)

Screw Length*	Thread Length*	Pieces / Box*	Weight / Box*
1 1/4	Full	1000	15#
2	Full	1000	22#
3	2 7/8	1000	29#
4	3 7/8	1000	38#
5	3 7/8	1000	47#
6	3 7/8	500	29#
7	3 7/8	500	33#
8	3 7/8	500	38#

\*Approximate Values - Other sizes available as special order

#### D. Determine minimum screw length per following:

Plywood / OSB Decks:	Fastener length must penetrate deck a minimum of 3/4"
Wood Plank Decks:	Fastener length must embed deck a minimum of 1"
Steel Decks:	Fastener length must penetrate deck a minimum of 3/4"
Structural Concrete Decks:	Fastener length must embed deck a minimum of 1"

### Method of Application

- A. Install fasteners with variable low speed drill with depth sensing tip, if possible, to prevent over-drill of fastener. Use a #3 Phillips bit to drill fasteners. Structural concrete should be pre-drilled with a hole 1/2" deeper than the fastener to be used using a masonry 3/16" carbide drill bit. **Caution:** Eye protection is recommended during the installation of all fasteners.

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### General Requirements

- A. Plywood decks require a 3/4" penetration through the bottom surface of the deck.
- B. Steel decks require 3/4" minimum deck penetration by the fastener. The threaded portion of the fastener must engage the deck. Fasteners must engage the top rib of fluted steel decks. Fastening through the bottom rib of a fluted steel deck is not permitted.
- C. Structural concrete decks require the fastening of the insulation with fasteners approved by Mule-Hide for use in concrete roof decks and insulation plates. The fastener must penetrate the deck by at least one inch. It is suggested that each hole drilled in a concrete deck be at least 1/2" deeper than the potential penetration of the concrete fastener. The additional 1/2" depth is for the residual filings left by the concrete after the drill has been removed.
- D. Gypsum, either poured or precast, cementitious fiber decks (tectum, etc.) and lightweight concrete decks must be secured with Mule-Hide TL Fasteners, Peel Rivets (a registered trademark of Creative Construction Components, Inc.) or an acceptable fastening system approved by Mule-Hide Technical Department.
- E. All decks must have a minimum pull-out resistance of 300 pounds to be considered for fully adhered projects. For a mechanically attached project, a minimum pull-out resistance of 360 pounds is required. Mule-Hide recommends a test installation be performed to check the pull-out resistance of the appropriate fastener prior to bidding the project. Pull-out tests should be performed by a qualified individual and include different sections of the roof to assure uniformity of the deck.

### Approved Fasteners

- A. Only approved Mule-Hide fasteners supplied by Mule-Hide Products Co. may be used on warranted Mule-Hide systems. **Caution:** Some fasteners have unusual design characteristics which could harm the membrane if used with the Mule-Hide membrane; therefore, it is recommended that Mule-Hide approved fasteners be used whenever possible.
- B. All fasteners shall be corrosion resistant coated and meet the corrosion resistance requirements of Factory Mutual Standard 4470.
- C. All fasteners shall be compatible with and suitable for the insulation used and the deck to be penetrated.

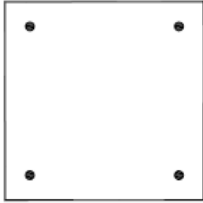
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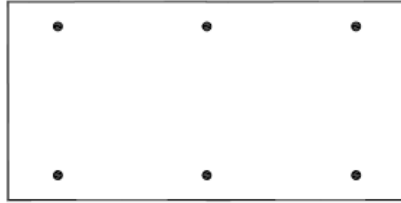
### Fastener Patterns - Insulation

- A. Insulation shall be mechanically attached using approved fasteners per insulation manufacturers' specifications and FM wind uplift requirements. Unless the insulation manufacturer's fastening requirements are more stringent, Mule-Hide requires the following minimum fastening rates and suggests the following patterns:

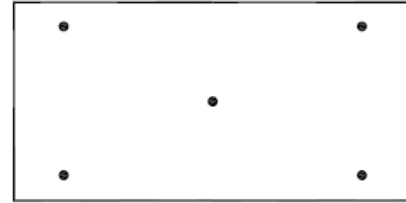
#### Mechanically Attached Systems



4'x4' BOARDS



4'x8' BOARDS



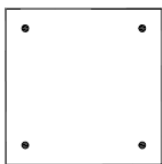
4'x8' BOARDS (2" THICK OR MORE)

All insulation must be pre-fastened to the deck with either Mule-Hide #12 DP, HDP (#14) or EHD (#15) fasteners and 3" plates at a minimum as shown above. All fasteners must be at least six (6) inches from the edge of the board and centered as shown.

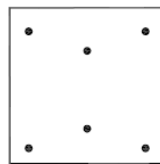
#### Fully Adhered Systems

Insulation Type or Overlay	Fasteners per 4' x 8' board		
	Field	Perimeter	Corner
Approved Polyisocyanurate - Min 2" thick (top layer)	8	12	16
Approved Polyisocyanurate - Min 1.5" up to 2" thick	12	18	24
Approved Polyisocyanurate - Min 1.0" up to 1.5" thick	16	24	32
½" HD Poly-Iso - Installed over Approved Insulation	16	24	32
HD Fiberboard - Min 1/2" thick- Installed over Approved Insulation	16	24	32
Dens Deck Prime or Securock - 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

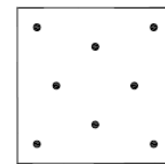
#### Eight Fasteners Per Board (4 x 8)



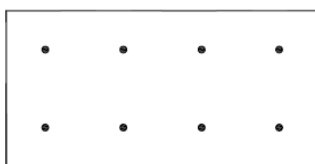
4'x4' FIELD (4)



4'x4' PERIMETERS (6)

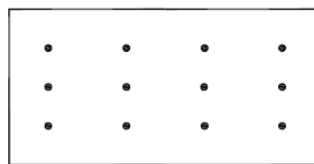


4'x4' CORNERS (8)



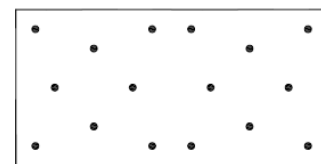
4'x8' FIELD (8)

1 FASTENER PER EVERY 4 SQ. FT.



4'x8' PERIMETERS (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



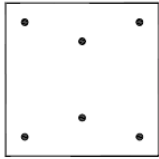
4'x8' CORNERS (16)

1 FASTENER PER EVERY 2 SQ. FT.

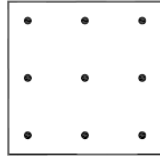
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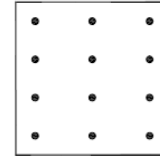
### Twelve Fasteners Per Board (4 x 8)



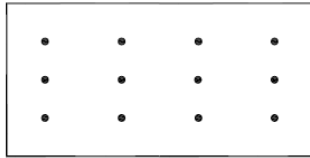
4'x4' FIELD (6)



4'x4' PERIMETERS (9)

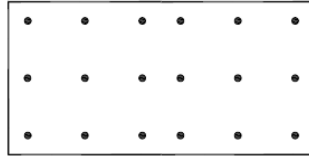


4'x4' CORNERS (12)



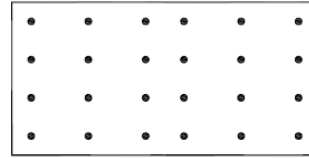
4'x8' FIELD (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



4'x8' PERIMETERS (18)

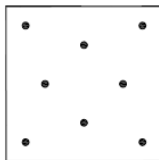
1 FASTENER PER EVERY 1.77 SQ. FT.



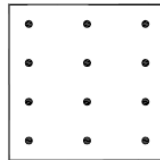
4'x8' CORNERS (24)

1 FASTENER PER EVERY 1.33 SQ. FT.

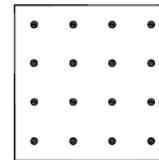
### Sixteen Fasteners Per Board (4 x 8)



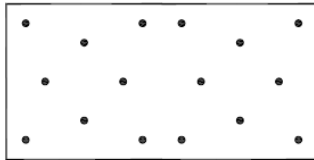
4'x4' FIELD (8)



4'x4' PERIMETERS (12)

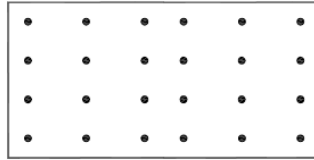


4'x4' CORNERS (16)



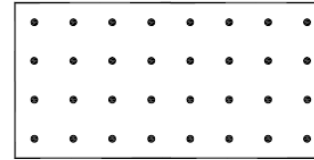
4'x8' FIELD (16)

1 FASTENER PER EVERY 2 SQ. FT.



4'x8' PERIMETERS (24)

1 FASTENER PER EVERY 1.33 SQ. FT.



4'x8' CORNERS (32)

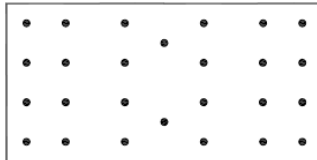
1 FASTENER PER EVERY 1 SQ. FT.

### Seventeen Fasteners Per Board (4 x 8)



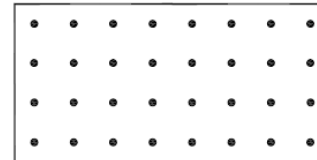
4'x8' FIELD (17)

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.

#### Perimeter enhancements:

To meet increased uplift requirements in the perimeters and corners of each roof area, additional insulation attachment provisions must be installed as follows:

**Perimeters** – insulation attachment to be increased 50% over the field attachment requirements with a maximum of one (1) fastener every one (1) square feet.

**Corners** – insulation attachment to be increased 50% over the field attachment requirements with a maximum of one (1) fastener every one (1) square feet.

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See attached details MHFM-724, MHFM-725, & MHFM-726 for examples of Factory Mutual Attachment patterns for those projects requiring Factory Mutual Approval.

### Fasteners Available From Mule-Hide

**Typical Fasteners** - Refer to Mule-Hide website at [www.mulehide.com](http://www.mulehide.com) for most current information.

Fastener (1) (2)	Uses	Roof Deck (3)
Mule-Hide DP (#12)	Insulation attachment Only	Steel, Wood
Mule-Hide HDP (#14)	Insulation attachment & System attachment	Steel, Wood, Concrete
Mule-Hide EHD (#15) (4)		Steel, Wood

#### Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, contact Mule-Hide Technical Department prior to bidding.
3. Contact Mule-Hide Technical Department for non-standard roof decks.
4. Required for Factory Mutual, mechanically attached systems

#### Attachment of Wood Nailers

- A. Wood nailers should be fastened in accordance with local building code requirements or following Factory Mutual's Loss Prevention Data Sheet 1-49 requirements.

Wood nailers are not considered part of the Mule-Hide System Warranty, and are not addressed in depth in the Mule-Hide specifications, nor are they inspected by Mule-Hide. However, wood nailers do play a major role in the performance of the roofing system and contribute to the wind uplift resistance of overall system

The following is a summary of Factory Mutual nailer attachment requirements as per Loss Prevention Data Sheet 1-49. Please consult Loss Prevention DataSheet 1-49 for additional information.

#### Attachment to Masonry Walls

1/2" diameter anchor bolts spaced 48" on center.  
Spacing to be reduced to 24" on center for areas within 8' of an outside corner

3/8" diameter anchor bolts spaced 32" on center.  
Spacing to be reduced to 16 on center for areas within 8' of an outside corner

#### Steel or Wood Decking

For attachment into steel decking, fasteners are to engage top flutes only.  
FM requires that 5/8" diameter steel washers be installed with the approved fasteners.

Minimum #10 screws stagger fastened 12" on center  
Spacing to be reduced to 6" on center within 8' of an outside corner.

Bolted connection (to an angle) spacing to be 48" on center  
Spacing to be reduced to 24" on center within 8' of an outside corner.

#### Nailer to Nailer

Use fasteners that extend a minimum of 1-1/4" below bottom of new nailer  
Fasteners to be stagger fastened 12" on center.  
Spacing to be reduced to 6" on center within 8' of an outside corner.