

INTRODUCTION to the MULE-HIDE PRODUCTS CO., INC. PVC SPECIFICATION MANUAL

The main purpose of this manual is to create a better understanding of specifications and conditions for the installation of Mule-Hide Roofing Systems. This information is intended to assist building owners, architects and design professional in selecting a suitable roof system.

Each successful roofing project is the product of good design, proper materials and installation. Mule-Hide Products Co., Inc. is committed to help you achieve success by helping you to knowledgeably select and use Mule-Hide products. In addition to our quality products, Mule-Hide offers a full-time technical service department and one of the most comprehensive performance warranty programs in the industry.

Mule-Hide is not, under any circumstance, responsible for the design and construction of any building nor responsible for the adequacy of any structure to support a roof system. Under no circumstances will Mule-Hide be responsible for any roofing system failures due to design errors, structural defects of any building components or damages caused by other trades. Mule-Hide's review of any specifications or building plans is for the sole purpose of making recommendations concerning details for the installation of the Mule-Hide roofing system products.

Mule-Hide reserves the right to make changes or modifications to this publication at any time without prior notice. Although Mule-Hide has attempted to take care in preparing these specifications, no representation or warranty can be made in connection with these specifications. Mule-Hide expressly disclaims all representations and warranties, whether expressed or implied, including warranties of merchantability and fitness for a particular purpose.



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PRODUCT UPDATE

Revised 1/14/15

OTC Regulation Update for Adhesives and Sealants

Increased regulations in the Northeast to reduce emissions of volatile organic compounds (VOCs) resulting from the application of adhesives, sealants and primers have required Mule-Hide to continue development of low-VOC substitutes.

The language within the regulations varies by state but essentially indicates that any person who sells, offers for sale, supplies or uses an adhesive, sealant or primer that does not meet the VOC content limits set forth will be in violation of the regulations. Mule-Hide will not be able to sell or ship non-compliant products to these states during the regulated period.

The following states, including the District of Columbia, have current regulations in affect:

- California
- Connecticut
- Delaware
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- Pennsylvania
- Rhode Island

Regional Regulations

Virginia has regional regulations in the Northern Virginia Emissions Control Area, the Fredericksburg Emissions Control Area, Sportsylvania County and Fredericksburg City. Compliant products are also to be used in the following locations: Richmond Emissions Control Area and the cities/counties of Charles, Chesterfield, Hanover, Henrico, Prince George, Colonial Heights, Hopewell, Petersburg and Richmond.

Georgia has regulations in the Atlanta area including Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Newton, Paulding, Rockdale, Spalding, and Walton counties.

Utah also has regional regulations. The following counties are affected: Box, Elder, Cache, Davis, Salt Lake, Tooele, Utah and Weber.



In addition, New Hampshire and Vermont are considering VOC regulations.

Most of the states with current VOC regulations are members of the Ozone Transportation Commission (OTC), which is made up of 12 states in the Northeast and Mid-Atlantic regions of the U.S. However, not all members of the OTC have VOC regulations in effect.

Low-VOC Compliant Products

Mule-Hide offers the following products as low-VOC alternatives.

EPDM	Compliant Alternative
EPDM Bonding Adhesive	Low-VOC Bonding Adhesive or Acrylic Water Base Bonding Adhesive
Black Splice Adhesive	Black In-Seam Tape
White Splice Adhesive	White In-Seam Tape
EPDM Tape Primer	Low-VOC Primer
TPO	Compliant Alternative
TPO Bonding Adhesive	Low-VOC Bonding Adhesive or WBBA 2000 (Waterbase Contact Adhesive)
TPO Tape Primer	Low-VOC Primer
PVC	Compliant Alternative
	Low-VOC PVC Bonding Adhesive or HydroBond Water-Based PVC Bonding Adhesive
Walkable PVC	Compliant Alternative
DecTec SBA 100	DecTec WBA100 (Water Base Latex Adhesive)

Products packaged in 16 oz. or smaller tubes are exempt.

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While this manual is published on a periodic basis, no manual can explicitly cover every condition or detail on a specific project or provide a detail for every new design or new product. For conditions or details not covered in this manual, please contact your local Mule-Hide representative, the Mule-Hide Technical Department or Customer Service Department for assistance.

PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST CURRENT INFORMATION & LATEST UPDATES

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SECTION 1

MULE-HIDE PRODUCTS CO., INC.

PVC SYSTEM GUIDELINES

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Technical Guide

"The name trusted in roofing since 1906"



HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

Basic Considerations

The installation of a Mule-Hide roof involves procedures and techniques that have been carefully conceived and engineered to help you provide your customers with the most reliable, lowest maintenance roofing system available.

Successful roof installations do not just happen; they must be carefully planned and implemented. An understanding of the basic properties of the Mule-Hide system can help the contractor to exploit its unique strengths and to avoid unnecessary problems. Keep the following in mind as you go through this section: Mule-Hide Heat-Weld Membranes are polyester scrim-reinforced, single-ply roofing system designed primarily for mechanical and fully adhered attachment and hot-air welded seams. Mule-Hide membrane is formulated with polymers that are highly resistant to sunlight and weather, as well as many chemicals.

The remainder of this section covers the proper methods of performing each step of the installation. This material was written to provide the contractor with practical, detailed information that can help ensure the proper performance of each step of the Mule-Hide installation.

Preparing the Substrate

The substrate under the Mule-Hide Heat-Weld Membranes must be properly prepared. The general goal of this preparation is to provide a smooth compatible surface for the insulation (when required) and the membrane.

The contractor should follow good roofing practice when evaluating and preparing the surface. For example, as general practice especially on reroofing jobs, prepare the entire roof before starting the Mule-Hide installation in order to minimize contamination and ensure the integrity of the seams. By keeping in mind the general properties of the Mule-Hide Heat-Weld Membrane you can help evaluate unusual situations when they arise; but if you are in doubt as to the resolution of problems not addressed on the Mule-Hide Standard Details or Specifications, contact your Mule-Hide Technical Service Department for advice.

New Roofing Installations

On new roofing installations, keep the deck and insulation surface free of debris and trash. Note precisely the location of structural members, electrical conduits, and gas and water lines under the deck, as well as general deck characteristics that will affect the placement of mechanical fasteners - such as the direction and spacing of steel deck flutes.

Follow good roofing practice in the loading of the roof with Mule-Hide Heat-Weld Membrane rolls. Stack carefully and store in a cool, clean, dry location.

CAUTION: Keep the packaging protecting the Mule-Hide Heat-Weld Membrane intact until ready to use.

Reroofing Installations

To ensure a successful reroofing job, you must be aware of the conditions that led to the need for the reroof. It may be that leakage has occurred from sources other than the roof. If so, be sure that the Building Owner or Operator is aware of any such sources as early as possible, and understands that the application of a new roof may not solve all of the leakage problems. Some useful points to cover in your evaluation follow.

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Investigate existing leakage conditions thoroughly. Before the installation begins, be sure that a thorough investigation of existing roof conditions has been performed, and that a review or “as-built” plans and specifications for the building as well as the assessment of current conditions has determined that the building is structurally sound and otherwise suitable for reroofing.

It is helpful to know such details as the nature, extent, and duration of leaks that may have occurred through the old roofing. Because leaks often occur from sources such as building parapets, walls, and windows, a new roof may not solve all leakage problems. Check the building walls for dampness, spalling brick, large stress cracks, and efflorescence (salty, powdery deterioration) - signs of problems that extend beyond the roof itself. Look for stains inside the building, and be sure that all sources of such stains are known.

Evaluate existing roof conditions: The cause(s) of poor drainage conditions should be thoroughly understood and solved as part of the reroofing process. For example, check for signs of ponding, a sure sign of poor drainage. If ponding occurs, determine the extent and duration of ponding. If needed, are overflow scuppers or other means of drainage present? Determine if a provision should be made for their installation.

Are there noticeable splits in the existing roofing? Splits may indicate a change in substrate or in metal deck direction; they could be indications that an expansion joint is required.

Be sure that you know ALL types and conditions of substrate that are present, the spacing of structural members under the deck, the direction and gauge of a steel deck, the thickness of concrete of insulating fill, drain placement, slope, and the location of expansion joints.

Make a roof drawing: Once on the roof, work up a detailed roof drawing on the Mule-Hide Pre-Job Survey showing all dimensions, drains, mechanical equipment, penetrations, skylights, monitors, parapet walls, and other features. You will have to submit your drawing(s) as part of the Warranty Application.

Removal (tear-off) of existing roofing: Your crews should remove no more roofing and insulation from a given area of the roof than can be completely covered with new insulation and Mule-Hide membrane that day. On tear-offs, ALL gravel and debris will have to be broomed from the deck.

Reroofing over existing roofing: When reroofing over old roofing, broom ALL gravel and debris from the old roofing surface, cut out blisters and fishmouths, and seal. Remove and replace wet insulation as required. As general practice, prepare the entire roof before starting the Mule-Hide installation in order to minimize contamination and insure the integrity of seams.

Laying Insulation

If old insulation is present and is to be retained, you should determine if it is wet. The surest diagnostic technique is by taking and evaluating a series of roof cuts. Alternatively, three techniques currently available to make this determination by indirect means are: nuclear moisture detection, infrared thermography, and electrical capacitance.

These techniques provide measurements of factors that can be associated with the presence of moisture. As such, they can help point out certain inconsistencies in the existing roof system (and the operator), but do not necessarily provide valid measures of moisture. Limited direct verification is always advisable.

Whatever your method of investigation, wet insulation must be removed and replaced. The presence of wet insulation must be noted on the Pre-Job Survey. These areas must be designated on the roof diagram.

Insulation must be laid and fastened according to its manufacturer's specifications, and at a minimum must follow Factory Mutual's suggested guidelines.

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The longest dimension of the insulation should run PARALLEL to the flutes of a steel deck and PERPENDICULAR to the direction in which the Mule-Hide field sheet will be unrolled. Regardless of the approved lay of the insulation board, the membrane field sheet direction must be proper with respect to the deck construction, as explained in "Installing Membrane - Field Sheet Membrane," below.

Lay no more new insulation than will be covered by the roofing membrane on the same day. Work on any given area of the roof must be made completely watertight at the end of each workday.

Good roofing practice dictates that care can be taken to achieve smooth transitions between insulation boards and roof areas. Always consider proper drainage and adjust thickness to achieve. The membrane should never have to bridge an area and transitions should never cause ponding.

Insulation Attachment

Mechanically Attached Systems

For a Mechanically Attached System, the roof insulation is attached to the substrate in order to keep the insulation in place. The individual boards are typically attached as follows:

- 4' x 8' Insulation Boards – 6 insulation fasteners and plates per board over entire roof area.
- 4' x 4' Insulation Boards – 4 insulation fasteners and plates per board over entire roof area.

See page 3 of the Fastener Guidelines portion of this manual for basic fastener patterns. Consult the Mule-Hide Technical Department for additional questions.

Fully Adhered Systems

In a Fully Adhered System, the membrane is bonded directly to the insulation. Therefore, the strength, or wind uplift resistance of a Fully Adhered System, is dependent upon the type and thickness of the top most layer of insulation, and number of fasteners installed. This requires that a greater number of insulation fasteners be used for a Fully Adhered System than for a Mechanically Attached one.

The number of fasteners used also varies across the roof area. In the center of the roof, called the Field, the least number of fasteners are required. In the Perimeter and Corner areas, additional fasteners are needed since the wind uplift pressure is greater in these areas than in the Field of the roof.

Basic insulation attachment patterns can be found in the Fastener Guidelines portion of this manual, beginning on page 3. More specific information is available in our Design Summary's located in Section 2 of this manual. Contact Mule-Hide Technical Department for addition information.

Installing Mechanically Attached Membrane

Perimeter Half Sheets (This example assumes that two half sheets are needed)

To ensure that your installation meets the Mule-Hide specifications, refer to Standard Details as you read this section.

CAUTION: Keep the protective packaging of the Mule-Hide Heat-Weld Membrane intact until ready to use.

NOTE: Half-sheets are 50% to 60% the width of the field sheet. The field sheets must always be installed perpendicular to steel deck flutes, plywood deck joints, or deck plank direction, as appropriate. All field seams shall be shingled with the flow of water. PVC Systems require a minimum of two half sheets, consult TPO Tech Bulletin MA02-2006 for number of TPO half sheets.

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HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

1. Install the first perimeter half-sheet. Roll out the first half-sheet of membrane along one edge of the work area. This edge should be parallel to the direction in which the field sheets will run. Overlap the fascia with one edge of the roll, extending the membrane over the edge of the roof, past where the clip for the metal fascia is to be fastened. Allow the membrane to relax at least 15 minutes prior to fastening, 30 minutes when temperatures are below 60° F. Fasten the membrane to the vertical surface with corrosion-resistant ring shank cap nails (or other appropriate fastener when a nailer is not available) at 12 in O.C.

NOTE: Face Nailing is not acceptable into less than nominal 2x (e.g., 2 x 6 in.) wood nailers.

On the roof surface, note the position of the edge of the half-sheet, and then fold back the first half-sheet until the folded edge is roughly even with the roof edge.

2. Install the second perimeter half-sheet. Unroll the second half-sheet roll of membrane so that it laps under the unfolded edge of the first half-sheet 5 inches. This will produce a 2 to 2-1/2 in. clear lap area for seam welding. As with the first sheet, allow the membrane to relax at least 15 minutes prior to fastening, 30 minutes when temperatures are below 60° F. Install the appropriate Mule-Hide fasteners in the second half-sheet at the spacing specified for the particular deck type, utilizing the “set-pattern” (blue markings spaced 6 in. apart) scribed on the membrane. If still in doubt about fastener spacing or other items, consult the Mule-Hide technical Service department.

NOTE: Consult Fastener Guidelines (Section 5) for determination of “perimeter” and fastener spacing.

3. Fold back the unfastened edge of the second half-sheet.

Field Sheet Membrane

1. Unroll the first full-width sheet membrane. Roll out the full-width Mule-Hide field sheet membrane so that it laps UNDER the second half-sheet by 5 in. This will produce a 2 to 2-1/2 in. clear lap area for seam welding. Position the butt end of the membrane so that it will be overlapped 5 in. by the second half-sheet that will be installed perpendicular to the field sheets.

NOTE: All field seams shall be shingled with the flow of water.

2. Allow the membrane to relax at least 15 minutes when the temperature is above 60° F prior to fastening.
3. Fasten the field sheet. Mechanically fasten both edges and the butt end of the first field sheet into the deck. Take care to avoid making wrinkles. Fasteners must be installed so that the plates are 1/2 in. from the edges and end of field sheet. Space fasteners apart as required for the specific deck type and wind uplift requirements (see Section 4).
4. Install two more field sheets. These and subsequent rolls of field sheet membrane must OVERLAP by 5 inches (to the scribed blue lap line) the previous runs of field sheet membrane. Align butt ends so that they will be overlapped 5 inches by the still-to-be-installed second perpendicular half-sheet. Mechanically fasten field sheet into the deck along the edge that does not overlap the previous sheet, as well as the butt end. Space fasteners apart as indicated for the specific deck type and wind uplift requirements.
5. Roll the first half-sheet back into place. The first half-sheet should overlap the second half-sheet by 5 inches. Then roll the second half-sheet back; it should overlap the first field sheet by 5 inches.
6. Hot-air weld the half-sheets and the field sheets. Using the hot-air welding machine, weld all overlapping edges of the membrane together.

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HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

NOTE: In the subsequent hot-air welding operations we recommend hot-air welding the sheets together after installing a group of three full field sheets.

Perpendicular Half-Sheets

1. Unroll and mechanically fasten perpendicular half-sheets. To install half-sheets that are perpendicular to the field sheets, follow the same general procedure that was used with the first two half-sheets. As noted previously, the second perpendicular half-sheet must overlap the field sheet butt ends by 5 inches. This overlap will produce a 2 to 2 1/2 inch clear lap area for seam welding.

NOTE: The two perpendicular half-sheets must overlap the two previously installed half-sheets, and must run out to the edge of the roof, to the metal fascia clip position.

2. Hot-air weld the sheets together. Weld the sheets together using the hot-air welding machine. Take care to avoid making wrinkles.
3. Probe all seams. Seams may be checked when cool. For best results, checking seams 8 hours after hot-air welding is recommended. Repair any voids found the same day. After probing and all necessary repairs have been made, caulk all cut edges of reinforced membrane with Mule-Hide Edge Sealant.

NOTE: Pay special attention to the "T" lap seams formed where the second perpendicular half-sheet overlaps the butt ends of the field sheets. To ensure proper seaming of the "T" joints for 50 and 60 mil membrane, the top layer of the Heat-Weld Membrane is creased a minimum of one inch into the lower layer of membrane by using a heat gun with a narrow or pencil tip nozzle and a rubber hand roller. By inserting a heat gun nozzle between the layers of the membrane, the membrane will soften and begin to flow allowing it to crease and seal completely after applying pressure with a hand roller to ensure adequate bonding of the softened material. After heat-sealing the "T" joint, Edge Sealant must be applied a minimum of 6 inches in each direction of the "T" joint.

Installing Fully Adhered Membrane

Perimeter Half Sheets are NOT used in a Fully Adhered System.

To ensure that your installation meets the Mule-Hide specifications, refer to Standard Details as you read this section.

CAUTION: Keep the protective packaging of the Mule-Hide Heat-Weld Membrane intact until ready to use.

Position membrane over substrate with minimum 3" overlap at lap seams, and positioned so that laps will shed water. Allow the membrane to relax at least 15 minutes prior to fastening, 30 minutes when temperatures are below 60° F. After membrane has relaxed, fold membrane in half lengthwise exposing the underside of the sheet. Pails of adhesive are often used to weight the back edge of the membrane to hold it in position.

Using a medium nap roller, apply a smooth even coat of bonding adhesive to back side of membrane and substrate. **Do not apply adhesive in area of seam laps.** Allow adhesive to dry to a 'tacky' state. Test adhesive by placing a knuckle into it and turning your wrist a one-quarter turn. Adhesive is ready to mate when it does not string when knuckle is lifted.

Roll coated membrane onto substrate being careful to not wrinkle the sheet or trap air bubbles. Once membrane is mated to the substrate, thoroughly broom into place with a stiff bristled push broom to ensure proper contact and 100% adhesion. Repeat this procedure for remaining sheets.

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The Mule-Hide membrane shall be mechanically attached at the base of all parapet walls, curbs, peaks, valleys, and slopes intersections where the net change in slope is greater than 1 ½" per foot.

Hot-air weld the sheets together. Weld the sheets together using the hot-air welding machine. Take care to avoid making wrinkles.

Probe all seams. Seams may be checked when cool. For best results, checking seams 8 hours after hot-air welding is recommended. Repair any voids found the same day. After probing and all necessary repairs have been made, caulk all cut edges of reinforced membrane with Mule-Hide Edge Sealant.

NOTE: Pay special attention to the "T" lap seams formed where end lap intersects a side lap. To ensure proper seaming of the "T" joints for 50 and 60 mil membrane, the top layer of the Heat-Weld Membrane is creased a minimum of one inch into the lower layer of membrane by using a heat gun with a narrow or pencil tip nozzle and a rubber hand roller. By inserting a heat gun nozzle between the layers of the membrane, the membrane will soften and begin to flow allowing it to crease and seal completely after applying pressure with a hand roller to ensure adequate bonding of the softened material. After heat-sealing the "T" joint, Edge Sealant must be applied a minimum of 6 inches in each direction of the "T" joint.

Probing Seams

Probe all seams and repair all deficient seams no later than the following workday. **FAULTY SEAMS HAVE BEEN THE SINGLE MOST COMMON DEFICIENCY NOTED BY MULE-HIDE INSPECTORS.** Make it a routine to probe seams each workday, and to repair all seam deficiencies with the hand welder before leaving the work site.

Flashing Details

While many roofing jobs are likely to have their own special problems, the contractor is just as likely to face certain rooftop features over and over again. This section explains how to accommodate these common roof features quickly and effectively, time after time with the Mule-Hide Heat-Weld Membrane Roofing Systems.

In general, when dealing with common roof features (curbs, vents, etc.), complete the pertinent details per Mule-Hide Standard Details. When approaching such features, cut and fit the membrane around each obstacle you encounter. All membrane flashings shall be installed concurrently with the roofing membrane as the job progresses. Install night seals as necessary at the end of each workday. Should any water penetrate the new roofing because of incomplete flashings, the affected areas shall be removed and replaced. In reroofing, maintain the ability of the existing roof to drain - don't block off drains or scuppers.

The Advantage of Hot-Air Weldability

The unique hot-air weldability of both the scrim-reinforced field sheet membrane and unreinforced flashing membrane gives the contractor a special advantage when completing roof details. When used in connection with roofing details, hot-air welding provides the same assurance of watertightness as in field seaming - assurance that comes from permanently fused seams that can be as strong as the Mule-Hide Heat-Weld Membrane itself.

General Approach

The general approach to complete common roofing features involves hot-air welding, Mule-Hide Bonding Adhesive, Mule-Hide Edge Sealant, and terminating flashings. Common roofing features include such details as wall flashings, vertical and flat edge terminations, inside corners, outside corners, round shapes, drains, curbs and pitch pockets. Mule-Hide recommends that you rely on pitch pockets only as a last-ditch measure, although from time to time they can provide efficient means of dealing with particular problems.

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HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

As a general approach, the Bonding Adhesive is used to adhere, as appropriate, field sheet membrane to features such as curbs, vents, and parapets. Then, hot-air welding is used to seam membrane overlaps and Mule-Hide Edge Sealant is applied to cut edges of reinforced membrane.

IMPORTANT: All roofing work must follow Mule-Hide standard Details. Any failure to complete details to Mule-Hide specifications can stand between you and favorable inspection - and therefore, a Warranty. If no Standard Detail applies to a particular requirement of your job, sketch the way you think it should be handled and submit the sketch with your Pre-Job Survey for approval. Consult Mule-Hide's Technical Department if you have any questions about the Mule-Hide Standard Details.

NOTE: No deviation from Mule-Hide Standard Details is authorized until (1) it is submitted by the contractor in writing or sketch form for review and the job file, and (2) is approved by Mule-Hide's Technical Department.

Penetrations

Mule-Hide Heat-Weld Membranes must be mechanically attached at all penetrations. See details for specific methods of attachment.

Curbs, Vents, and Roof-to-Wall Flashings

Install Mule-Hide fasteners and plates as required around these penetrations. Using the Mule-Hide Reinforced Heat-Weld Membrane cut out flashings as required. All Heat-Weld Membrane flashings shall be fully adhered using Mule-Hide's Bonding Adhesive. The following conditions must be met:

1. All surfaces to be fully adhered should be compatible, dry and smooth with no excessive surface roughness. If an existing asphalt surface is present, one-half inch minimum plywood, 9 oz. polyester slipsheet or 26 gauge minimum galvanized metal barrier must be placed over the asphaltic surface.
2. After the proper surface has been prepared, Mule-Hide's Bonding Adhesive shall be applied using a minimum 1/2 inch nap paint roller at a rate of approximately 2-1/2 gallons per 200 square feet of surface area depending on the type of substrate. Apply adhesive in smooth even coat, avoiding globs, puddles, or other types of irregularities.

Adhesive should be applied to the area of substrate to be flashed. Let adhesive dry sufficiently to produce strings when touched with a dry, clean finger. Mule-Hide Heat-Weld Membranes used as flashing shall be cut to a workable length and shall have an even coating of Bonding Adhesive applied to it at a rate of approximately 1/2 gallon per 100 square feet. Carefully roll onto the previously coated substrate after the adhesive coating the membrane has dried sufficiently as indicated above. **Coverage rates will vary depending on substrate and environmental conditions.**

Avoid wrinkling membrane when applying to substrate. The amount of adhesive that can be successfully applied to the membrane will vary depending on ambient temperatures, humidity and manpower. After mating membrane to the substrate, carefully roll the membrane with a 2-inch wide rubber hand roller to promote maximum positive contact between the membrane and the substrate. Overlap all adjacent flashing sheets a minimum of 2 inches. The Heat-Weld Membrane Flashings shall extend a minimum of 6 inches onto the field sheet and be adhered securely. There shall be a minimum 2 inches hot-air weld in front of the fastener plates. All side laps are to overlap a minimum of 2 inches.

Areas of the flashings and membrane to be welded are not to have Membrane Adhesive applied to them.

All flashings shall extend a minimum of 8 inches above roof membrane level unless previously accepted by the owner or his representative and the Mule-Hide Technical Department. All flashings shall be hot air welded at their connections with the roofing membrane.

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HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

Apply Edge Sealant at all welded edges of flashings. All flashings shall be properly terminated according to mule-Hide's published Standard Details.

NOTE: After flashing is adhered in place, promote full contact adhesion by going back over entire area with a 2-inch rubber hand roller.

Roof Drains

Install roof drains according to the Standard Details. Field seams must not run through drains. In reroofing, old drains must be "**thoroughly cleaned**" or replaced. Existing sealing materials must be completely removed to avoid contamination and interference with the new membrane seal and with consistent clamping pressure. Insure that studs and clamping ring are in good condition. Replace parts as required, including screens.

Metal Work

Install metalwork in a manner that prevents damage from expansion or contraction and from the wind. Seal and water proof all metalwork in an acceptable manner. Note that metalwork other than Mule-Hide Coated Metal and Mule-Hide supplied accessories are not covered by Mule-Hide Warranty.

Standard Details - Curbs and Vent Stacks

IMPORTANT: All roofing detail work must follow Mule-Hide Standard Details. Any failure to complete details to Mule-Hide specifications can stand between you and a favorable inspection - and therefore, a Warranty. Consult Mule-Hide Technical Service department if you have any questions about how to solve special roofing problems using the Mule-Hide system, or about the Mule-Hide Standard Details.

Special Problems

Many roofing jobs are likely to have some special problems. This section explains how to accommodate some of these problems quickly and effectively with the Mule-Hide Roofing System.

Voids and Wrinkles in Seams - General

Unprobed, defective seams are the most common problem found by Mule-Hide inspectors. If defective seams are found by the Inspector on your job, they are likely to delay the issuance of a Mule-Hide Warranty. Therefore, it is in your best interest and good roofing practice to thoroughly check your seams to ensure they are acceptable to Mule-Hide BEFORE the final inspection occurs.

Probe all seams daily. Be sure to probe ALL new seams approximately 8 hours after completion or at the beginning of the next workday. Mark all voids and other defects for repair with a water-soluble marker. All seam welds must be at least 1 inch wide and free of voids. Seams that do not meet these specifications are not acceptable to Mule-Hide.

Defective seams must be repaired the same day as found. All voids and otherwise defective seams must be repaired by hot-air welding with a Mule-Hide approved hand-held hot-air welder the same day as probed.

NOTE: Seams do not deteriorate over a few days' or weeks' time when [properly] welded. When an inspector finds voids, the contractor could have found the problem with effective probing during the installation.

Repairing Voids and Wrinkles

Voids. The presence of voids generally indicates that not enough heat is being applied to the membrane, and therefore the movement of the welding machine should be slowed down. It may also be possible that you are trying to weld membrane that is dirty or wet. Follow this procedure:

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Clean the surface to be welded. Clean the surfaces of both sheets to be welded thoroughly with Fantastik or other similar general cleaner. Rinse clear and let dry. Surfaces must be cleaned until they are white. Make a final pass over the cleaned area with a clean rag dampened with Mule-Hide Membrane Cleaner.

Wrinkles. The presence of wrinkles in seams indicates the possibility of voids and a weak seam. Wrinkles may form if the hot-air welding machine drags the membrane at an angle to the seam. Such dragging can be caused by a machine that is out of alignment by the welding of seams along, up, or down too great a slope, or by the improper unrolling of the membrane, so that it does not lie flat and/or parallel to the seam direction.

Wrinkles and other distortions may also occur in hand welding operations because of inconsistent hand-rolling and welder movement. The operator should strive for smooth, consistent progress. Use a low enough heat setting to permit smooth work, especially with non-reinforced sheet.

Hand welding for field seams may be necessary on steep slopes, although some contractors find that the hot-air welder machine can be “held back” by the operator (possible with a helper) when welding DOWN slopes. This practice increases the difficulty of “staying on course,” and is not recommended for the novice operator.

Repairing Punctures and Holes in Membranes

Occasionally, punctures and holes may occur in the Mule-Hide Heat-Weld Membrane. Punctures and holes are frequently the result of other trades working on the roof, which should be kept to a minimum by the building owner/manager or project general contractor.

To repair punctures and holes in the Heat-Weld Membrane follow this procedure for hand welding a patch:

1. Clean the surface to be patched. Clean an area a minimum of 4 inches in all directions around the puncture or hole thoroughly with Fantastik or other similar general cleaner. Rinse thoroughly. Wipe with clean, damp rags and dry well. Surface must be cleaned until it is white.
2. Wipe the cleaned area of the field sheet membrane with Mule-Hide Membrane Cleaner, following all directions and precautions on the label. Final cleaning with the Mule-Hide Membrane Cleaner will help ensure the removal of any remaining dirt or soap film.
3. Cut out patch. Cut a round or rectangular patch with rounded corners from field sheet membrane. The patch must be 3 inches larger in all directions than the puncture or hole.

NOTE: All patches must be cut from scrim-reinforced membrane.

4. Position patch over the puncture or hole. Take care to allow for even laps on all sides.
5. Hot-air weld the patch. Using the hand-held hot-air welder and hand roller, hot-air weld the patch over the puncture or hole.
6. Caulk the cut edges. Caulk all edges of the patch with Mule-Hide Edge Sealant.

Making a Temporary Tie-In

While the roofing job is underway, it is vital to keep insulation, roofing board, and/or other substrate and deck dry. Moisture that is present under the Mule-Hide Heat-Weld Membrane will have a difficult time escaping once the membrane is hot-air welded.

Therefore, a “night seal,” or temporary waterstop, should be applied whenever storms threaten and at the end of every workday. The time needed to apply a night seal is well invested. The resulting protection can prevent the need for costly and time-consuming tear-off of wet substrate materials!

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HOW TO INSTALL MULE-HIDE REINFORCED HEAT-WELD MEMBRANES

IMPORTANT! The membrane used to make a night seal must be trimmed back prior to work. Asphaltic products used to make a night seal are not compatible with Heat-Weld Membranes.

Temporary Sealing of a Penetration

From time to time, at the end of a workday or before a storm breaks, it may be necessary to seal penetrations temporarily. Follow this procedure:

1. DO NOT make finished cuts at this time. A surplus of membrane will ensure that the next steps do not compromise the eventual, final completion of the penetration detail.
2. Turn membrane up on curb or equipment a minimum of 2 inches.
3. Install duct tape. Tape should be a minimum of 4 inches wide. Make sure you have a good bond between the tape and the curb. Tape should always be used in a manner that does not rely strictly on the tape adhesive to stay in place; e.g. ballast, wrap, or tack in place.
4. Before permanent seaming and adhesive bonding, trim membrane that is contaminated with tape adhesive. Remember, adhesive from the duct tape will prevent successful hot-air welding and good bonding with Mule-Hide Bonding Adhesive.

WARNING: Duct tape is not a suitable means for permanent sealing of seams in the Mule-Hide Heat-Weld Membrane System. Only hot-air welding is an acceptable means of seaming.

Roof Walkways

A walkway must be provided to accommodate regular traffic to service rooftop units. You can use smooth surface paver blocks over a slip sheet, or use our Mule-Hide Walkway Rolls.

End of Section

Technical Guide

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Equipment Needed to Install Mule-Hide Heat-Weld Membranes

Introduction - This section is intended to serve as a general guideline of the equipment that the contractor may need to successfully install a Mule-Hide Heat-Weld Membrane Roofing System.

General - The following list of hand tools should be included for an average crew of 4 to 6 men:

- One automatic welder
- Asphalt-free extension cord (#10/3 wire, 220 volt) with 220/30 amp male-female twist lock plugs for use with the automatic welder, not to exceed 100 feet in length
- 2 or 3 hand welders with nozzles
- Asphalt-free extension cords (#14/3 wire, 110 volts)
- 3 or 4 rubber hand rollers
- 1 pair of scissors per man
- 3 standard screw guns with disengaging clutch (RPM range of 1800-2500 with adjustable nose piece)
- Tape measures and one 100-foot tape
- 2 or 3 cotter pin extractors for probing seams
- Non-permanent ink pens (water soluble)
- Chalk lines with non permanent chalk (blue chalk)
- 4-inch wide paint brushes
- One-half inch nap paint rollers with solvent-resistant cores and handles
- Clean cotton rags
- Caulking guns
- Push Brooms
- Asphalt free waterproof canvas or other type of waterproof tarp for covering Mule-Hide products and equipment

Specialized Equipment - The Mule-Hide Roofing System requires 4 types of specialized equipment:

- Mule-Hide-approved automatic hot air seaming machine
- Mule-Hide-approved hand-held seaming machine
- Generator large enough to provide power to automatic welder and hand gun(s)
- Cotter pin puller or other type of pointed instrument to probe seams

WARNING: Never touch the metal portion of the fan housing, blower tube or blower nozzle of the automatic welder or hand held heat guns. They become extremely hot and can cause severe burns.

Technical Guide

EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

The Mule-Hide Heat-Weld Membranes can be permanently fused to itself by the application of super-heated air and pressure. To provide the required heat and pressure, Mule-Hide Heat-Weld Membrane Roofing Systems specifies an automatic welder for making field seams. A hand welder is specified when an automatic welder cannot be used (see next Section).

Automatic Welder

General Description: An automatic welder is an electrically powered, self-propelled device that utilizes electrical resistance heating and fan-forced hot air in combination with its own weight (including additional weight mounted on the exterior housing) to fuse the Mule-Hide Heat-Weld Membranes to themselves.

Technical Specifications

The following specifications are for general information. Consult the manual accompanying the equipment for additional details.

- **Electrical requirements:** 220V, 30A (minimum fused), 7500 W (minimum recommended available power), single-phase current. If using a generator, ensure generator is of sufficient size to power all welding tools (hand gun(s), automatic welder) run from generator.
- **Power cord and extensions:** #10, 3-conductor type may be used for distances up to 100 ft.; for longer lengths, consult an electrical contractor. We suggest the use of the highest quality electrical cords to extend the life of your equipment and improve overall performance.
- **Supplemental weight:** When welding Mule-Hide field membrane, an additional weight is to be fixed on the exterior housing over the wheels of the automatic welder. Most automatic welders have removable external weights.
- **Adjustments:** Tracking alignment, nozzle alignment, forward speed, temperature of heating element and airflow louver (and therefore hot air output).
- **Welding speed:** The speed of the welder must be no faster than necessary to reproduce good hot air weld and will vary according to environmental conditions. As a general rule, 10 to 12 feet per minute (fpm) is a typical speed in warm summer temperatures; 8 fpm or less is typical in cold weather temperatures.
- **Metal track (if required by welder manufacturer):** Several lengths, 8 foot each of 24-26 gauge galvanized metal for use as a track for the automatic welder. The metal tracks may be necessary to minimize wrinkles during welding.

NOTE: Conditions seldom justify running at maximums speed, which usually result in inconsistent seam quality. As ambient temperatures change throughout the day, the operator must rely on his judgment to determine the optimum operating speed and temperature of the automatic welder. It is good roofing practice to conduct test seaming before welding the field seams. See page 4 for test welding instructions.

Procedure - Before Connecting to Power

Use the automatic hot-air welder to make all field seams as general practice; the nozzle can be adjusted to weld near-horizontal seams (typical field seams).

Be sure to take the following preliminary steps when using an automatic unit.

1. Supplemental weight. Fix the supplemental weight to the exterior housing over the wheels. This weight will ensure that the proper pressure is applied to the seam being welded.
2. Check hot-air nozzle alignment and adjust if required.

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EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

3. Welding and non-welding positions. The hot-air nozzle can be locked into an UPWARD non-welding position, or into its DOWNWARD welding positions. The nozzle and blower assembly can be freely raised from the welding position after the release trigger on the blower housing is pulled and the entire assembly is slid OUTWARD from the machine. In this OUTWARD position, the nozzle and blower assembly escapes the detent that locks it into the DOWN position, and can be rotated to the UP position, where it will lock when the trigger is released. Position the hot-air nozzle so that it is in its DOWNWARD welding position and visually check to ensure that the nozzle will not direct the hot air into the silicone drive wheel or belt. Such misdirected super-heated air can quickly ruin the expensive wheel or belt drive. Any misalignment of the nozzle should be corrected at this time. After ensuring that the nozzle is properly aligned, return the hot-air nozzle to its UPWARD, non-welding position.

Be sure that the blower and transmission power switches are OFF and that the blower temperature control and speed control are set to ZERO.

CHECKPOINT: At this point, it is assumed that you are ready to hot-air weld a field seam, and the following requirements have been met:

- A roll of Mule-Hide Heat-Weld Membrane has been attached to the roof deck, and a second roll has been unrolled to provide a 5-1/2-inch overlap for mechanically attached and a 3" overlap for fully adhered over the previously attached edge, per Standard Mule-Hide Specifications.
- The surfaces to be hot-air welded are clean. If these surfaces are dirty, they must be rag-wiped clean with Fantastik® (or similar cleaner), then wiped with a clean rinse rag and thoroughly dried. The seam area should then be wiped with a clean rag dampened with Mule-Hide Membrane Cleaner to ensure removal of any remaining dirt or soap film.
- With the nozzle and blower assembly in the UP position, the automatic welder is positioned so that the silicone pressure wheel or belt is placed at the edge of overlapping sheet and the beveled guide wheel in front is at the edge of the top Mule-Hide sheet.
- Transmission and blower switches are OFF and speed and heat controls are set to ZERO.

WARNING: Never touch the metal portion of the fan housing blower tube, or blower nozzle. They become extremely hot and can cause severe burns.

Procedure - Connecting to Power

With the preliminaries done, you are ready to hot-air weld.

4. Connect the machine to power.
5. Turn the heater/blower power switch ON.
6. Set the temperature switch to the desired setting (1004° F is a good starting point).
7. Allow the machine to warm up (generally around 5 minutes).

NOTE: Test seams should be made at least at the start of work each morning and afternoon or any other time there is a noticeable change in temperature. Test seams should be made on use scrap material. After scrap material has cooled, attempt to physically tear them apart and examine them for consistent 1-1/2 to 2 inch wide fully laminated seam.

8. Prepare to set the machine in motion.
 - If ambient temperature is higher than 60 degrees F, adjust the transmission speed control switch so that the machine will move at about 12 fpm; further adjustment may be required once you are underway, depending on the quality of the seam produced.

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EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

- If ambient temperature is 40-60 degrees F, adjust the machine to move at about 10 fpm; further adjustment may be required, depending on the quality of the seam produced.
- If ambient temperature is less than 40 degrees F, adjust the machine to move at less than 8 fpm; the best rate will have to be determined based on the quality of the seam produced. As a general rule, the colder the ambient temperature - and, hence, the membrane - the more slowly the automatic welder will have to proceed in order to produce good seams.

NOTE: As there are no ideal working conditions and ambient temperatures change throughout the day, the operator must rely solely on his own judgment to determine the operating speed of the automatic welder.

CAUTION: the operator of the welding equipment should be absolutely sure that the machine is positioned properly to begin welding before proceeding to the next step. Remember that the guide handle points IN THE DIRECTION THAT THE MACHINE WILL MOVE.

9. Separate the overlapping sheets. Place one hand palm-down on the blower housing, and put your index finger on the release trigger. With your other hand, use a seam probe (or similar tool) to separate the two overlapping Mule-Hide Heat-Weld Membranes so that the nozzle can be slid between them.
10. Insert the blower nozzle between the sheets. Pull the trigger, and position the nozzle between the membrane sheets, locking it in its DOWN welding position. Immediately proceed to the next step to prevent burning the membrane!
11. Start the machine moving. Quickly turn the transmission switch ON. NOTE: Some machines start automatically. The machine will start moving and welding the seam. Mark the start of the seam with a water-soluble marker.
12. Stay on course. As the automatic welder proceeds, keep the small guide wheel at the front of the machine at the edge of the top sheet. Steer the machine from the front to minimize zigzagging, which is likely to result from steering from the rear. If you go off-course, simply get back on course quickly. Seam deficiencies will be repaired later, with the hand welder.

IMPORTANT: Keep plenty of slack in the power cord. Any drag can pull the machine off-course.

13. Adjust to the speed that produces the best weld. The guidelines set in Step 8 provide good starting points. As welding proceeds, some trial-and-error adjustments will be required. Generally, adjusting the speed will be the most effective means of "dialing in" the best seam production. When the ambient temperature is very high, it may be necessary to turn the temperature down.

Rules-of-Thumb for Judging Seam Quality

- The seamed membrane is not discolored: Increase speed if membrane discolors (yellow/brown). If ambient temperature is very high and membrane discolors even when speed is at maximum, turn down the temperature control.
- Bubbling. If welder setup is marginally too hot, the seam surface may exhibit a slight bubbling appearance.
- Voids and wrinkles. A good seam has no voids or wrinkles and is 2 inches wide with the exposed edge tight. If not, see "Repairing Voids and Wrinkles," and "Repairing Holes in Membranes."
- Seam strength may be tested when cool. For best results, testing seams 8 hours after hot-air welding is recommended.

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EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

14. Completing a welding run. At the end of a run, lock the nozzle in its UP, non-welding position and turn the transmission switch OFF to stop the machine's movement. NOTE: some machines stop automatically when the nozzle is taken out of the seam. Mark the end of the seam with a water-soluble marker.
15. Clean the nozzle frequently. The nozzle should be wire-brushed frequently to remove hot particles of the Mule-Hide Heat-Weld compound. (Some applicators wire-brush after each welding run.) If not removed, such particles are likely to be deposited by the nozzle, forming brown streaks at the edge of the lap; more than aesthetics is at stake - the presence of such particles in the seam can affect seam integrity.
16. Cool the welder down. At the completion of a period of welding - for example, at lunchtime or quitting time - with the nozzle locked in its UPWARD position, turn the temperature adjustment dial to its lowest setting. The heating element will shut off, but the blower will continue to operate, cooling the heating element. After about five minutes, turn the power switch OFF. NOTE: some machines will shut down automatically after pushing only one button.

Precautions

As with any high power electrical equipment used outdoors, use accepted practice and common sense to avoid injury. Some suggestions:

- Do not operate any heat welder during storms.
- Use extreme caution to avoid burns. The temperature of the super-heated air in this machine can reach approximately 1200 degrees F (645 degrees C).
- Guard against snagging the power cord.
- If the power cord should become disconnected while the machine is operating, it is desirable to reconnect as quickly as possible, with careful attention to safety, to avoid possible damage from overheating. Switch the machine OFF to avoid arcing when reconnecting to power. Reconnect to power. Turn the power switch ON to resume normal operation.
- Inspect the power cord and connections before each welding session. Repair or replace worn or frayed cords and connectors promptly.
- Although the unit may be a double-insulated design, a ground fault interrupter (G.F.I.) at the power source is still recommended.

NOTICE: This equipment is for industrial use only. These instructions are for general information only. Prior to actual operation of the hot-air welding equipment, refer to the operating instructions that are provided by the manufacturer. Because the handling and use of this equipment is beyond Mule-Hide's control, we will not accept any liability for the results obtained.

All statements herein are expressions of opinion, which by performance and testing are believed to be accurate and reliable, and are presented without any knowledge that such recommended uses may infringe any patent. No warranty of any kind whatsoever, expressed or implied, is made or intended.

Hand Welder

General Description: The hand-held hot-air welder is an electrical powered, hand-held device that utilizes electrical resistance heating and fan-forced super-heated air to heat Mule-Hide Heat-Weld Membranes. A hand-held rubber roller is used in conjunction with the welder to apply the pressure that fuses the heated Mule-Hide Heat-Weld Membrane surfaces to each other.

The hand-Held welder is used as general practice to touch up imperfect seams. It is also used when the self-propelled automatic model is inappropriate, such as in roofing details and on highly sloped surfaces.

Technical Guide

EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

Technical Specifications:

- **Electrical requirements:** 115V, 15A (minimum fused), 2,500 W (minimum recommended available power), single-phase current. If using a generator, ensure generator is capable of providing adequate wattage for using the automatic welder and hand gun(s) at the same time.
- **Power cord and extensions:** #12, 3-conductor type may be used for distances up to 100 ft.
- **Adjustments:** Temperature of heating element and air flow louvers (and therefore hot air output).
- **Accessories:** 3/4-in. (20-mm) nozzle (for welding details), 1-1/2-in. (40-mm) nozzle (for straight welding, as when repairing field seams), hand-held silicone rubber roller.
- **Welding speed:** Speed will vary according to ambient weather conditions, element control settings, and user proficiency.

Procedure - Before Connecting to Power

Use the hand-held hot-air welder to repair and/or make all seams that cannot be made by the automatic welders. Be sure to take the following preliminary steps before plugging in the equipment:

1. Fit the appropriate nozzle. In general, the 1-1/2-in. (40 mm) nozzle should be fitted to the welder when making or repairing straight welds; the 3/4-in. (20 mm) nozzle should be fitted when welding flashing details.
2. Be sure the power is OFF and the heat adjustment switch is set to ZERO.

CHECKPOINT: At this point, it is assumed that you are ready to hot-air weld a seam, and the following requirements have been met:

- All fasteners are in place and the two surfaces to be welded are in position.
- The surfaces to be hot-air welded are clean, free of adhesive (a potential problem with flashing details) and other contaminants. If these surfaces are dirty or contaminated, they must be rag-wiped clean with Fantastik® or similar general cleaner, then wiped with a clean rinse rag and dried thoroughly. The seam area should then be wiped with a clean rag dampened with Mule-Hide Membrane Cleaner to ensure removal of any remaining dirt or soap film.
- During its warm-up period, hot air from the welder should be directed in a safe direction.
- A rubber hand roller is available.

WARNING: Never touch the metal portion of the fan housing, blower tube, or blower nozzle. They become extremely hot and can cause severe burns.

Procedure - Connecting to Power

With the preliminaries done, you are ready to hot-air weld.

1. Connect the machine to power. Ensure that the welder is pointed in a safe, unobstructed direction.
2. Switch the power on. Turn the power switch ON and turn the heat adjustment switch to its highest position.
3. Warm-up the welder for 5 minutes.

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EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

NOTE: When first starting out or when welding confined work areas such as corners and pipe penetrations, it is advisable to turn the heat setting down a few notches to avoid applying heat faster than you can work effectively.

4. Insert the nozzle into the lap approximately 2" back from the edge of the membrane to create an air dam. Position the nozzle between the surfaces to be welded and quickly position the hand roller on the outer membrane about 1/8 to 1/4 in. from the end of the nozzle.

NOTE: More heat is needed when beginning a weld than after a weld is underway, because the membrane is cool. In addition, the super-heated air has an easy escape before a seam is formed. As welding proceeds, the membrane warms up and the hot air from the welder is partially trapped by the seam. Be prepared to pick up the pace as you proceed.

5. Roll the seam. When the membrane becomes softened, apply a firm pressure to the roller and roll it across the seam in strokes about 3 in. long.
6. After finishing the first pass down the seam to create the air dam, repeat the process to complete the seam. When making the final pass down the seam, keep a small (1/8") portion of the tip exposed beyond the edge of the membrane to ensure a complete weld all the way across the seam.
7. Adjust seaming speed to produce the best weld. As the seaming continues, some trial-and-error adjustment of seaming speed will be required. The membrane surfaces must be heated sufficiently to permit the roller pressure to fuse them together, yet the membrane must not be overheated.

Rules-of-Thumb for Judging Seam Quality

- The seamed membrane is not discolored: Increase seaming speed if membrane discolours (yellow-brown).
 - Bubbles and thinning: Overheating the membrane causes small bubbles and overstretching to the point of leaving too little sheet thickness, especially when working with unreinforced material. Another sign of overheating is a darkened "smeared" appearance on the seam.
 - Voids and wrinkles. A good seam has no voids or wrinkles. If voids or wrinkles are present, see "Repairing Voids and Wrinkles."
8. Clean the nozzle frequently. As with the automatic welding machine, the nozzle of the hand welder should be wire-brushed frequently to remove hot particles of the Mule-Hide Heat-Weld compound that may adhere to it. If not removed, such particles are likely to be deposited by the nozzle; the presence of such burned particles in the seam can affect seam integrity.
 9. Cool the welder down. When the welder is to be shut down at the completion of a period of welding - turn the temperature adjustment dial to its lowest setting. The heating element will shut off, but the blower will continue to operate, cooling the heating element. Set the welder down so that hot air from the welder is pointed in a safe direction. After about five minutes, turn the power switch OFF.

Precautions

As with any high power electrical equipment used outdoors, use accepted practice and common sense to avoid injury. Some suggestions:

- Do not operate any heat welding equipment during storms.
- Use extreme caution to avoid burns. The temperature of the super-heated air in this machine can reach approximately 800 degrees F (427 degrees C).

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EQUIPMENT NEEDED TO INSTALL HEAT-WELDED MEMBRANES

- Guard against snagging the power cord.
- If the power cord should become disconnected while the machine is operating, it is desirable to reconnect as quickly as possible, with careful attention to safety, to avoid possible damage from overheating. Switch the machine OFF to avoid arcing when reconnecting to power. Reconnect to power. Turn the power switch ON to resume normal operation.
- Inspect the power cord and connections before each welding session. Repair or replace worn or frayed cords and connectors promptly.
- Use of a ground fault interrupter (G.F.I.) at the power source is recommended.

NOTICE: This equipment is for industrial use only. These instructions are for general information only. Prior to actual operation of the hand-held welding equipment, refer to the operating instructions that are provided by the manufacturer. Because the handling and use of this equipment is beyond Mule-Hide's control, we will not accept any liability for the results obtained.

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Seam Probing

General Description: the probing of hot-air welded seams is an important step in the application of a Mule-Hide roof, and is your best insurance for successful inspection. **SEAMS WITH VOIDS AND WRINKLES HAVE BEEN THE MOST COMMON DEFECTS CITED BY MULE-HIDE INSPECTORS OVER THE YEARS.**

To ensure consistently high-quality seaming on your job, be sure that ALL seams are probed with an appropriate seam probing tool each work day, and all deficiencies noted/marked with a water-soluble marker and repaired as promptly as possible with a hand-held hot-air welder. Mule-Hide recommends that you probe seams with a cotter pin puller.

Procedure for Probing the Seams

The probing of seams should not be done until the hot-air welds have thoroughly cooled. As a general procedure, seam probing and repair of deficiencies should be done for all seams approximately 8 hours after they are initially welded.

WARNING: Premature probing can open warm seams that would have been perfectly acceptable once they had cooled.

1. Draw probing tool tip along seams. Gripping the probing tool by its handle, draw its tip along the edge of the hot-air welded seam. Apply firm pressure into the seam junction - not into the bottom sheet. The tool should not penetrate into the lap area.
2. Mark deficiencies. Using a water-soluble marker, mark off the beginning and end of each void.
3. Repair deficiencies promptly. Using a hand-held welder, repair all seam deficiencies as quickly as possible. It is required by Mule-Hide that repairs be made the same day that they are discovered.
4. Check repairs. After the repaired seams have cooled completely, probe them again. If the repair is successful, wipe off the water-soluble marker line; if not, do the repair over.

End of Section

Technical Guide

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INSULATION GUIDELINES

1.0 Insulation Guidelines

- A. The following is a list of generic insulations acceptable for use with Mule-Hide Roofing Systems. Requests to use other types of insulation boards are to be made to Mule-Hide's Technical Department in writing prior to job bid. Such requests must include the conditions for approval, project name and location of project.
- B. Insulation must be no less than 1 inch thick with the exception of high-density wood fiberboard, high density polyisocyanurate, extruded polystyrene and tapered boards. When the insulation is applied directly over a steel deck, in no case shall the minimum allowable thickness be less than that required to span the flutes of a steel deck.
- C. Applicable building codes should always be checked prior to proposing the application to Mule-Hide or the building owner.
- D. Factory Mutual (FM) and Underwriters Laboratory (UL) assemblies can be found in the Factory Mutual Approval Guide and/or Underwriters Laboratories Building Material Directory and Fire Resistance Directory. Code requirements may dictate the use of specific types and thicknesses of insulation. You can contact the Mule-Hide Technical Department for help in determining which Mule-Hide system may meet your code requirements.

2.0 Insulation

Insulation Type	Used as Overlay Board	Roof Systems		
		Adhered	Ballasted	Mech Attached
Polyisocyanurate - Min 1" thick (top layer) - Min 20 psi	Yes	Yes	Yes	Yes
OSB/Polyisocyanurate Composite - Min 1.5"	Yes	Yes	Yes	Yes
HD Polyisocyanurate Coverboard – Min ½" thick	Yes	Yes	Yes	Yes
HD Fiberboard - Min 1/2" thick ⁸	Yes	Yes	Yes	Yes
Dens Deck Prime / Securock - Min 1/4" thick	Yes	Yes	Yes	Yes
OSB - Min 7/16" thick ²	Yes	Yes	Yes	Yes
Expanded Polystyrene - Min 1" - Type I ^{3 4 6}	NO	NO ¹	Yes	NO ¹
Expanded Polystyrene w/facer - Min 1" - Type II ^{3 4 7}	NO	NO ¹	Yes	Yes ⁵
Extruded Polystyrene - Min 3/4" thick - Type X ^{3 4}	NO	NO ¹	Yes	NO ¹
Extruded Polystyrene - Min 1" - Type IV ^{3 4}	NO	NO ¹	Yes	Yes ⁵
Extruded Polystyrene Fan Fold – Min ¼" thick ^{3 4}	NO	NO ¹	NO	Yes
Protection Mat - Min 6 oz.	NO	NO ¹	Yes	Yes

- Notes:
- 1 - Requires overlay board
 - 2 - OSB must be installed with the rough side up
 - 3 - Not approved over Coal Tar Pitch
 - 4 - Can not be placed in contact with PVC, requires a separation layer
 - 5 - Overlay board recommended
 - 6 - Type I = min 0.90 lb density
 - 7 - Type II = min 1.35 lb density
 - 8 - DO NOT use '6-sided' or asphalt coated board for PVC or water based adhesive

See other requirements listed below.

3.0 Minimum Insulation Specifications

- A. Project or Code requirements may dictate use of materials other than those listed below. Contact Mule-Hide Technical Department with questions regarding use insulations in a Mule-Hide Roofing System.
1. Wood fiberboard (High Density)
Thickness: 1/2" Minimum
Classification: ASTM C-208, Type 2
 2. Polyisocyanurate
Thickness: 1" Minimum
Classification: ASTM C 1289,
Facers: Fiber reinforced facers, both sides
 3. High Density Polyisocyanurate
Thickness: 1/2" Minimum
Compressive Strength: Min 90 psi at 10% deformation
Facers: Fiber reinforced facers, both sides
 4. Extruded Polystyrene Boards (flat stock)
Thickness: 3/4" Minimum
Classification: Type X
Compressive Strength: Min 15 psi at 10% deformation
Not for use over Coal Tar Pitch. Applications may require use of higher density material or overlay.
 5. Extruded Polystyrene Boards (fan fold)
Thickness: 1/4" Minimum
Compressive Strength: Min 15 psi at 10% deformation
Not for use over Coal Tar Pitch.
 6. Expanded Polystyrene Boards
Thickness: 1" Minimum
Classification: Type 1
Compressive Strength: Min 10 psi at 10% deformation
Not for use over Coal Tar Pitch. Applications may require use of higher density material or overlay.
 7. Expanded Polystyrene Boards (fan fold)
Thickness: 1/2" Minimum
Classification: Type 1
Compressive Strength: Min 10 psi at 10% deformation
Not for use over Coal Tar Pitch. Applications may require use of higher density material or overlay.
 8. Perlite is a mineral fiber insulation board that Mule-Hide does not recommend be used in conjunction with the Mule-Hide Roofing Systems. However, should perlite be required to meet building codes, FM, or UL requirements, the perlite **must** be overlaid with an acceptable insulation. **Perlite is not acceptable for use in recover applications.**
 9. Fiberglass is not an acceptable insulation for use in Mule-Hide Roofing Systems.

Technical Guide

INSULATION GUIDELINES

4.0 Insulation Fastening Patterns

- A. Insulation that is mechanically attached to the substrate shall use approved Mule-Hide fasteners. Minimum insulation attachment rates shall be as per Mule-Hide's requirements or insulation manufacturer's specifications, whichever is greater. Projects requiring Factory Mutual or other Code approvals may require heavier gauge fasteners or additional fasteners. In no case shall the insulation attachment rate be less than Mule-Hide's requirements.
- B. Insulation is always fastened with 3" Galvalume Stress Plates with minimum #12 Drill Point fasteners.
- C. Refer to Mule-Hide specifications and details for minimum fastening rates and patterns.

5.0 Other Methods of Insulation Attachment

- A. Asphalt - While Mule-Hide may accept (on a job to job basis) attachment of insulation with hot asphalt for use with Mule-Hide systems, asphalt is neither supplied nor manufactured by Mule-Hide; therefore, the attachment of the insulation with asphalt shall not be covered by Mule-Hide's Standard Warranty. However, if a qualified project designer specifies asphalt attachment, the following recommendations are given:
 - 1. Steep asphalt ASTM D312, Type III or IV, shall be specified
 - 2. Asphalt may only be used to attach approved insulations to primed structural concrete decks, properly nailed base sheets or a base layer of mechanically attached, approved insulation. Insulation must be approved by Manufacturer for use with hot asphalt.
 - 3. Maximum insulation board size shall not exceed 4'x 4'. **4'x 8' boards are not permitted.**
 - 4. Expanded or extruded polystyrene insulation shall not be attached with asphalt.
- B. Other insulation adhesive products may be an acceptable method of attaching certain insulation boards to approved substrates. As Mule-Hide does not supply or manufacture insulation adhesives, the products must be installed in strict compliance with the requirements published by the manufacturer. Contact the manufacturer for information and recommendations regarding the appropriate use of these products. Mule-Hide must be contacted prior to the use of any such product. The attachment of the insulation is not covered by the Standard Mule-Hide warranty.
- C. Mule-Hide Premium warranties require that Mule-Hide give approval of the insulation adhesive prior to bidding. A copy of the Insulation Adhesive Manufacturer's letter of acceptance for the project must be forwarded to Mule-Hide for review and acceptance by Mule-Hide prior to bidding the project.

6.0 Insulation Storage

- A. Insulation boards stored or stocked on the job site or roof must be stacked on pallets (or other supports) above the deck or ground.
- B. Insulation shall be covered with waterproof tarps to protect insulation from sun and inclement weather. Wet or damaged insulation must not be used in Mule-Hide roofing systems.
- C. Insulation should not be stored on the job site for more than thirty (30) days if at all possible.

7.0 Insulation Application - Recommended Practices

- A. For mechanically attached systems, install field sheets perpendicular to long dimension of the top layer of insulation. Where possible, boards should run parallel to the direction of the flutes of the deck.
- B. Install insulation boards in parallel courses with tightly fitted and staggered joints. Cut all boards accurately to fit neatly around all projections and at all edges. Gaps greater than 1/4" shall be filled. End joints should be staggered a minimum of 6 inches or as approved by insulation manufacturer.
- C. Do not use wet or damaged insulation boards. Install no more insulation than can be covered with seamed membrane and watertight details before any precipitation occurs.
- D. On steel decks, the ends of the insulation boards shall rest on the top of the flutes and not in suspension over the valleys.
- E. When two layers of insulation are used, the second layer must have the joints staggered to the first layer a minimum of 6 inches or as approved by insulation manufacturer. One set of fasteners may be used to secure both layers of insulation unless otherwise required by the insulation board manufacturer or the design professional.
- F. In accordance with Mule-Hide specifications, provide proper water cutoffs to completely seal the insulation on a daily basis.

Caution: Do not install over wet, damp or uneven substrates.

Caution: Keep all insulations away from fire, flame and ignition sources during storage and installation.

End Of Section

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 to fasten the roof insulation, roof membrane, and All Purpose Bar. On a job-to-job basis, the Mule-Hide Technical Department may accept the use of non-Mule-Hide fasteners and/or insulation adhesives for attachment of Mule-Hide accepted insulation. Any non-Mule-Hide fastener and plate used must be approved by the Mule-Hide Technical Department prior to job start-up. Your local Mule-Hide Territory Manager can advise you of the acceptability of 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

Technical Guide

INSULATION GUIDELINES

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.

Technical Guide

INSULATION GUIDELINES

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 be secured to 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 pull-out resistance of 360 pounds minimum. 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.

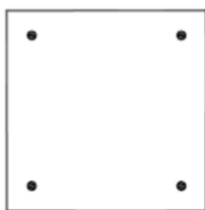
Approved Fasteners

- 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.

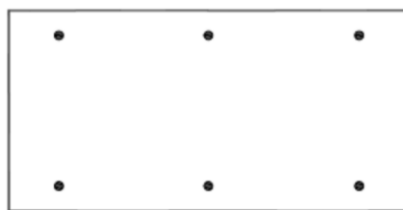
Fastener Patterns - Insulation

- 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:

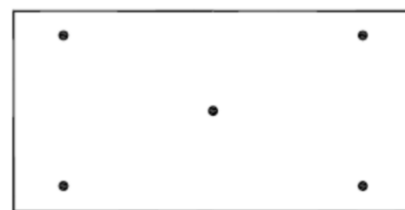
Mechanically Attached Systems



4'x4' BOARDS



4'x8' BOARDS



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

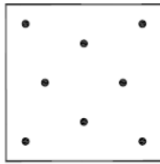
All of the insulation must be pre-fastened to the deck with Mule-Hide #12 DP fasteners and 3" plates at a minimum as shown above. All fasteners must be at least six (6) inches from the edge of the board and centered as shown.

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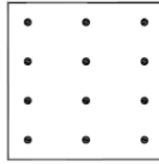
INSULATION GUIDELINES

Fully Adhered

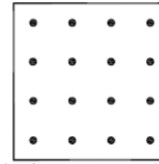
Wood Fiber



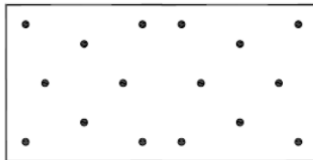
4'x4' FIELD (8)



4'x4' PERIMETERS (12)

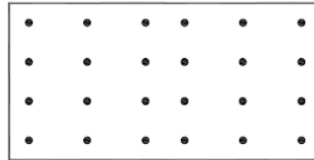


4'x4' CORNERS (16)



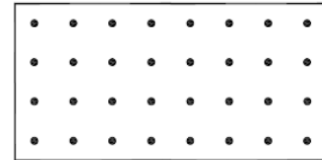
4'x8' FIELD (16)

1 FASTENER PER EVERY 2 SQ. FT.



4'x8' PERIMETERS (24)

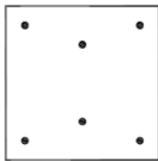
1 FASTENER PER EVERY 1.33 SQ. FT.



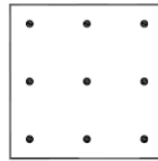
4'x8' CORNERS (32)

1 FASTENER PER EVERY 1 SQ. FT.

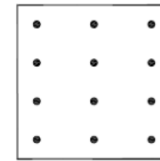
Polyisocyanurate Insulation – 1.5" to less than 2" thick



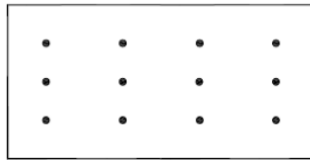
4'x4' FIELD (6)



4'x4' PERIMETERS (9)

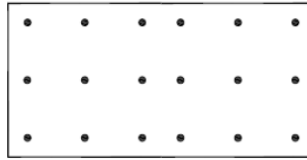


4'x4' CORNERS (12)



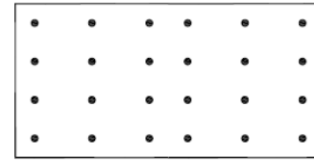
4'x8' FIELD (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



4'x8' PERIMETERS (18)

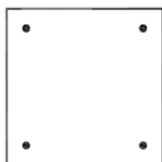
1 FASTENER PER EVERY 1.77 SQ. FT.



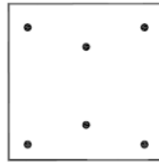
4'x8' CORNERS (24)

1 FASTENER PER EVERY 1.33 SQ. FT.

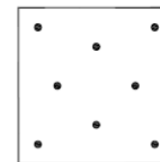
Polyisocyanurate Insulation – 2" thick or greater



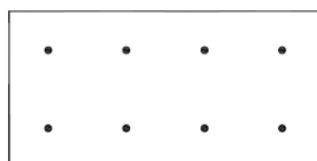
4'x4' FIELD (4)



4'x4' PERIMETERS (6)

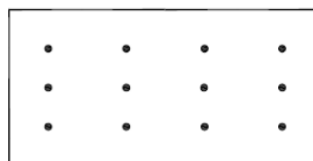


4'x4' CORNERS (8)



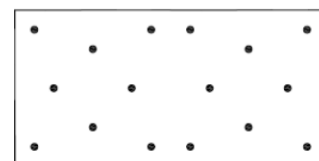
4'x8' FIELD (8)

1 FASTENER PER EVERY 4 SQ. FT.



4'x8' PERIMETERS (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



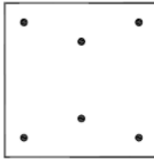
4'x8' CORNERS (16)

1 FASTENER PER EVERY 2 SQ. FT.

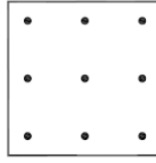
Technical Guide

INSULATION GUIDELINES

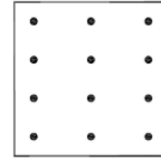
Dens Deck or SecurRock



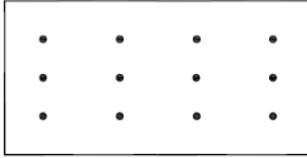
4'x4' FIELD (6)



4'x4' PERIMETERS (9)

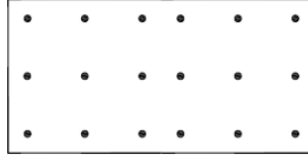


4'x4' CORNERS (12)



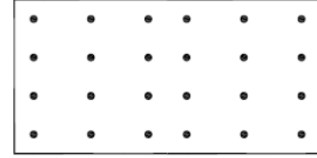
4'x8' FIELD (12)

1 FASTENER PER EVERY 2.66 SQ. FT.



4'x8' PERIMETERS (18)

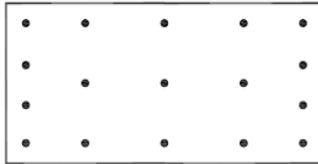
1 FASTENER PER EVERY 1.77 SQ. FT.



4'x8' CORNERS (24)

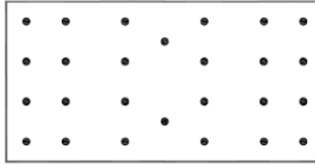
1 FASTENER PER EVERY 1.33 SQ. FT.

OSB



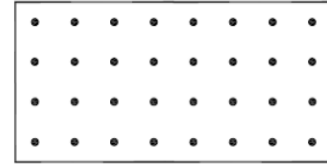
4'x8' FIELD (17)

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.

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.

All of the insulation must be pre-fastened to the deck with Mule-Hide #12 DP 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.

See attached details MHFM-208, MHFM-212, & MHFM-216 for examples of Factory Mutual Attachment patterns for those projects requiring Factory Mutual Approval.

Technical Guide

INSULATION GUIDELINES

Fasteners Available From Mule-Hide

Typical Fasteners - Refer to Mule-Hide website at 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)	System attachment	Steel, Wood, Concrete

Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, submit request to Mule-Hide 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 shall be firmly attached to the deck, wall or existing structurally sound surface, so as to resist a force of 200 pounds per linear foot in any direction (fastening 16 inch o.c. maximum is recommended for most applications). See below the Factory Mutual Loss Prevention Data Bulletin 1-49 for recommended type and size of fasteners, nailers and spacing:

Factory Mutual Loss Prevention Bulletin 1-49 and Other Nailer Attachment

Deck Type	Mule-Hide Fastener	Fastener Type		
		1/2" Dia. Anchor Bolts	3/8" Dia. Anchor Bolts	3/4" Dia. Structural Steel Posts
1/2" to 5/8" Plywood	12" o.c.	N/A	N/A	N/A
5/8" or Greater Plywood	16" o.c.	N/A	N/A	N/A
Wood Plank	16" o.c.	N/A	N/A	N/A
Existing 2X Wood Nailers	16" o.c.	N/A	N/A	N/A
Steel Deck	16" o.c.	N/A	N/A	N/A
Concrete	16" o.c.	4'0" o.c.*	2'8" o.c.**	N/A
Structural Steel	N/A	N/A	N/A	4'0" o.c.
Lightweight Concrete	16" o.c.	N/A	N/A	N/A

* Within 8' of all corners, spacing shall be 2'0" o.c.

** Within 8' of all corners, spacing shall be 16" o.c.

SECTION 2

MULE-HIDE PRODUCTS CO., INC.

PVC SYSTEM WARRANTY INFORMATION

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10 / 15 Year Warranty - FA-PVC Design Summary	2
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***PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST
CURRENT INFORMATION***

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"The name trusted in roofing since 1906"

MULE - HIDE PRODUCTS CO., INC.

1195 Prince Hall Drive
Beloit, WI 53511-3964

Phone (608)365-3111
Fax (608)365-7852
www.mulehide.com

P.O. Box 1057
Beloit, WI 53512-1057

Warranty
Program

OVERVIEW

Overview

Mule-Hide Products Co., Inc. ("Mule-Hide") offers several types of warranties ranging from material warranties to System warranties. These warranties are available in 10, 15, and 20 year durations. A Mule-Hide warranty is a guarantee by Mule-Hide to repair or replace deficiencies with Mule-Hide materials or roof systems. Mule-Hide presently offers three types of warranties for our single-ply membranes/systems and our SAMB membranes/systems:

- Roofing Membrane Limited Warranties
- Standard System Warranties
- Premium System Warranties

A Membrane Only warranty may be combined with select Standard or Premium warranties. Available selections are as follows;

- Standard-10 or Premium-10 + Membrane-15 OR Membrane-20
- Standard-15 or Premium-15 + Membrane-20

Mule-Hide also offers material/system warranties for our coatings:

- Coatings Material Only Warranties
- Coatings System Warranties.

Fees are required for all System warranties. System Warranties must be obtained through a Mule-Hide Warranty Eligible Applicator. System warranties are not available for residential projects. Membrane and material warranties do not require the applicator to be Mule-Hide Warranty Eligible, but certain membrane/material warranties do require fees.

Coatings Material Only Warranty

This warranty, subject to the terms and conditions stated in the warranty, warrants to the building owner that the materials are free of manufacturing defects and will not prematurely deteriorate to the point of failure because of weathering. Workmanship is not covered by this warranty. Mule-Hide does not perform inspections of the installation before issuing the Coatings Material Only Warranty. Distributor invoices showing purchase of Mule-Hide materials are required and are to be submitted to Mule-Hide with the Mule-Hide Warranty Application.

Coatings System Warranty (Over Metal Roofs Only)

This warranty, subject to the terms and conditions stated in the warranty, covers leaks due to defects in the Mule-Hide materials or workmanship of the Mule-Hide Warranty Eligible Applicator in installing same. A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Coatings System warranties require inspections by a Mule-Hide representative. Mule-Hide recommends that Warranty Applications be submitted for review prior to project start. Distributor invoices showing purchase of Mule-Hide materials are required and are to be submitted to Mule-Hide with the Mule-Hide Warranty Application.

Roofing Membrane Limited Warranty

This warranty covers only the Mule-Hide membrane (or portion thereof) determined by Mule-Hide to be defective and resulting in roof leaks. This Warranty does not cover workmanship or

Mule-Hide Warranty Program Overview - Continued

other components not supplied by Mule-Hide. Mule-Hide does not perform inspections of the installation before issuing the Roofing Membrane Limited Warranty. A Mule-Hide Warranty Application must be submitted to Mule-Hide to obtain this warranty (check with Mule-Hide for those programs that may not require submittal of a Warranty Application). Certain warranties may require fees and proof of purchase. Mule-Hide recommends that Warranty Applications be submitted for review prior to project start.

Note: *Projects requesting a 20-year Roofing Membrane Limited Warranty require specific membranes and design enhancements. Contact Mule-Hide for additional information.*

Standard System Warranty

The Standard System warranty is a "No Dollar Limit" labor and material warranty. It covers the Mule-Hide labeled membrane and other components supplied by Mule-Hide and must be installed by a Mule-Hide Warranty Eligible Applicator. The Standard System warranty does not cover the roof insulation, attachment of the roof insulation, or metal flashing components (unless Mule-Hide Metal Accessories are purchased from Mule-Hide). A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Standard System warranties require inspections by a Mule-Hide representative. Mule-Hide recommends that Warranty Applications be submitted for review prior to project start.

Note: *Projects requesting a 20-year Standard System Warranty require specific membranes and design enhancements. Contact Mule-Hide for additional information.*

Premium System Warranty

The Premium System warranty is a "No Dollar Limit", labor and material warranty. It covers the Mule-Hide labeled membrane, insulation, other components supplied by Mule-Hide, as well as approved products (such as metal flashing, insulation adhesive and other pre-approved accessories) installed by a Mule-Hide Warranty Eligible Applicator. The Warranty Application and the appropriate fee must be submitted to Mule-Hide by a Mule-Hide Warranty Eligible Applicator. Premium System warranties require inspections by a Mule-Hide representative. Distributor invoices showing purchase of Mule-Hide materials are required and are to be submitted to Mule-Hide before the warranty can be issued. Mule-Hide recommends that Warranty Applications be submitted for review prior to project start. *Premium System Warranties require the use of Mule-Hide Polyisocyanurate Insulation.*

Note: *Projects requesting a 20-year Premium Warranty require specific membranes and design enhancements. Contact Mule-Hide for additional information.*

Terms and Conditions of Warranties

Mule-Hide's obligations under these warranties are limited to the specific terms and conditions of the respective Warranty. Sample copies of the Mule-Hide Warranties are available from Mule-Hide upon request for review of the actual terms, conditions and limitations. Mule-Hide warranties are not issued until the warranty fee has been paid and any required Distributor invoices have been received by Mule-Hide.

Mule-Hide Warranty Program Overview - Continued

Mule-Hide Warranty Eligible Applicator Program

Those contractors wishing to become Mule-Hide Warranty Eligible Applicators for the purpose of offering System Warranties should contact their local Mule-Hide Territory Manager. Please call Mule-Hide at 800-786-1492 or check the Mule-Hide web site (www.mulehide.com) to obtain the name and phone number of your local Mule-Hide Territory Manager.

Mule-Hide Warranty Types

Refer to the appropriate product pages for listings of available warranty types by product line. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide or check the Mule-Hide web site ((www.mulehide.com)) for the latest updates regarding changes or modifications to this document or the Mule-Hide Warranty Program.

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“The name trusted in roofing since 1906”

MULE-HIDE PRODUCTS CO., INC.

1195 Prince Hall Drive
Beloit, WI 53511-3964

Phone (608)365-3111

Fax (608)365-7852

www.mulehide.com

P.O. Box 1057

Beloit, WI 53512-1057

WARRANTY OFFERINGS

HEAT-WELD
TPO and PVC

Warranty Type	Warranty Fees	
	Cost/SF	Min \$
Membrane Only - 10 Years	\$0.00	\$25.00
Membrane Only - 15 Years ⁴	\$0.01	\$100.00
Membrane Only - 20 Years ^{4,6}	\$0.02	\$200.00
Standard - 10 Years ^{3,4}	\$0.05	\$400.00
Standard - 15 Years ^{3,4}	\$0.08	\$525.00
Standard - 20 Years ^{2,3,4,6}	\$0.11	\$800.00
Standard -10 + Membrane -15 ^{3,4,5}	\$0.06	\$500.00
Standard -10 + Membrane -20 ^{3,4,5}	\$0.07	\$600.00
Standard -15 + Membrane -20 ^{3,4,5,6}	\$0.10	\$725.00
Premium - 10 Years ^{1,3,4}	\$0.04	\$350.00
Premium - 15 Years ^{1,3,4}	\$0.07	\$475.00
Premium - 20 Years ^{1,2,3,4,6}	\$0.10	\$750.00
Premium-10 + Membrane-15 ^{1,3,4,5}	\$0.05	\$450.00
Premium-10 + Membrane-20 ^{1,3,4,5,6}	\$0.06	\$550.00
Premium-15 + Membrane-20 ^{1,3,4,5,6}	\$0.09	\$675.00

Important Warranty Notes:

Current Warranty fee schedules are as listed. Please contact Mule-Hide for pre-approval when applying for any non-published Warranty timeframes.

¹ Mule-Hide Premium Warranties are offered only on new construction and total tear-off systems, or for recover (retrofit) systems when an independent company has performed a moisture survey. Accepted survey types are nuclear, infrared and conductive. The moisture survey must be submitted with the Warranty application for recover applications. All wet roofing materials found in the survey must be removed.

² Refer to 20-Year Design Enhancement Documents

³ These warranties are only available to Mule-Hide Warranty Eligible Applicators.

⁴ Commercial projects only. Standard and Premium System Warranties are not available for residential projects.

⁵ Upon expiration of the Standard or Premium warranty component the terms and conditions of the membrane only warranty apply.

⁶ Requires Min. 60 mil reinforced TPO or Min. 60 mil reinforced PVC.

Mule-Hide Limited Membrane and NDL System Warranties are only valid when components are installed according to manufacturers' specifications. Always refer to Mule-Hide Application Guidelines for additional information.

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Care and
Maintenance

OVERVIEW

Overview

Following are some recommendations on how to care for your roof to help ensure a long useful service life. The manufacturer's warranty is not a maintenance program or agreement. There are various items associated with your roof system that are not covered under the warranty. It is the responsibility of the Building Owner to regularly maintain the roof.

Inspect your roof on a regular basis

All roofs require periodic maintenance and inspections in order to perform as designed and to provide a long useful service life. Mule-Hide recommends that your roofing system be inspected at least twice a year, and after every major storm. These inspections should be performed by a Mule-Hide Warranty Eligible Applicator or by someone specially trained in single-ply and modified bitumen roofing installations. Maintain a log of maintenance procedures and people accessing the roof. This aids the building owner in determining the source of any damage to the roof.

The inspection should concentrate on high-risk areas such as roof hatches, drains and around all rooftop equipment as well as general inspection of the entire roof. The inspector should be looking for membrane damage (cuts and tears), oil or Freon leaks, chemical spills, or water infiltration into the roofing System.

Such inspections are needed because problems stemming from neglect, abuse, contamination, accidents, or storm damage can result in extensive and costly repairs if not detected and repaired promptly.

Regular inspection and maintenance is also critical to sustaining the roof Warranty in force. Your Warranty could be compromised if the roof fails due to lack of basic maintenance on the part of the building owner. Therefore, it is critical that the owner understands and follows our maintenance requirements.

Drainage

Ponding water is a source of potential damage for all roofing systems. A small puncture or cut in a well-drained roofing system may result in limited damage. However, a significant amount of damage may occur to the roof insulation, roof deck, and building interior if the same puncture or cut occurs in an area of ponding water. Good roofing practice suggests that water not be allowed to remain on the roof for more than 48 hours after a rainfall. Roof drainage should be evaluated by the specifier in accordance with all applicable codes. In addition, the roof surface must be kept clean of debris that can impede drainage. This is especially important at drain areas to avoid clogging. Such areas include roof drains, wall scuppers, gutters and downspouts.

Care and Maintenance Information Continued.....

Chemicals & Petroleum Products

Even though our membranes provide outstanding resistance to natural weather, exposure to organic substances such as oils, fats, and organic solvents may affect their durability. How a membrane is affected depends upon the membrane's composition. An adverse reaction to a substance typically results in membrane splitting, cracking, and swelling.

Periodic inspections can help assure that such damage is quickly identified and addressed. If swelling occurs, contact Mule-Hide immediately.

Some common sources of potential problems include:

Air Conditioner Compressors - Oil may be spilled during maintenance of the compressor or it may leak oil.

Kitchen Exhaust Fans - Grease from cooking exhausts can accumulate on the roofing surface, especially if the units are not serviced frequently.

Animal Fats – EPDM & Self-Adhering Mod Bit Membranes

EPDM and Self-Adhered Modified Bitumen Membranes are susceptible to damage from kitchen wastes (vegetable oils) or other animal fats that are vented directly onto the roof surface. If incidental contact is likely, contact Mule-Hide for recommendations on preventative measures.

Animal Fats – TPO & PVC Membranes

The use of TPO and PVC membranes for restaurant rooftops will not void the Warranty. However, a rooftop maintenance program must be in-place to ensure that accumulations of animal fats/grease are regularly removed and the membrane surface cleaned with a mixture of warm soap and water and/or by other approved cleaning methods (see Cleaning below).

Cleaning

General cleaning of the field membrane can be accomplished with detergent and water. Mule-Hide recommends a detergent such as trisodium phosphate (TSP), a granular detergent that is available at most paint stores. Use of TSP is preferred as it does not leave a 'film' on the membrane that may inhibit seaming or patching.

Mix the TSP with water as per directions and brush wash the affected area by hand with a stiff bristled brush. Thoroughly rinse with clean water and repeat as necessary.

For more aggressive cleaning, a polypropylene scouring pad can be used in conjunction with the TSP detergent.

A light power wash can also be used, however, care must be taken to not damage the membrane, flashings, or field seams.

Before seaming or repairs are attempted, ensure that the surface of the field membrane is clean, has been thoroughly rinsed to remove all detergent and contaminants, and that the membrane has been allowed to dry completely.

To maximize reflectivity, white membrane(s) should be cleaned once every two years.

Care and Maintenance Information Continued.....

Foot Traffic

Mule-Hide membranes are designed to be part of a roofing system and are not a traffic-bearing component of the building. However, virtually all roofs are subjected to some amount of roof traffic, such as that required to service roof top units.

When it is necessary for workers to be on the roof to service rooftop equipment, e.g., HVAC units, antennas, etc., workers should be cautioned to use walkways and to exercise care with their tools and equipment to avoid puncturing the roofing membrane. Mule-Hide recommends that the building owner or property manager keep a "Roof-Top Maintenance and Activity Log" to track dates and activities by personnel or other trades.

Walkways must be provided if regular rooftop traffic is required, such as servicing of rooftop equipment on a regular basis. If a unit on the roof has a monthly maintenance schedule, walkways to and around the unit are recommended. Exercise caution when not walking on walkways, especially on white membranes (White-on-Black EPDM, Elastomeric Acrylic Coatings, TPO and PVC) since ice or frost build-up may not be visible. All membranes are slippery when wet.

Metal Work

Moisture can enter your roofing system in many different ways. Not all leaks are the result of issues with the roofing system. Moisture can also enter the roofing system and building through building walls, parapets, roof top units, skylights, and variety of other items. Maintaining these in a watertight condition will help to prevent damage to your roofing system. In addition, leaking that occurs from any of these items is not covered under the Mule-Hide warranty.

Keep roof maintenance items, such as counterflashings, metal curbs, metal ducts, etc., sealed watertight at all times. All exposed mastics and sealants, regardless of the purpose or function, are required maintenance items to be remediated by the Building Owner, including but not limited to pitch pan and metal flashing sealants.

Leaks – Standard & Premium Warranties

If you have a leak, check for the obvious such as clogged roof drains, broken skylights, loose counterflashings, broken water pipes, leaking roof units, and storm damage. Note when the leaking occurs. Items such as heavy or light rain, wind direction, temperature and time of day are important clues for tracking suspected leaks. Does the leak start and stop with the rain, or does leaking continue after the rain has ceased?

Leaks resulting from the deterioration or failure of building components or physical damage are not covered by the Warranty. If you believe that the leak is related to the Mule-Hide Warranty, please notify Mule-Hide's Warranty Department at (800) 786-1492 as soon as possible and follow up with written notification. The building owner must pay the investigation and repair cost if the problem is found to be outside the scope of the Warranty.

Temporary Repairs

If your roof becomes damaged, prompt action can limit damage to our roofing system. Small cuts and tears can be repaired with a one-part urethane sealant. Remember, these are only temporary repairs to the Mule-Hide membrane. Contact Mule-Hide for additional information.

Care and Maintenance Information Continued.....

Roof Cement

Do not use Any Asphalt Product to make repairs on single ply membranes (EPDM, TPO, or PVC) as it **WILL** degrade the membrane. If any asphalt product is used on the roofing membrane, that area will have to be removed and replaced at the Owner's expense.

Changes to Roof

Notify Mule-Hide of any changes made to the roofing system. This includes replacement of existing roof top equipment, installation of new roof top equipment, TV Antennas, tie-ins to new roofing systems, etc. Contact Mule-Hide before any changes are made to the roofing system so that the proper procedure can be followed and the change authorized by Mule-Hide. Unauthorized changes to your roofing system can compromise your Mule-Hide warranty.

This overview represents the applicable information available at the time of publication. Please visit the Mule-Hide website at www.mulehide.com, or contact either Mule-Hide or your Mule-Hide Territory Manager for information that may be more current.

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Contractor Warranty
Eligibility

PROGRAM

Contractors wishing to become Warranty Eligible, should obtain a **Contractor Warranty Eligibility Application** form from their Mule-Hide Field Territory Manager. You can find the contact information for your Mule-Hide Territory Manager by checking the Mule-Hide website at www.mulehide.com or by calling (800) 786-1492 and asking for the Warranty Program Coordinator.

The Contractor Warranty Eligibility Application form shall be filled out completely and signed by an officer of the company. Forward the completed application to the Mule-Hide National Support Center, marked to the attention of the Warranty Program Coordinator. Submission of the Contractor Warranty Eligibility Application form does not guarantee or imply acceptance by Mule-Hide.

Upon receipt of the application, the Mule-Hide Territory Manager will be advised of the application submittal and will contact the contractor to evaluate his qualifications and training needs. Training requirements may include attendance at a training seminar and a commitment to a training session for the contractor's crew(s). A review of the Contractor's workmanship on completed roofing projects will be requested and documented by the Mule-Hide Territory Manager.

Only Warranty Eligible Contractors are able to apply for Mule-Hide's Standard or Premium System (labor and material) Warranties and Coatings System Warranties. **It is the contractor's responsibility to contact Mule-Hide should they wish to be able to obtain System Warranties.**

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E-Z MEMBRANE SINGLE-PLY WARRANTY APPLICATION

Mule-Hide Products Co., Inc. | 800-786-1492 | Fax: 888-218-7838 | mulehidewarranties@mulehide.com
National Support Center, 1195 Prince Hall Drive, Beloit, WI 53511

PROJECT NAME: Building Name _____ Street _____ City _____ State _____ Zip _____ Country _____ Architect/Specifier _____ Phone _____		CONTRACTOR NAME: Name _____ Street _____ City _____ State _____ Zip _____ Phone _____ Fax _____ Mule-Hide Applicator Number _____ Person filling out application _____ Email Address _____																	
BUILDING OWNER: Name _____ Contact Name _____ Phone _____		DISTRIBUTOR INFORMATION: Distributor Name _____ City _____ State _____ Salesman _____																	
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="text-align: left;">WARRANTY FEE SELECTION</th><th style="text-align: left;">PRICE/S.F.</th><th style="text-align: left;">SIZE (S.F.)</th><th style="text-align: left;">COST</th></tr></thead><tbody><tr><td>Membrane Only - 10 Years</td><td>N/A</td><td>x _____</td><td>= \$25.00 flat fee</td></tr><tr><td>Membrane Only - 15 Years ¹</td><td>\$.01</td><td>x _____</td><td>= (MIN \$100.00)</td></tr><tr><td>Membrane Only - 20 Years ^{1,2}</td><td>\$.02</td><td>x _____</td><td>= (MIN \$200.00)</td></tr></tbody></table>				WARRANTY FEE SELECTION	PRICE/S.F.	SIZE (S.F.)	COST	Membrane Only - 10 Years	N/A	x _____	= \$25.00 flat fee	Membrane Only - 15 Years ¹	\$.01	x _____	= (MIN \$100.00)	Membrane Only - 20 Years ^{1,2}	\$.02	x _____	= (MIN \$200.00)
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Important Warranty Notes: 1 Commercial projects only. 2 Minimum of 60-mil membrane is required for 20-year warranties																			
PROJECT INFORMATION																			
<small>Mule-Hide Limited Membrane are only valid when components are installed according to manufacturers' specifications. Always refer to Mule-Hide Application Guidelines for additional information. If specifications were written for this project, please submit one copy with this application</small>																			
ROOF MEMBRANE - A minimum of 60-mil membrane is required for 20-year warranties																			
<input type="checkbox"/> BLACK EPDM <input type="checkbox"/> 45 <input type="checkbox"/> 60 <input type="checkbox"/> 90		<input type="checkbox"/> TPO <input type="checkbox"/> 45 <input type="checkbox"/> 60 <input type="checkbox"/> 80																	
<input type="checkbox"/> REINFORCED BLACK EPDM <input type="checkbox"/> 45 <input type="checkbox"/> 60		<input type="checkbox"/> PVC <input type="checkbox"/> 50 <input type="checkbox"/> 60 <input type="checkbox"/> 80																	
<input type="checkbox"/> WHITE ON BLACK EPDM <input type="checkbox"/> 60																			
SYSTEM TYPE <input type="checkbox"/> Fully Adhered <input type="checkbox"/> Ballasted <input type="checkbox"/> Mechanically Attached																			
ROOF SYSTEM <input type="checkbox"/> New Roof <input type="checkbox"/> Re-Roof (Tear Off) <input type="checkbox"/> Recover (Over Existing)																			
BUILDING TYPE <input type="checkbox"/> Commercial <input type="checkbox"/> Public/Government <input type="checkbox"/> School <input type="checkbox"/> Worship <input type="checkbox"/> Healthcare																			
<input type="checkbox"/> Institutional <input type="checkbox"/> Industrial <input type="checkbox"/> Funeral <input type="checkbox"/> Residential (10 year Membrane Only Warranty ONLY)																			
BUILDING USE: _____ BUILDING HEIGHT: _____ ft. NUMBER OF LEVELS: _____																			
PARAPET HEIGHTS: North _____ ft. South _____ ft. East _____ ft. West _____ ft. (show on roof plan)																			
PROJECT START DATE: _____ PROJECTED/ACTUAL COMPLETION DATE: _____																			

Warranty applications and pre-job survey form must be sent in for approval before the start of the project. Requests for final inspection must be received within 30 days of roof completion. Warranties must be executed within 90 days of roof completion. Any warranty issued by Mule-Hide Products Co., Inc. will be based upon the accuracy and completeness of the information contained in this warranty application, roof drawing and pre-job survey.

ELIGIBLE CONTRACTOR SIGNATURE (MUST BE AN OFFICER OF THE COMPANY)

By _____ Title _____ Date _____

ALL PROJECTS REQUIRE A SUBMITTAL OF A ROOF DRAWING AND DIMENSIONS. SUBMISSION OF SHOP DRAWINGS ARE ACCEPTABLE ONLY IF DIMENSIONS ARE PRESENT.

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin black lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The grid covers the entire area of the page, leaving no margins or other markings.



HEAT-WELD WARRANTY APPLICATION

Mule-Hide Products Co., Inc. | 800-786-1492 | Fax: 888-218-7838 | mulehidewarranties@mulehide.com
National Support Center, 1195 Prince Hall Drive, Beloit, WI 53511

<u>PROJECT NAME:</u> Building Name _____ Street _____ City _____ State _____ Zip _____ County _____ Architect/Specifier _____ Phone _____	<u>CONTRACTOR NAME:</u> Name _____ Street _____ City _____ State _____ Zip _____ Phone _____ Fax _____ Mule-Hide Applicator Number _____ Person filling out application _____
<u>BUILDING OWNER:</u> Name _____ Contact Name _____ Phone _____	<u>DISTRIBUTOR INFORMATION:</u> Distributor Name _____ City _____ State _____ Salesman _____

<u>WARRANTY FEE SELECTION</u>	<u>PRICE/S.F.</u>	<u>SIZE (S.F.)</u>	<u>COST</u>
Membrane Only - 10 Years	N/A	x _____	\$25.00 flat fee
Membrane Only - 15 Years ⁴	\$.01	x _____	(MIN \$100.00)
Membrane Only - 20 Years ^{4,6}	\$.02	x _____	(MIN \$200.00)
Standard - 10 Years ^{3,4}	\$.05	x _____	(MIN \$400.00)
Standard - 10 Years and 15 Membrane Only ^{3,4,5}	\$.06	x _____	(MIN \$500.00)
Standard - 10 Years and 20 Membrane Only ^{3,4,5,6}	\$.07	x _____	(MIN \$600.00)
Standard - 15 Years ^{3,4}	\$.08	x _____	(MIN \$525.00)
Standard - 15 Years and 20 Membrane Only ^{3,4,5,6}	\$.10	x _____	(MIN \$725.00)
Standard - 20 Years ^{2,3,4,6}	\$.11	x _____	(MIN \$800.00)
Premium- 10 Years ^{1,3,4}	\$.04	x _____	(MIN \$350.00)
Premium - 10 Years and 15 Membrane Only ^{1,3,4,5}	\$.05	x _____	(MIN \$450.00)
Premium - 10 Years and 20 Membrane Only ^{1,3,4,5,6}	\$.06	x _____	(MIN \$550.00)
Premium - 15 Years ^{1,3,4}	\$.07	x _____	(MIN \$475.00)
Premium - 15 Years and 20 Membrane Only ^{1,3,4,5,6}	\$.09	x _____	(MIN \$675.00)
Premium - 20 Years ^{1,2,3,4,6}	\$.10	x _____	(MIN \$750.00)

Important Warranty Notes:

Current Warranty fee schedules are as listed. Please contact Mule-Hide for pre-approval when applying for any non-published Warranty timeframes or any other non-standard considerations..

1 Mule-Hide Premium Warranties are offered only on new construction and total tear-off systems, or for recover (retrofit) systems when an independent company has performed a moisture survey. Accepted survey types are nuclear, infrared and conductive. The moisture survey must be submitted with the Warranty application for recover applications. All wet roofing materials found in the survey must be removed. Requires use of Mule-Hide insulation.

2 Refer to 20-Year Design Enhancement Documents

3 These warranties are only available to Mule-Hide Warranty Eligible Applicators

4 Commercial projects only. Standard and Premium System Warranties are not available for residential projects.

5 Upon expiration of the Standard or Premium warranty component the terms and conditions of the membrane only warranty apply.

6 Requires .060 Reinforced TPO or PVC

Warranty applications and pre-job survey form must be sent in for approval before the start of the project. Requests for final inspection must be received within 30 days of roof completion. Warranties must be executed within 90 days of roof completion. Any warranty issued by Mule-Hide Products Co., Inc. will be based upon the accuracy and completeness of the information contained in this warranty application, roof drawing and pre-job survey.

ELIGIBLE CONTRACTOR SIGNATURE (MUST BE AN OFFICER OF THE COMPANY)

By _____ Title _____ Date _____

ALL PROJECTS REQUIRE A SUBMITTAL OF A ROOF DRAWING AND DIMENSIONS. SUBMISSION OF SHOP DRAWINGS ARE ACCEPTABLE ONLY IF DIMENSIONS ARE PRESENT.

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PRE-JOB SURVEY

Mule-Hide Limited Membrane and NDL System Warranties are only valid when components are installed according to manufacturers' specifications. Always refer to Mule-Hide Application Guidelines for additional information. If specifications were written for this project, please submit one copy with this application

ROOF MEMBRANE ☐ TPO ☐ 45 ☐ 60 ☐ 80 Minimum of 60-mil membrane is required for 20-year warranties
☐ PVC ☐ 50 ☐ 60 ☐ 80

SYSTEM TYPE ☐ Fully Adhered ☐ Ballasted ☐ Mechanically Attached

ROOF SYSTEM ☐ New Roof ☐ Re-Roof (Tear Off) ☐ Recover (Over Existing)

BUILDING TYPE ☐ Commercial ☐ Public/Government ☐ School ☐ Worship ☐ Healthcare
☐ Institutional ☐ Industrial ☐ Funeral ☐ Residential (10 year Membrane Only War-

BUILDING HEIGHT: _____ ft. **NUMBER OF LEVELS:** _____

PARAPET HEIGHTS: North _____ ft. South _____ ft. East _____ ft. West _____ ft. (show on roof plan)

PROJECT START DATE: _____ **PROJECTED/ACTUAL COMPLETION DATE:** _____



If you are completing this application for a "membrane" warranty, please stop here. For all other types of warranties, please continue.



DRAINAGE: Slope per ft.: _____ Positive Drainage? ☐ Yes ☐ No

EXISTING ROOF: (Check All Appropriate) Skip if New Construction or Roof Membrane is removed

Roof Type: ☐ Asphalt ☐ Modified ☐ Cold Process ☐ Spray Foam (Must be removed)
☐ Coal Tar Pitch Age of CTP: _____ Resaturated within last 10 years? ☐ Y ☐ N
☐ TPO ☐ PVC ☐ EPDM ☐ Other _____

Surface: ☐ Smooth ☐ Stone ☐ Granules ☐ Gravel ☐ Was the Roof Gravel Broomed?

EXISTING INSULATION: Skip if New Construction or Roof Insulation is removed

Was a Moisture Survey Performed? ☐ Yes ☐ No Type of Survey: _____

Core Samples Taken? ☐ Yes ☐ No *ALL WET INSULATION MUST BE REMOVED FOR WARRANTY*

ROOF INSULATION: Indicate type, thickness, and whether insulation is new or is being re-used.

Overlayment/Cover Board: Size: ☐ 4' x 4' ☐ 4' x 8'

HDFB - Dens Deck - Other: _____ Thickness _____" Manufacturer _____

Insulation: ☐ New ☐ Existing Type: ☐ Flat ☐ Tapered Size: ☐ 4' x 4' ☐ 4' x 8'

HDFB - ISO - EPS - Other: _____ Thickness: _____" Manufacturer: _____

Insulation: ☐ New ☐ Existing Type: ☐ Flat ☐ Tapered Size: ☐ 4' x 4' ☐ 4' x 8'

HDFB - ISO - EPS - Other: _____ Thickness: _____" Manufacturer: _____

Vapor Barrier Type: _____ Thermal Barrier: _____

SlipSheet: ☐ HP-Protection Mat ☐ Other: _____

ROOF DECK TYPE: (List Thickness or Gauge) Fastener tests are required for all Non-FM deck types

Steel: _____ Gauge Wood Planking: _____ "Thick Concrete: _____ "Thick
 Plywood: _____ "Thick Gypsum: _____ "Thick Tectum: _____ "Thick
 Insulating Concrete installed over: ☐ Steel _____ Gauge ☐ Concrete ☐ Other _____
 Oriented Strand Board: _____ "Thick Other: _____

INSULATION ATTACHMENT

Fasteners: ☐ DP-12 ☐ HD-14 ☐ HD-15 **Brand:** ☐ Mule-Hide ☐ Other: _____

Fasteners installed per board - Board Size: ☐ 4' x 4' ☐ 4' x 8'

Field: _____ Perimeter: _____ Corner: _____

INSTA STIK Adhesive

☐ Contractor confirms that the crew using INSTA STIK Quik Set on this project is properly trained in handling, storage, and use. DOW Applicator # _____

☐ Contractor requires job start-up assistance and training on the proper use of INSTA STIK Quik Set before this project starts.

☐ Project or roof has been damaged by high winds - Attach explanation

Project distance from Coast Line ☐ > 50 Miles ☐ _____ Miles

Adhesive Pattern ☐ Field— 12" oc Perimeter— 12" oc Corner — 9" oc

☐ Field— 12" oc Perimeter— 9" oc Corner — 6" oc

Other ☐ Field - ____" oc Perimeter - ____" oc Corner - ____" oc

MEMBRANE FASTENERS (MECHANICALLY ATTACHED SYSTEMS ONLY)

ALL MECHANICALLY ATTACHED SYSTEMS REQUIRE THE USE MULE-HIDE HEAVY DUTY, #14 FASTENERS AS A MINIMUM. HEAVY DUTY, #15 FASTENERS ARE REQUIRED FOR FLORIDA AND FM APPROVALS.

Fastener Type: ☐ HD-14 ☐ HD-15 Fastener Length: _____

TPO Sheet Width: ☐ 6' ☐ 8' ☐ 10' ☐ 12' Half Sheets: ☐ -1 ☐ - 2 ☐ - _____

PVC Sheet Width: ☐ 80" ☐ 5' ☐ 10' Half Sheets: ☐ -1 ☐ - 2 ☐ - _____

Fastener Spacing in Seam: ☐ 6" ☐ 12"

FASTENER / ADHESIVE PULL TESTS

Was a pull out test conducted? ☐ Yes ☐ No **Submit copy of test to Mule-Hide**

Fastener Tested: ☐ DP-12 ☐ HD-14 ☐ HD-15 ☐ Other _____

If yes, number of test pulls: _____ High Value: _____ Low Value: _____

Adhesive Tested: ☐ INSTA STIK ☐ Other _____

If yes, number of test pulls: _____ High Value: _____ Low Value: _____

MEMBRANE ADHESIVES (FULLY ADHERED SYSTEMS ONLY)

What Type of Adhesive was used for the field sheets: ☐ Solvent Based ☐ Water Based

APPROVALS

Does this project require compliance with Factory Mutual (FM) ☐ Yes ☐ No

If "yes", which requirement: ☐ FM 1-90 ☐ Other _____

Does this project require compliance with Underwriters Laboratory (UL)? ☐ Yes ☐ No

If "yes", please select the appropriate rated needed ☐ Class A ☐ Class B ☐ Class C

Does this project require compliance with Florida NOA? ☐ Yes ☐ No



MULE-HIDE PRODUCTS CO., INC
10 or 15 Year Warranty Design Summary
With Standard 55-MPH Wind Speed Coverage
For Fully Adhered PVC

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. This criteria is limited to buildings of 100' in height or less.

Membrane / Adhesive Type / Other

1. 0.050" or 0.060" or 0.080" thick Mule-Hide Reinforced PVC or PVC KEE HP
2. Mule-Hide PVC Bonding Adhesive - Solvent Based

Deck Type / Typical Fastener - Refer to Specifications for minimum pullout criteria.

Standard Roof Deck (4)	Insulation Fastener (1)	Insulation Plate
Steel (22 gauge or heavier)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Structural Concrete (3,000 psi)	Mule-Hide HD-14 (2)	Mule-Hide 3" Metal Stress Plates
Plywood (Min 15/32" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Wood Plank (Min 1-1/2" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Fibrous Cement & Gypsum (2)(3)	TL Fasteners by Tru-Fast	3" Galvalume Insulation Plate by Tru-Fast

Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Pullout testing is required, must exceed 360 pounds with TL Fastener.
4. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed

Insulation/Overlayment - Mechanical Attachment into Standard Roof Decks*

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
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. Thicknesses stated are for single layer of material.
2. Consult Specification Manual for list of approved insulations for use under overlayment.
3. Polyisocyanurate less than 1.5" in thickness requires approved overlayment.
4. Insulation fastening density shall not be less than 1 per 2 square feet on fibrous cement and gypsum decks.
5. Certain codes may require additional fastening requirements.

MULE-HIDE PRODUCTS CO., INC.
10 or 15-Year Warranty Design Summary
With Standard 55-MPH Wind Speed Coverage
For Fully Adhered PVC

6. Factory Mutual defines perimeter areas as the lesser of 0.1 times the building width or 0.4 times the building height. Corners areas are the intersections of the perimeter areas.

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Warranty Application must include a copy of the manufacturers letter of acceptance for the project, including application rates for that specific project. Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be installed according to Mule-Hide approved details.
2. Conventional metal edge details that require flanges to be 'stripped in' must be construction from PVC coated sheet metal and stripped in with PVC membrane. All seams are to be heat-welded.
3. All Metal Scuppers must have welded (soldered) seams.

Other Requirements

1. No 'As-Built' projects. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Florida NOA, Factory Mutual (FM) or Underwriters Laboratory (UL).

NOTES:

1. **This is a summary of the Mule-Hide PVC Fully Adhered System Specification, as written in the Mule-Hide TPO Specification Manual. Refer to Mule-Hide PVC Specification Manual for complete specification and details.**
2. **The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.**



MULE-HIDE PRODUCTS CO., INC
10 or 15 Year Warranty Design Summary
With Standard 55-MPH Wind Speed Coverage
For Mechanically Attached PVC

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. 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.

Membrane

1. 0.050" or 0.060" or 0.080" thick Mule-Hide Reinforced PVC or PVC KEE HP

Deck Type / Typical Fastener - Refer to Mule-Hide Specifications for minimum pullout criteria.

Standard Roof Deck (3)	Max Sheet Width	Max Fastener Spacing	Fastener (1)	Seam Plate (1)
Steel - Min 22 ga.	10'	12" OC	HD-14	2.4"
Wood Plank - Min 2x or Plywood - Min 23/32"	10'	12" OC	HD-14	2.4"
Plywood - Min 15/32"	81"	6" OC	HD-14	2.4"
Structural Concrete - Min 3,000 psi	10'	12" OC	HD-14 (2)	2.4"

Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed

Insulation/Overlayment - Mechanical Attachment into Standard Roof Decks*

Insulation Type or Overlay	Board Size	
	4' x 4'	4' x 8'
Approved Polyisocyanurate - Min 1.0" thick (top layer) - Min 20 psi	4	6
Extruded Polystyrene - Min 1.0" thick - Min 25 psi	4	6
HD Fiberboard - Min 1/2" thick- Installed over Approved Insulation	4	8
Dens Deck Prime - Min 1/4" thick - Installed over Approved Insulation	4	8

***NOTES:**

1. Gypsum board or suitable base sheet may be approved as needed to meet required fire code.
2. Consult Specification Manual for list of approved insulations for use under overlayment.
3. Contact Mule-Hide Technical Department for Polyisocyanurate less than 1.5" in thickness.
4. Certain codes may require additional fastening requirements.

MULE-HIDE PRODUCTS CO., INC.
10 or 15-Year Warranty Design Summary
With Standard 55-MPH Wind Speed Coverage
For Mechanically Attached PVC

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be installed according to Mule-Hide approved details.
2. Conventional metal edge details that require flanges to be 'stripped in' must be construction from PVC coated sheet metal and stripped in with PVC membrane. All seams are to be heat-welded.
3. All Metal Scuppers must have welded (soldered) seams.

Other Requirements

1. No 'As-Built' projects. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Florida NOA, Factory Mutual (FM) or Underwriters Laboratory (UL).

Perimeter Half Sheets - Number Required

Building Height	Perimeter Sheets
0 to 69 feet	Minimum of two (2) 41" perimeter sheets or 1 (one) 5' perimeter sheets
Over 70 feet	Contact Mule-Hide Technical Department

Perimeter Half Sheets - Width

Width of Field Sheet	Width of Perimeter Sheets
81"	40.5"
10'	5'

NOTES:

1. This is a summary of the Mule-Hide TPO Mechanically Attached System Specification, as written in the Mule-Hide PVC Specification Manual. Refer to Mule-Hide PVC Specification Manual for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.



MULE-HIDE PRODUCTS CO., INC

10 or 15 Year **Premium** Warranty Upgrade Requirements With Standard 55-MPH Wind Speed Coverage

ALL Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. These are upgrades to Mule-Hide's Standard Specifications that are required for either a 10 or 15 Year **Premium** Warranty.

INSULATION/OVERLAYMENT

A 10 or 15 Year **Premium** Warranty requires the use of Mule-Hide Polyisocyanurate insulation.

Insulation Type or Overlay
Mule-Hide Polyisocyanurate (1) (2)
Approved Overlay - Installed over Mule-Hide Polyisocyanurate

NOTES:

1. Minimum 1" thickness for Mechanically Attached Systems.
2. Minimum 1.5" Thickness for Fully Adhered Systems.
3. Contractor to provide proof of purchase of Mule-Hide Insulation.

INSULATION ATTACHMENT

Mechanical Attachment - Must use Mule-Hide Insulation plates and fasteners. Fastener density and placement must be as per Mule-Hide Specifications and recommendations. Contact Mule-Hide Technical Department for job specific attachment requirements.

Insulation Adhesive - Insta-Stik by Dow Chemical Company - Warranty Application must include a copy of the manufacturer's letter of acceptance for the project, including application rates for that specific project. Other Manufactures may be considered, submit request prior to bidding.

SHEET METAL

If the perimeter sheet metal is to be included in the Mule-Hide Warranty, it must be Mule-Hide Metal Accessories purchased from Mule-Hide or Anchor-Tite as manufactured by Metal-Era. Contractor to submit proof of purchase of Mule-Hide Metal Accessories. Contractor to provide proof of purchase and copy of Metal-Era Warranty for project.

NOTES:

1. This is a summary of the Mule-Hide upgrade requirements for a 10 or 15 year **Premium** Warranty. Refer to Mule-Hide's Specification Manuals for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.

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SECTION 3

MULE-HIDE PRODUCTS CO., INC.

PVC Fully Adhered Specification

PVC Fully Adhered Summary Specification

***PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST
CURRENT INFORMATION AT WWW.MULEHIDE.COM***

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System Specifications

"The name trusted in roofing since 1906"



FULLY ADHERED PVC SYSTEM

07 54 00/MUL

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CURRENT INFORMATION AT WWW.MULEHIDE.COM**

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System Specifications

"The name trusted in roofing since 1906"



FULLY ADHERED PVC SYSTEM SPECIFICATION

PART 1 - GENERAL

March 2015

1.01 Description

A. Scope:

1. Furnish and install a Fully Adhered Mule-Hide Reinforced PVC Roofing Membrane with flashings and accessories necessary to comprise a roofing system.

B. Related Work:

The work includes, but is not necessarily limited to the installation of:

1. Vapor Retarder (where specified)
2. Wood Blocking (Nailers)
3. Insulation
4. Slip Sheet (where required)
5. Fasteners
6. Roof Membrane
7. Roof Membrane Flashings
8. Metal Flashings
9. Adhesives
10. Sealants
11. Walkways

1.02 Quality Assurance

- A. The Mule-Hide Reinforced PVC Membrane Roofing System shall be installed by an independent roofing contractor (Mule-Hide Warranty Eligible Applicator) eligible to apply for Mule-Hide warranties when System Warranties are requested.
- B. There shall be no deviations from this specification or the Mule-Hide Products Co. ("Mule-Hide") standard details without prior written approval from Mule-Hide's Customer Service Department.
- C. Upon completion of the installation according to the terms and conditions stated in this specification and in accordance with the information provided in the Warranty Application and Pre-Job survey form and any additional approvals which might have been given by Mule-Hide, an authorized representative of Mule-Hide may perform an on-site inspection of the roof to verify that all installation and material requirements have been met.

1.03 Submittals

- A. Prior to the time of bidding, the roofing contractor shall submit to the Owner or Owner's representative the following items:
 1. Copies of Mule-Hide specifications and published product data.
 2. Samples of each material to be used in the roof system.

3. Specimen copy of Mule-Hide Products Co. warranty.
4. Dimensioned shop drawings to include an outline of the roof and appropriate details for flashings and terminations.
5. Certification from insulation, roofing and accessory components manufacturers that all materials supplied comply with identified ASTM and industry standards.
6. Verification that system specifications meet all identified code and insurance requirements including but not limited to the following:
 - a. Factory Mutual Research Laboratories
Norwood, MA
 - b. Underwriters Laboratories
Northbrook, IL

1.04 Product Delivery, Storage and Handling

- A. All products delivered to the job site shall be in their original unopened containers or wrappings and clearly labeled with the manufacturer's name, product identification and date of manufacture.
- B. Protect all materials from damage during transit, storage and delivery to the job site. Place all materials on pallets and protect from moisture.
- C. Store all materials in a dry, clean area protected from the elements. All rolls of membrane shall be stored flat on pallets.
- D. All adhesive and caulking shall be stored at temperatures between 60°F and 80°F.
- E. All flammable materials shall be stored in a cool, dry area away from open flames and sparks. Follow precautions outlined on containers or supplied by the material manufacturer/supplier.
- F. All materials determined to have been damaged (confirmed by Mule-Hide) are to be replaced with new materials at no cost to the owner.

1.05 Job Conditions

- A. Mule-Hide PVC roofing materials may be installed under certain adverse weather conditions such as high humidity or extreme temperatures, but only after consultation with the Mule-Hide Customer Service Department as special precautions or procedures may be necessary. The performance of the materials, installation costs and production rates may be affected.
- B. Only as much new roofing as can be made watertight each day shall be installed each day. This includes all flashing work.
- C. All substrates to receive new insulation, membrane or flashing shall be thoroughly dry and free of contaminants. Should surface moisture occur, the contractor shall provide adequate equipment to dry the substrate prior to application of new materials.
- D. Prior to and during application, all dirt, debris and dust shall be removed from surfaces to be roofed for both new and reroofing substrates.

System Specifications

FULLY ADHERED PVC

Revised March 2015

- E. On all reroof jobs and for all lightweight deck systems, pullout tests shall be performed by the independent roofing contractor, fastener manufacturer or owner's representative to verify the condition of the deck or substrate and to confirm system design pullout values.

A minimum of 10 pullout tests for areas up to 500 squares, thereafter 2 tests per 100 squares is considered sufficient. Tests should be taken approximately 60% in perimeters and 40% from field areas. Additional tests shall be performed in areas where the integrity of the deck is questionable. A written report of pullout test results shall be submitted to Mule-Hide's Customer Service Department for review.

- F. Precautions shall be taken to prevent wind blow-off or wind damage during the course of the roofing application. This may necessitate additional securement of temporary construction, materials and equipment.
- G. The contractor shall verify and ensure that all roof drain lines are unblocked before starting work. Any blockages found shall be reported to the owner's representative and Mule-Hide's Customer Service Department in writing.
- H. Temporary waterstops shall be installed at the end of each day's work. Temporary waterstops shall be removed at the start of the next day's work and disposed of properly. Waterstops should be compatible with all materials.
- I. Do not install the Mule-Hide PVC Roofing Membrane in direct contact with any product containing asphalt, coal tar pitch, creosote or penta-based materials. Consult the Mule-Hide Customer Service Department for special installation requirements.
- J. Do not allow contaminants such as petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc., or direct steam venting to come into direct contact with the Mule-Hide PVC Roofing Membrane. Contact the Mule-Hide Customer Service Department for recommendations if such conditions exist.
- K. The contractor shall follow all safety regulations as recommended by OSHA.
- L. All work shall be scheduled and executed without exposing interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- M. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surfaces and equipment movement. Contractor shall provide all necessary protection and barriers to segregate the work areas and prevent damage to adjacent areas. If excessive traffic over newly installed membrane is necessary, contractor shall provide plywood or polyester felt protection to prevent damage.
- N. All existing roofing materials to be removed for construction shall be immediately removed from the construction site to a dumping area authorized to receive such debris. Any hazardous materials such as asbestos or materials containing asbestos fibers shall be removed and disposed of in accordance with applicable City, State and Federal requirements.
- O. Any unusual or concealed conditions discovered during the course of the work are to be reported to the owner and Mule-Hide immediately in writing. Work is to be halted until the owner has responded with a solution to the problems.
- P. All local building codes and requirements must be followed where applicable. It is the roofing contractor's sole responsibility to determine and ensure that the roofing system selected complies with all local codes and requirements.

- Q. Both interior and exterior building areas affected by construction shall be cleaned up and any damaged areas shall be repaired to the owner's satisfaction.

1.06 Warranties

All Mule-Hide warranties are available for commercial projects. A Roofing Membrane Limited Warranty for a maximum of 10 years is available for residential projects.

A. Mule-Hide's Roofing Membrane Limited Warranty

Mule-Hide offers a 10, 15 or 20-year Roofing Membrane Limited Warranty ("Warranty") for a charge. The Warranty covers only the Mule-Hide PVC membrane (or portion thereof) determined by Mule-Hide to be defective and resulting in roof leaks. This Warranty does not cover workmanship or other components not supplied by Mule-Hide. Mule-Hide does not perform inspections of the installation before issuing the Roofing Membrane Limited Warranty. A Mule-Hide Warranty Application and the appropriate fee must be submitted to Mule-Hide to obtain this warranty. Proof of purchase may be required.

Note: Projects requesting a 20-year Roofing Membrane Limited Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Fully Adhered Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

B. Mule-Hide's Standard System Warranty

Mule-Hide offers a 10, 15 or 20-year Standard System Warranty ("Standard") for commercial projects for a charge. The Standard warranty is a "No Dollar Limit", labor and material warranty that covers the Mule-Hide labeled membrane and other components supplied by Mule-Hide installed by a Mule-Hide Warranty Eligible Applicator. The Standard warranty does not cover insulation or its attachment system. Metal flashing components are not covered under this warranty. A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Standard warranties require inspections by a Mule-Hide representative.

Note: Projects requesting a 20-year Standard System Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Fully Adhered Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

C. Mule-Hide Premium System Warranty

Mule-Hide offers a 10, 15 or 20-year Premium System Warranty ("Premium") for commercial projects for a charge. The Premium warranty is a "No Dollar Limit", labor and material warranty that covers the Mule-Hide labeled membrane, insulation, other components supplied by Mule-Hide and approved products (such as metal flashing, insulation adhesive or other pre-approved accessories) installed by a Mule-Hide Warranty Eligible Applicator. A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Premium warranties require inspections by a Mule-Hide representative.

Note: Projects requesting a 20-year Premium Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Fully Adhered Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

- D. Standard and Premium System warranties are not available for residential projects.
- E. PVC tie-ins to built-up (BUR) or any other type of roof system are not covered by Mule-Hide warranties.
- F. Contact Mule-Hide for other extended warranties that may be available.
- G. Terms and Conditions of Warranties

Mule-Hide's obligations under the Roofing Membrane Limited Warranty, the Standard System Warranty, and the Premium System Warranty are limited to the specific terms and conditions of the respective Warranties. Sample copies of the Mule-Hide Warranties are available from Mule-Hide upon request.

PART 2 - PRODUCTS

2.01 General

- A. The components of the Fully Adhered Mule-Hide PVC Membrane Roof System are to be products manufactured or supplied by Mule-Hide Products Co., Inc. as specified in the contract documents.
- B. Components other than those supplied or manufactured by Mule-Hide may be submitted for review and acceptance by Mule-Hide's Customer Service Department. Mule-Hide's acceptance of any other product is based on chemical compatibility and published performance data. Mule-Hide does not guarantee such products or their performance. Other components may be considered on a job-by-job basis and must be approved in writing by Mule-Hide's Customer Service Department. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the designer for acceptability for use with Mule-Hide PVC roofing products.

2.02 Roofing Membrane

The Mule-Hide Reinforced PVC Membrane is available 50 mils (.050-inch) thick, 60 mils (.060-inch) thick or 80 mils (.080-inch) thick. The Mule-Hide PVC membrane is a polyester scrim reinforced thermoplastic roofing membrane that meets and exceeds the requirements of ASTM D4434 (Type III) Standard Specification for Poly (Vinyl Chloride) Sheet Roofing. Refer to the Product Data Sheets for physical properties and additional information.

2.03 Accessory Materials

- A. PVC Cut Edge Sealant - a liquid PVC sealing compound, shall have a consistency equal to that of "honey" at room temperature, and shall be furnished in 16 oz. bottles.
- B. PVC Bonding Adhesive - a solvent-based adhesive for bonding the Mule-Hide PVC Membrane to various vertical substrates and insulation boards.
- C. Termination Caulk - a single-component, non-sag elastomeric polyurethane caulk. Contact Mule-Hide for acceptable brands.
- D. Aluminum Foil Tape - a 3-mil tape with acrylic adhesive used over Mule-Hide PVC roofing system metal joints prior to PVC Flashing strips being welded over the joints.
- E. Slip sheets - Mule-Hide offers a variety of slip sheets dependent upon the particulars of an application. Some of these are the following:

1. A laminated kraft paper with fiberglass scrim reinforcement.
 2. Polyester Mat Protection Material - needle-punched polyester fabric.
- F. PVC Membrane Cleaner - a clear liquid available in 5 gallon cans used for cleaning asphalt and dirt from membrane surface.
- G. PVC Non-Reinforced Flashing – an 80-mil PVC Flashing (unreinforced) membrane can be used to complete flashing details.
- H. PVC Coated Metal - 24-gauge galvanized steel to which is laminated 35-mils of Mule-Hide's PVC Non-Reinforced Flashing (white) used for flashing and edge metal detailing.
- I. Mule-Hide All-Purpose Bar - an extruded aluminum bar 50 mils thick used to terminate adhered, reinforced membrane base flashings in certain constructions.
- J. Membrane Fasteners and Plates - Mule-Hide offers a variety of membrane fasteners and plates to meet specific job conditions and substrates.
1. Mule-Hide Steel/Wood Deck Fasteners
 - a. Drill Point-Coated
 - b. Thread Point-Coated
 - c. Stainless Steel Drill Point
 2. Mule-Hide Concrete Fasteners - For Structural Concrete Decks
 3. TL (2 Piece) - (High Density Nylon Auger & Metal Plate) - For Cementitious Fiber Substrates (Tectum, etc.) and Lightweight Concrete or Gypsum Decks
 4. Mule-Hide Metal Plates - Mule-Hide offers a variety of metal plates for membrane and insulation attachment.
- K. PVC Walkway Roll - a 90-mil (.090 inch) thick textured, polyester reinforced PVC membrane for traffic areas.
- L. Prefabricated Details - PVC Universal (inside/outside) Corners, PVC Pre-Molded Pipe Seal in sizes to fit pipes from 1" – 6", PVC Molded Sealant Pockets.
- M. Thermoplastic Pourable Sealer - a one-part thermoplastic sealant for use in PVC Molded Sealant Pockets.

2.04 Related Materials By Others

- A. Wood Nailers
1. Nailers shall be #2 or better lumber and shall be pressure treated for rot resistance. Creosote and asphaltic preservatives are not acceptable.
 2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data Sheet 1-49.
 3. Wood nailers shall be installed as specified on the project drawings and shall be of a height sufficient to match the thickness of the insulation being used.

B. Vapor Retarders

1. Vapor retarders shall meet specified code and/or insurance requirements.
2. Vapor retarders shall be compatible with insulation and other accessories.
3. The use and placement of a vapor retarder should be determined by an architect or engineer. However, Mule-Hide recommends that a vapor retarder be considered when both of two conditions are anticipated:
 - a. The outside average January temperature is below 40°F, and
 - b. The expected interior winter relative humidity is 45 percent or greater.

C. Insulation

1. Insulation shall be installed as a protection layer over the existing substrate or to obtain a desired thermal value.
2. Insulation shall be compatible with the Mule-Hide PVC Membrane Adhesive and the Mule-Hide PVC Membrane.
3. The following insulation boards are acceptable for use in a Mule-Hide Fully Adhered Roofing System when a standard warranty is requested:
 - a. Polyisocyanurate insulations having nonasphaltic facers meeting or exceeding the physical property requirements of Fed. Spec HH-I-1972 and having a minimum compressive resistance of 18 psi. Thickness minimum is 1" or greater as required by insulation manufacturer to span flutes on steel decks.
 - b. High Density wood fiberboard with nonasphaltic binders. Boards with asphalt binders or have been coated with asphalt cannot be used in direct contact with the PVC membrane. Contact the insulation manufacturer for minimum thickness requirements when installing this board directly over a steel deck.
 - c. Expanded polystyrene requires an acceptable cover board to which the PVC membrane may be adhered. Minimum density of EPS boards must be 1.25 PCF and meeting ASTM C578, Type II physical properties. Check with the EPS (expanded) manufacturer for minimum thickness requirements to span flutes on steel decks.
 - d. Extruded polystyrene meeting ASTM C578, Types IV, VI or VII physical properties. An acceptable cover board shall be required over the extruded polystyrene to which the PVC membrane may be adhered. Check with the EPS (extruded) manufacturer for minimum thickness requirements when spanning flutes on steel decks.
4. Insulation manufacturer shall provide its recommendations for use and attachment to the owner with a copy to Mule-Hide Products Co. In addition, the insulation manufacturer shall provide a copy of their specific warranty conditions if required by the building owner.

D. Insulation Adhesive

1. Insta-Stik™ - A single component polyurethane, construction grade, low-rise expanding foam adhesive used for attaching approved insulations to concrete, cellular lightweight insulating concrete, gypsum or cementitious wood fiber decks.
2. Millennium® – A one part urethane low-rise adhesive. Used for attaching approved insulations to concrete, cellular lightweight insulating concrete, gypsum or cementitious wood fiber decks.
3. Insulation adhesives are alternative methods of attachment of insulation to various deck types and for multi-layers of insulation. Contact Mule-Hide's Customer Service Department for acceptable uses.

2.05 Precautions

- A. Consult Material Safety Data Sheets and container labels for specific safety instructions prior to use.
- B. Avoid breathing vapors of solvent, sealant and adhesives. Use with adequate ventilation. Avoid prolonged contact of solvents, sealants and adhesives with skin.
- C. Do not use Mule-Hide PVC roofing products near fire or flame.
- D. Do not use open flames for drying of surfaces, sealants, or adhesives.
- E. Do not use oil-based paint on Mule-Hide's PVC Coated Metal or membrane. Contact Mule-Hide's Customer Service Department for recommendations.
- F. Do not allow muriatic acid (masonry cleaner) to come in direct contact with the Mule-Hide PVC Membrane or accessory products.

PART 3 - EXECUTION

3.01 General

When installing a Fully Adhered Mule-Hide Reinforced PVC Membrane Roofing System in cooler weather, it is recommended that liquids such as solvents, sealants, etc., be stored at temperatures between 60°F and 80°F until just prior to use in order to facilitate the installation. Liquid products, if stored outdoors, should be brought up to room temperature prior to use.

3.02 Substrate Conditions

The following general conditions apply to the substrate that will receive a Fully Adhered Mule-Hide PVC Membrane Roofing system for both reroof and new construction:

- A. The roof deck must be structurally sound to provide proper securement for mechanical fasteners. Areas showing a loss of integrity due to corrosion, rotting, warping, concrete spalling, etc., must be repaired or replaced prior to installing the roofing system.
- B. It is imperative that the roofing contractor make test cuts at each roof area prior to reroofing. The condition of the substrate must be suitable to receive a Fully Adhered Mule-Hide PVC Membrane Roofing System. Wet insulation must be removed and replaced. See Single-Ply Roofing Institute's guidelines for determining wet insulation.

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- C. A determination must be made regarding the presence or absence of coal tar pitch within the existing roof assembly. The presence of coal tar pitch requires a separation layer of insulation a minimum of 1-1/2" thick, having a minimum "R" value of 5.0 if the coal tar pitch is 10 years or older. All joints must be butted tightly together or have joints completely taped to prevent volatiles from damaging roof membrane. If the existing assembly is less than 10 years old, specific procedures must be followed. Contact the Mule-Hide Customer Service Department for specific requirements.
- D. Contact Mule-Hide Customer Service Department when the substrate is exposed to excessively high humidity and/or a corrosive environment. Special fasteners (i.e., stainless steel) or details may be required.
- E. It is acceptable to install a Fully Adhered Mule-Hide PVC Membrane Roofing System over the following deck substrates in new construction, provided that an acceptable insulation or barrier board is installed over the substrate as needed:
 - 1. Structural Metal Deck (24-gauge minimum) shall conform to recommendations outlined in Factory Mutual's Loss Prevention Data Sheet 1-28. Pullout tests are required on all decks less than 22 gauge. An insulation or barrier board is required to provide a smooth surface and shall be of sufficient thickness to span steel flutes without damage by traffic.
 - 2. Plywood should conform to Factory Mutual's requirements should tested (for uplift) assemblies be required. For non-FM assemblies, plywood minimum thickness shall be determined by local code requirements but shall not be less than 15/32" thick. Contact Mule-Hide for maximum membrane sheet widths, fastener sizes and spacing when using plywood, as requirements will change with thickness used. Insulation or cover/barrier board may be required under the membrane.
 - 3. Structural concrete and pre-cast, pre-stressed concrete (3,000 psi minimum) shall be cured and dry to industry standards. Surfaces shall be smooth and free of moisture or frost. All sharp ridges or other projections above the surface shall be removed before roofing. Insulation or cover/barrier board may be required under the membrane.
 - 4. Lightweight Insulating Concrete Fill and Metal Formwork (minimum 24-gauge metal formwork) – the roof deck shall be cured and dry to the deck manufacturer's and/or industry standards and shall be smooth and free of ridges and depressions. All necessary venting as recommended by the roof deck manufacturer shall be accomplished. These decks may be acceptable to receive a Fully Adhered Mule-Hide PVC Membrane Roofing System after pull-out tests have been completed and appropriate fasteners have been selected. Insulation or a cover/barrier board is required under the membrane.
 - 5. Wood plank (1" minimum) shall conform to Factory Mutual's requirements for Class I impregnated decks. Insulation or cover/barrier board may be required under the membrane.
 - 6. Cementitious Wood Fiber Decks - Certain cementitious wood fiber decks may be acceptable to receive a Mule-Hide Fully Adhered Roofing System after pull-out tests have been completed and appropriate fasteners have been selected. Insulation or cover/barrier board is required under the membrane.

7. Gypsum Concrete Deck - shall be cured and dry to manufacturer's and/or industry standards. The surface of the deck shall be smooth and free from ridges and depressions. These decks may be acceptable to receive a Fully Adhered Mule-Hide PVC Membrane Roofing System after pull-out tests have been completed and appropriate fasteners have been selected. Insulation or cover/barrier board may be required under the membrane.
8. Oriented Strand Board (OSB) shall be a minimum 7/16" thick. Contact Mule-Hide for acceptable sheet sizes, fastener types and spacing when using OSB as requirements will change with thickness used. Minimum thickness or usage restrictions may change depending on local code requirements. Pullout tests must be performed and submitted to Mule-Hide Technical Department prior to bidding the project.

3.03 Preparation of Existing Substrate

A. General

1. To prevent delays or interruptions, coordinate work with other trades or suppliers to ensure that components to be incorporated into the Fully Adhered Mule-Hide PVC Membrane Roofing System are available as the work progresses. Examine substrates to which the roofing materials are to be applied to ensure that their condition is satisfactory for the Mule-Hide PVC Roofing System application. Do not permit voids greater than 1/4" width in the substrate. Concrete substrates shall be cured and free of laitance and curing compounds. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges and debris. Inspect substrates and correct defects before application of roofing membrane.
2. Large blisters on existing roof systems shall be cut and patched to provide a reasonably level substrate surface.
3. Gravel over existing nailers must be totally removed prior to installing new nailers and flashings. Verify that the existing nailers are securely anchored to the roof decks.
4. When an additional thickness of insulation is being added, new nailers must be added to match the height of the new insulation. Nailers must be securely anchored to the roof deck per Section 3.05 of this specification.
5. All roof surfaces shall be free of ponded water, ice, or snow and drain properly. Drainage is the responsibility of the roofing contractor and designer/specifier.
6. Specifier and/or roofing contractor shall determine the condition of the existing roof deck and roofing. Areas with deteriorated decking or wet insulation or other materials shall have those affected materials removed and replaced.
7. When removing an existing roof during reroofing, remove only that amount of roofing and flashing that can be made watertight with new Mule-Hide PVC materials in a one-day period or prior to the onset of inclement weather.

3.04 Vapor Retarder Installation (where specified)

General

Specific climatic and job conditions may require the use of a vapor retarder. It is the sole responsibility of the design professional to determine the need for a vapor retarder, and its type and location in the roofing system. A vapor retarder may often act as an "air barrier" which may have a positive effect in reducing internal air pressure. Air barriers should be strongly considered for buildings subject to high internal air pressures such as airplane hangars and buildings with many loading bays such as warehouse facilities.

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The National Roofing Contractor's Association recommends the installation of vapor retarders when interior relative humidity is 45% or greater and the outside mean average January temperature is below 40°F.

Contact Mule-Hide Customer Service Department for questions regarding compatibility with Mule-Hide products.

3.05 Wood Nailers

- A. Install nailers at the perimeter of the roof and around all roof penetrations and projections (unless otherwise shown on Mule-Hide standard details).
- B. Nailers shall be firmly anchored to the decks at a maximum 2'-0" o.c. and shall resist a pullout force of 200 lbs./linear foot in any direction. A 1/2" vent space shall be provided between adjacent lengths of nailers. Fasteners shall be installed within 6 inches of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
- C. Height of nailers shall match the surface level of the insulation and roof membrane.
- D. All woodwork to be reused shall resist a minimum force of 200-lbs./linear foot in any direction and shall be free of rot.

3.06 Insulation Installation

- A. Mule-Hide accepted roof insulations shall be installed in accordance with Mule-Hide specifications or the insulation manufacturer's current published specifications and recommendations (whichever is more stringent) for use with Fully Adhered Single-Ply Roof Systems.
 - 1. Mule-Hide accepted roof insulations, as a minimum requirement, shall be attached per the current Factory Mutual Approval Guide, utilizing Mule-Hide fasteners, approved low-rise foam adhesive or hot asphalt and with tight joints in parallel courses with end joints staggered. When more than one layer of insulation is to be used, succeeding layers are to be laid staggered in relation to the previous layer of insulation and all joints shall be staggered. The appropriate method of attachment is determined by the project requirements and deck type.
 - 2. If the first layer is mechanically attached and succeeding layers are adhered, the first layer must be at a thickness and attached at a fastener rate and pattern equivalent to the that required to meet the uplift requirements for the project.
 - 3. All roof insulation shall be neatly cut to fit around all penetrations and projections with a maximum allowable gap of 1/4".
 - 4. Open joints greater than 1/4" wide shall be repaired with like insulation material.
 - 5. Insulation shall be feathered or tapered to provide a sump area a minimum of 36" x 36" where possible at all drains.
 - 6. Install no more roof insulation in one day than can be covered with the Mule-Hide PVC Membrane or when the onset of inclement weather is anticipated.
 - 7. Insulation installed over steel decks shall be checked so that no edges are left unsupported along the flutes. All insulations shall be of sufficient thickness and density to prevent breakage under normal roof construction or maintenance traffic.

8. Tapered insulation shall be installed in accordance with tapered fabricator's shop drawings.

B. Mechanical Attachment

1. All insulation boards must be mechanically attached to "standard" decks unless specifically accepted for hot asphalt or adhesive securement for the particular application by Mule-Hide Products Co. and the insulation manufacturer.
2. "Standard" decks shall be defined as 22-gauge or heavier steel decks, poured structural concrete 3000 psi or greater, 5/8" or greater plywood, and 1" minimum wood plank. Other deck types may be accepted by Mule-Hide for mechanical attachment of insulation in certain, specific applications. Contact the Mule-Hide Customer Service Department in these cases.
3. All insulation must be secured to the structural deck with approved fasteners at rates published by the insulation manufacturer and recommendations published by Factory Mutual Research Corp. for fully adhered applications as a minimum standard. An approved low-rise foam adhesive may be an acceptable alternate for certain deck types.
4. Contact Mule-Hide for specific fastening patterns and quantities for uplift compliance and for those projects where FM approved assemblies are requested. FM 1-90 or greater compliance may require the installation of additional membrane attachment in the perimeter and corner areas. This should be determined for each specific project.

C. Hot Asphalt Attachment

1. In some applications Mule-Hide may permit the use of ASTM D 312, Type III, steep asphalt, to attach roof insulation to structural concrete or base sheets. The insulation manufacturer must recommend and approve the application in writing for Mule-Hide's consideration. Mule-Hide Products Co. will not accept the use of hot asphalt for insulation attachment without Mule-Hide's prior written approval.
2. Insulation must be attached in accordance with the guidelines established by the Factory Mutual Research Corp., National Roofing Contractors Association, and specific insulation manufacturer's requirements as minimums.
3. The proposed insulation board must be accepted by Mule-Hide's Warranty Department for use with the Fully Adhered Mule-Hide PVC Membrane Roofing System and must be approved by the insulation manufacturer for hot asphalt attachment.
 - a. Maximum insulation board size for hot asphalt attachment shall be 4' x 4'. All concrete decks must be primed prior to installing the insulation. The insulation board must be set in a solid mopping of asphalt and "stepped in" to ensure maximum adhesion. Do not slide the roof insulation into the hot asphalt. **Spot-, sprinkle- or strip-mopping is not acceptable.**
 - b. Care must be taken to prevent excess asphalt from seeping out at the insulation joints when the boards are "stepped in". If the asphalt should seep out at the joints, aluminum tape must be applied over the asphalt to completely separate the asphalt from the Mule-Hide PVC Membrane.

4. Mule-Hide will not accept hot asphalt attachment of insulation on slopes greater than 1":12" without Mule-Hide's prior written approval. Hot asphalt is not acceptable for use to attach insulation direct to a steel or cementitious wood fiber deck.
- D. High Humidity Applications
 1. Certain high humidity applications will require the use of a vapor retarder. It is the sole responsibility of the design professional to determine the type and location of the vapor retarder in the roofing system.
- E. Lightweight Cementitious Decks
 1. Certified fastener pull-out tests must be performed by the fastener manufacturer and test results submitted to the Mule-Hide Customer Service Department for evaluation. Mule-Hide's acceptance or non-acceptance of a particular project will be based on actual project conditions and fastener pull-out test results.

3.07 Membrane Installation

The surface of the insulation must be inspected prior to the application of the Mule-Hide PVC membrane to verify that the surface is clean, smooth, free of contaminants or delaminated insulation facers, and that all fasteners are properly installed.

- A. General - Unroll Mule-Hide sheet roofing and position without stretching the membrane. Allow the membrane to relax at least 15 minutes when the temperature is above 60°F, or 30 minutes when the temperature is below 60°F, prior to installation. Inspect and remove any damaged membrane. Lap sheets a minimum of 3" to allow for a minimum 1-1/2" continuous weld area. Membrane overlaps shall be shingled or run parallel with the flow of water. **Backwater seams are not permitted.**
 1. The Fully Adhered Mule-Hide PVC Membrane must be mechanically secured at roof edges, parapet walls, curbs, penetrations and all valleys, peaks and slope intersections where the net change in slope exceeds 1-1/2" in 12". Contact Mule-Hide's Customer Service Department for specific recommendations.
- B. Mule-Hide PVC Bonding Adhesive
 1. After carefully positioning several sheets of the PVC membrane, one-half of the first sheet's length shall be folded back to expose the substrate and the bottom side of the sheet. Apply the adhesive to the exposed substrate and to the back side of the PVC membrane using a solvent resistant medium nap roller ensuring 100% coverage of the surface to be bonded. The application must be uniform with no globs or puddles. The adhesive shall be applied at a finished (both surfaces) rate of 60 sf per gallon. This equates to applying the adhesive to each surface at a rate of 120 sf per gallon. This is an approximate coverage rate and may vary depending on the type of substrate (porosity of surface) and climatic conditions.
 2. When the adhesive on the membrane has dried sufficiently to be tacky but not produce adhesive legs or strings with a light touch of a dry finger, the coated membrane shall be rolled onto the previously coated substrate in such a manner as to eliminate wrinkles and trapped air. If the adhesive on either surface has dried excessively, then the surface in question must be recoated with adhesive. The adhesive must show complete transfer between the substrate and membrane surfaces when peeled back as evidenced by adhesive legs and strings.

3. After the adhesive coated substrate and membrane surfaces have been mated, the bonded surface must be rolled or broomed to promote 100% adhesion. The remaining unadhered half of the first sheet shall be folded back and the adhering procedure repeated. On each succeeding sheet of PVC Membrane, sheet alignment, adhesive application, adhering and rolling procedures shall be repeated. **Do not apply adhesive to seam areas that will be hot air welded.**

C. Application Precautions

1. No adhesive shall be applied to lap areas that are to be welded. All sheets shall be aligned to provide adequate lap area as required by welding techniques.
2. Adhesive coverage rates can vary dramatically depending on the particular substrate and environmental conditions. Coverage rates stated herein are approximate only.
3. Adhesive "open time" will vary dramatically depending on the particular substrate and environmental conditions.

3.08 Welding of Lap Areas

A. General

1. All laps/seams shall be hot air welded.
2. All surfaces to be welded shall be clean and dry. No adhesive shall be present within the lap areas.

B. Hot-air Welding

1. Machines for hot air welding are available from several different sources. Each welder manufacturer's instructions for use shall be followed, as well as all local codes regarding electric grounding, supply and other related functions. Since most automatic welding machines require 218 to 230 volts, the use of a portable generator on the roof is recommended for greater flexibility. Consult the welding machine manufacturer for minimum requirements on the appropriate size of a portable generator. **Mule-Hide requires the use of automatic welding machines for all field seams where possible. Only those areas that cannot be completed with an automatic welder may be welded with a hand welder. The seam width must be as wide as one created with an automatic welder (approximately 1-1/2" wide).**
2. Hand-held welding machines are also available to weld membrane but should only be used where an automatic welded cannot be used (such as but not limited to flashings, vertical or steep sloped seams or areas where an automatic welded cannot be used). After the preheated nozzle tip is applied in the overlap area and the material starts to flow, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle tip. Angle the hot-air tool so that the flowing air faces the roller. The temperature of the hot-air tool shall be adjusted so that a minimum of smoke is developed and material from the bottom of the sheet begins to soften and flow from the seam. Seam strength may be tested when cool. For best results, testing seams 8 hours after hot air welding is recommended.

3. The roofing contractor shall check all welded seams for continuity and integrity using a rounded screwdriver or other suitable blunt object. Sample test seams shall be made daily by the contractor. Prior to welding field seams, the contractor shall, using scrap material, run at least two test seams, each a minimum of 2' long. Each test seam shall be used to determine adequate seam strength and to ensure the equipment has warmed up and is operating properly. This should be done each time the equipment is turned on after a cool down period.

C. Quality Control of Seams

After heat welding, the seams are checked for integrity with a blunt-ended probe. Any openings or "fishmouths" are to be repaired with a hand-held hot-air tool fitted with a narrow nozzle tip and with a roller. Each day the contractor shall attempt to pull apart several sections of welded seams to test the quality of the welds. Should the welds be deficient, a more thorough examination of the work performed must be carried out and necessary repairs made. PVC Cut Edge Sealant is used to seal the membrane edges (after the seam is welded) where reinforcing fabric is cut and exposed.

3.09 Flashing Installation

A. PVC Coated Metal Flashing

1. Mule-Hide's PVC Coated Metal Flashing shall be installed in accordance with Mule-Hide Roofing Systems' standard details.
2. Complete all metalwork concurrently with roofing and flashings so that a watertight condition exists daily.
3. PVC Coated Metal may be used at all peaks, valleys and slope intersections where the net change in slope exceeds 1-1/2" in 12". In some cases, reinforced membrane may be sufficient for ridges, but should be fastened securely at all transition areas. Contact the Mule-Hide Customer Service Department for specific recommendations.
4. PVC Coated Metal shall be installed to provide adequate resistance to bending and to allow for normal thermal expansion and contraction.
5. All metal joints are to be watertight and staggered over nailer joints to prevent joints in nailers and joints in metal from lining up.
6. Base flashings shall extend a minimum of 8" up vertical surfaces where possible.
7. All metal flashings and terminations shall be securely fastened in the plane of the roof deck with fasteners recommended by Mule-Hide.
8. Fasteners used to secure flashings to wood nailers shall be stainless steel, galvanized metal or other corrosion-resistant material, with a head diameter of not less than 3/8", and with fastener penetration into the wood nailer of at least 3/4".
9. Scuppers and metal overflows are to be assembled using Mule-Hide's PVC Coated Metal.
10. All PVC Coated Metal shall be fabricated to form hemmed edges to prevent sharp metal edges from cutting the membrane, except when used in conjunction with wood nailers.

B. PVC Membrane Flashings

1. All membrane flashings are to be installed concurrently with the roof membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Mule-Hide Customer Service Department. Should any water penetrate the new roofing because of incomplete flashings, the affected areas shall be removed and replaced at the contractor's expense.
2. All PVC Membrane flashings shall be fully adhered using Mule-Hide's PVC Bonding Adhesive. The following conditions must be met:
 - a. All surfaces to be fully adhered should be compatible, dry and smooth with no excessive surface roughness. If an existing asphalt surface is present, a 1/2" minimum plywood, 9 oz. polyester felt, acceptable insulation board or 26-gauge minimum galvanized metal barrier must be placed over the asphaltic surface.
 - b. After the proper surface has been prepared and the membrane to be used as flashing has been cut to a workable length, Mule-Hide's PVC Bonding Adhesive shall be applied to the prepared substrate and back side of the flashing where it contacts the substrate. Apply the PVC Bonding Adhesive using a minimum 1/2" nap paint roller at a finished rate of approximately 60 sf per gallon. This equates to 120 sf per gallon applied to each surface. **Coverage rate may vary depending on the type of substrate and climatic conditions.** Apply adhesive in smooth even coats, avoiding globs, puddles or other types of irregularities. **Do not apply adhesive to seam areas that will be hot air welded.**
 - c. Let adhesive dry sufficiently to be tacky but not produce strings when touched with a dry, clean finger. Carefully mate the flashing to the coated substrate.
 - d. Avoid wrinkling the flashing when applying to substrate. After mating membrane to the substrate, carefully roll the membrane with a 2" wide rubber hand roller to promote maximum positive contact between the membrane and the substrate. Overlap all adjacent flashing sheets a minimum of 2". The PVC Membrane flashings shall extend a minimum of 6" onto the field sheet. There shall be a minimum 1-1/2" hot-air weld in front of the fastener plates. All side laps are to overlap a minimum of 2" and welds shall be 1-1/2" wide.
3. All flashings shall extend a minimum of 8" above roof membrane level where possible unless previously accepted by the Owner or his representative and the Mule-Hide Warranty Department.
4. All flashings shall be hot air welded at their connections with the roofing membrane and other PVC flashings.
5. Apply PVC Cut Edge Sealant at all welded edges.
6. All flashings shall be properly terminated according to Mule-Hide's published Standard Details.

3.10 Walkway Installation

Walkways must be provided in areas where routine rooftop maintenance occurs and in areas where regular rooftop traffic is expected.

A. Mule-Hide PVC Walkway Roll Installation

1. Install PVC Walkway Rolls over clean, dry surfaces.
2. Layout areas where PVC Walkway material is to be installed with most of the material being oriented so that it is placed between field seams in maximum lengths of 30 feet with each adjacent and abutting section gapped a minimum of 6".
3. Heat weld the perimeter of the properly positioned PVC Walkway material. Check seams for any voids or inconsistencies that might prevent watertightness.
4. Apply PVC Cut Edge Sealant at all welded edges.
5. PVC walkways should be installed at all traffic concentration points (such as but not limited to hatches, access doors, rooftop ladders, equipment service panels) and regular maintenance paths used to access service areas.

B. Precast Pavers

1. Install precast paver systems acceptable to Mule-Hide over one layer of a Polyester Mat Protection Material or other acceptable slip sheet material.
2. A sheet of PVC membrane may be used as a protection layer under the precast pavers.
3. Set precast pavers so that they do not cover field seams.

3.11 Temporary Tie-ins

- A. Install temporary cutoffs around incomplete edges of roofing assembly at the end of each day's work and when work must be postponed due to inclement weather. Straighten the insulation line using pieces of insulation loosely laid, and seal the Mule-Hide sheet membrane to the deck or existing membrane. Use a heavy application of roof cement or hot asphalt at least six inches in width overlaid with an embedded reinforcement. Remove the temporary seals completely when work resumes, cutting out and removing the contaminated PVC membrane. Remove all sealant, contaminated membrane, insulation fillers, etc., from the work area and properly dispose off-site.
- B. Other methods of temporary tie-ins may be used. Mule-Hide does not recommend a specific method. This is the responsibility of the roofing contractor.

End of Section

This specification represents the applicable information available at the time of its publication. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide or check the Mule-Hide website (www.mulehide.com) for the latest updates regarding changes or modifications to this specification.

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MULE-HIDE PRODUCTS CO., INC

Fully Adhered Roofing System

SUMMARY SPECIFICATION

PVC Systems

This Summary Specification is a brief overview of Mule-Hide Product's specification and requirements for a Fully Adhered Mule-Hide Reinforced PVC Roofing System and is intended for use as a submittal in a bid package. Specifier's and Mule-Hide Warranty Eligible Contractors must comply with Mule-Hide Product's specifications and requirements prior to design or bid.

Part 1 General

1.01 Description

The Mule-Hide Fully Adhered Reinforced PVC Roofing System utilizes a (maximum) 81" wide, scrim reinforced Mule-Hide PVC membrane in thickness of 50, 60, or 80 mil. Approved insulation is attached to the substrate with either Mule-Hide Insulation fasteners and plates or an approved insulation adhesive, and the PVC membrane is bonded to the insulation with PVC Bonding Adhesive. The adjoining sheets are overlapped approximately 2" and seamed together with a min 1.5" wide heat weld.

1.02 Quality Assurance

- A. The roofing system must be installed by a Mule-Hide Warranty Eligible Contractor in accordance with installation guidelines and detail drawings as approved by Mule-Hide. Prior written approval from the Mule-Hide Warranty Department is required for all deviations from Mule-Hide's published specifications and details.
- B. Projects requesting a Labor and Material Warranty will be inspected by a Mule-Hide Representative to verify that Mule-Hide's installation and material requirements have been met.
- C. Mule-Hide roofing systems offer a variety of Underwriters Laboratories (UL), Factory Mutual (FM) and other ratings. Consult the appropriate approval guides and Mule-Hide Products for specific code approvals.

1.03 Submittals

- A. To ensure compliance with Mule-Hide's warranty requirements contact the Mule-Hide Warranty Department if any of the following conditions exist.
 - 1. Specified wind speed warranty greater than 55 MPH.
 - 2. Building height > 200'
 - 3. Projects located in coastal or high wind zones.
 - 4. Pressurized buildings
 - 5. Cold Storage or Freezer Buildings

6. Membrane exposed to chemicals

- B. Submit a completed Warranty Application form to Mule-Hide prior to bidding. Also include fastener pullout testing results as required for non-standard substrates.
- C. All projects must have a Mule-Hide warranty application number assigned prior to inspection.

1.04 Product Delivery, Storage, and Handling

- A. Deliver materials to the job site in original, unopened containers, with the manufacturer's name, brand name and installation instructions.
- B. Store all materials in a dry, clean area protected from the elements, as per manufacturer's recommendations.

1.05 Job Conditions

- A. All existing wet or damaged roofing materials must be removed and replaced with new materials.
- B. All existing phenolic insulation and sprayed-in-place urethane roofs must be removed.
- C. The specifier must determine the use and placement of vapor retarders. Consult ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) publications.
- E. Coordinate work between all trades to avoid traffic over completed sections of roofing.

1.06 Warranty.

Fees are required for all Labor and Material (System) Warranties. System Warranties must be obtained through a Mule-Hide Warranty Eligible Applicator. All projects requesting a System Warranty must be inspected by a Mule-Hide Representative. Components of the roofing system must be supplied by Mule-Hide. Warranty covers only Mule-Hide supplied materials. Sample warranties are available upon request. Contact Mule-Hide Warranty Department for warranty requirements.

Part 2 Products

2.01 General

- A. The components of this roofing system are to be manufactured, supplied, or approved in writing by Mule-Hide Products.

2.02 Membrane

Mule-Hide White reinforced 50, 60, or 80-mil thick Polyvinyl Chloride (PVC) membrane is used for this system. The membrane is available in widths of 40.5" and 81" and in lengths up to 100' (White membrane). Refer to our Product Data Sheet for physical properties and other information.

2.03 Related Materials

Mule-Hide products include: Reinforced and Non-Reinforced Flashings, Bonding Adhesives, PVC Cut-Edge Sealant, PVC Coated Metal, Membrane fasteners and discs, Thermoplastic One-Part Pourable Sealer, All-Purpose Bar, PVC Walkway Roll, Universal Single Ply Sealant, and other components.

Part 3 Execution

3.01 General

- A. Work should begin at the highest point of the roof level and proceed to the lowest point. Work should be completed on a daily basis including flashings, terminations, and daily seals.
- B. Prepare the existing roof deck or substrate according to Mule-Hide design guides and full-system specifications prior to applying the new roofing system.

3.02 Roof Deck Criteria

- A. A proper substrate shall be provided by the building owner. The structure shall be able to withstand normal construction loads and live loads.
- B. Substrate must allow for drainage so that all water is removed within 48 hours after a rain.

3.03 Substrate Preparation

- A. Re-cover projects - All wet or damaged materials must be removed and replaced with new materials.
- B. Substrate must be clean, level, and smooth so that the insulation lays flat. Fresh applications of bitumen based roof cement must be removed or covered.

3.04 Installation

Refer to the applicable Product Data Sheets and Material Safety Data Sheets for cautions and warnings.

A. Insulation Attachment

Attach roof insulation with Manufacturer supplied roofing fasteners and plates. Attachment rates and insulation requirements

will vary depending upon substrate and desired wind uplift. Consult Mule-Hide Warranty Department for attachment requirements.

B. Membrane Installation and Hot Air Welding

Place membrane over substrate with minimum 2" overlap at lap seams and positioned so that laps will shed water. Allow membrane to relax. After membrane has relaxed, fold membrane back so that half of the underside is exposed. Apply PVC Bonding Adhesive as per manufacturer's instructions. Fold back the unbonding half of membrane and repeat bonding procedure. Hot-air weld seams with automatic welder to achieve a min 1.5" wide heat weld.

C. Additional Membrane Securement

The membrane must be secured at the perimeter of each individual roof area, projection, and any angle change that exceeds 2" per lineal foot. Consult Mule-Hide's published detail drawings.

D. Membrane Flashing

All existing base flashings are to be removed. Install new membrane flashings as per manufacturer's details and guidelines. Flashings must be terminated along top edge as per appropriate Mule-Hide detail.

E. Other Related Work

1. Walkways should be provided in areas where regular rooftop traffic is expected. Walkways are considered a maintenance item and are excluded from the Mule-Hide warranty.
2. Mule-Hide PVC Walkway Rolls are to be installed over clean, dry surfaces, with a minimum 6" spacing over field seams. Hot air weld the perimeter of the Walkway Roll to the field membrane.
3. Concrete pavers may be used if installed over one layer of HP Protection Mat.
4. Copings, counter flashing and other metal work shall be fastened to resist wind uplift and prevent buckling. Metal should be sealed to prevent moisture infiltration.

This summary specification represents the applicable information available at time of publication. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide Products or visit our website at www.mulehide.com for the latest updates, changes, or modifications to this summary specification.

SECTION 4

MULE-HIDE PRODUCTS CO., INC.

PVC Mechanically Attached Specification

PVC Mechanically Attached Summary Specification

PVC Rhino Bond Summary Specification

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System Specifications

"The name trusted in roofing since 1906"



MECHANICALLY ATTACHED PVC SYSTEM

07 54 00/MUL

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System Specifications

"The name trusted in roofing since 1906"



MECHANICALLY ATTACHED PVC SYSTEM SPECIFICATION

07540/MUL

Revised March 2011

PART 1 – GENERAL

1.01 Description

A. Scope:

1. Furnish and install a Mechanically Attached Mule-Hide Reinforced PVC Roofing Membrane with flashings and accessories necessary to comprise a roofing system.

B. Related Work:

The work includes, but is not necessarily limited to the installation of:

1. Vapor Retarder (where specified)
2. Wood Blocking (Nailers)
3. Insulation
4. Slip Sheet (where required)
5. Fasteners
6. Roof Membrane
7. Roof Membrane Flashings
8. Metal Flashings
9. Adhesives
10. Sealants
11. Walkways

1.02 Quality Assurance

- A. The Mule-Hide Reinforced PVC Membrane Roofing System shall be installed by an independent roofing contractor eligible to apply for Mule-Hide warranties when Standard System and Premium System Warranties are requested.
- B. There shall be no deviations from this specification or the Mule-Hide Products Co. ("Mule-Hide") standard details without prior written approval from Mule-Hide's Customer Service Department.
- C. Upon completion of the installation according to the terms and conditions stated in this specification and in accordance with the information provided in the Warranty Application and Pre-Job survey form and any additional approvals which might have been given by Mule-Hide, an authorized representative of Mule-Hide may perform an on-site inspection of the roof to verify that all installation and material requirements have been met.

1.03 Submittals

- A. Prior to the time of bidding, the roofing contractor shall submit to the Owner or Owner's representative the following items:
 1. Copies of Mule-Hide's specification and published product data.

2. Samples of each material to be used in the roof system.
3. Specimen copy of Mule-Hide Products Co. warranty
4. Dimensioned shop drawings to include an outline of the roof and appropriate details for flashings and terminations.
5. Certification from insulation, roofing and accessory components manufacturers that all materials supplied comply with identified ASTM and industry standards.
6. Verification that system specifications meet all identified code and insurance requirements including but not limited to the following:
 - a. Factory Mutual Research Laboratories
Norwood, MA
 - b. Underwriters Laboratories
Northbrook, IL

1.04 Product Delivery, Storage and Handling

- A. All products delivered to the job site shall be in their original unopened containers or wrappings and clearly labeled with the manufacturer's name, product identification and date of manufacture.
- B. Protect all materials from damage during transit, storage and delivery to the job site. Place all materials on pallets and protect from moisture.
- C. Store all materials in a dry, clean area protected from the elements. All rolls of membrane shall be stored flat on pallets.
- D. All adhesive and caulking shall be stored at temperatures between 60 °F and 80°F.
- E. All flammable materials shall be stored in a cool, dry area away from open flames and sparks. Follow precautions outlined on containers or supplied by the material manufacturer/supplier.
- F. All materials determined to have been damaged (confirmed by Mule-Hide) are to be replaced with new materials at no cost to the owner.

1.05 Job Conditions

- A. Mule-Hide PVC roofing materials may be installed under certain adverse weather conditions such as high humidity or extreme temperatures, but only after consultation with the Mule-Hide Customer Service Department as special precautions or procedures may be necessary. The performance of the materials, installation costs and production rates may be affected.
- B. Only as much new roofing as can be made watertight each day shall be installed each day. This includes all flashing work.
- C. All substrates to receive new insulation, membrane or flashing shall be thoroughly dry and free of contaminants. Should surface moisture occur, the contractor should provide adequate equipment to dry the substrate prior to the application of new materials.

- D. Prior to and during application, all dirt, debris and dust shall be removed from surfaces to be roofed for both new and reroofing substrates.
- E. On all reroof jobs and for all lightweight deck systems, pullout tests shall be performed by the independent roofing contractor, fastener manufacturer or owner's representative to verify the condition of the deck or substrate and to confirm system design pullout values. A minimum of 10 pullout tests for areas up to 500 squares, thereafter 2 tests per 100 squares is considered sufficient. Tests should be taken approximately 60% in perimeters and 40% from field areas. Additional tests shall be performed in areas where the integrity of the deck is questionable. A written report of pullout test results shall be submitted to Mule-Hide's Customer Service Department for review.
- F. Precautions shall be taken to prevent wind blow-off or wind damage during the course of the roofing application. This may necessitate additional securement of temporary construction, materials and equipment.
- G. The contractor shall verify and ensure that all roof drain lines are unblocked before starting work. Any blockages found shall be reported to the owner's representative and Mule-Hide's Customer Service Department in writing.
- H. Temporary waterstops shall be installed at the end of each day's work. Temporary waterstops shall be removed at the start of the next day's work and disposed of properly. Waterstops shall be compatible with all materials.
- I. Do not install the Mule-Hide PVC Roofing Membrane in direct contact with any product containing asphalt, coal tar pitch, creosote or penta-based materials. Consult the Mule-Hide Customer Service Department for special installation requirements.
- J. Do not allow contaminants such as petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the Mule-Hide PVC Roofing Membrane. Contact the Mule-Hide Customer Service Department for recommendations if such conditions exist.
- K. The contractor shall follow all safety regulations as recommended by OSHA.
- L. All work shall be scheduled and executed without exposing interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- M. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surfaces and equipment movement. Contractor shall provide all necessary protection and barriers to segregate the work areas and prevent damage to adjacent areas. If excessive traffic over newly installed membrane is necessary, contractor shall provide plywood or polyester felt protection to prevent damage.
- N. All existing roofing materials to be removed for construction shall be immediately removed from the construction site to a dumping area authorized to receive such debris. Any hazardous materials such as asbestos or materials containing asbestos fibers shall be removed and disposed of in accordance with applicable City, State and Federal requirements.
- O. Any unusual or concealed conditions discovered during the course of the work are to be reported to the owner and Mule-Hide immediately in writing. Work is to be halted until the owner has responded with a solution to the problems.
- P. All local building codes and requirements must be followed where applicable. It is the roofing contractor's sole responsibility to determine and ensure that the roofing system selected complies with all local codes and requirements.

- Q. Both interior and exterior building areas affected by construction shall be cleaned up and any damaged areas shall be repaired to the owner's satisfaction.

1.06 Warranties

All Mule-Hide warranties are available for commercial projects. A Roofing Membrane Limited Warranty for a maximum of 10 years is available for residential projects.

A. Mule-Hide's Roofing Membrane Limited Warranty

Mule-Hide offers a 10, 15 or 20-year Roofing Membrane Limited Warranty ("Warranty") for a charge. The Warranty covers only the Mule-Hide PVC membrane (or portion thereof) determined by Mule-Hide to be defective and resulting in roof leaks. This Warranty does not cover workmanship or other components not supplied by Mule-Hide. Mule-Hide does not perform inspections of the installation before issuing the Roofing Membrane Limited Warranty. A Mule-Hide Warranty Application and the appropriate fee must be submitted to Mule-Hide to obtain this warranty. Proof of purchase may be required.

Note: Projects requesting a 20-year Roofing Membrane Limited Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Mechanically Attached Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

B. Mule-Hide's Standard System Warranty

Mule-Hide offers a 10, 15 or 20-year Standard System Warranty ("Standard") for commercial projects for a charge. The Standard warranty is a "No Dollar Limit", labor and material warranty that covers the Mule-Hide labeled membrane and other components supplied by Mule-Hide installed by a Mule-Hide Warranty Eligible Applicator. The Standard warranty does not cover insulation or its attachment system. Metal flashing components are not covered under this warranty. A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Standard warranties require inspections by a Mule-Hide representative.

Note: Projects requesting a 20-year Standard System Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Mechanically Attached Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

C. Mule-Hide Premium System Warranty

Mule-Hide offers a 10, 15 or 20-year Premium System Warranty ("Premium") for commercial projects for a charge. The Premium warranty is a "No Dollar Limit", labor and material warranty that covers the Mule-Hide labeled membrane, insulation, other components supplied by Mule-Hide and approved products (such as metal flashing, insulation adhesive or other pre-approved accessories) installed by a Mule-Hide Warranty Eligible Applicator. A Mule-Hide Warranty Eligible Applicator must submit a Warranty Application and the appropriate fee to Mule-Hide. Premium warranties require inspections by a Mule-Hide representative.

Note: Projects requesting a 20-year Premium Warranty require the use of the 60-mil thick PVC membrane and shall incorporate additional design enhancements as outlined in the 20-year Design Enhancements for PVC Mechanically Attached Roofing System Specification. Mule-Hide recommends that Warranty Applications be submitted for review prior to bidding the project.

- D. Standard and Premium System warranties are not available for residential projects.
- E. PVC tie-ins to built-up (BUR) or any other type of roof system are not covered by Mule-Hide warranties.
- F. Contact Mule-Hide for other extended warranties that may be available.
- G. Terms and Conditions of Warranties

Mule-Hide's obligations under the Roofing Membrane Limited Warranty, the Standard System Warranty, and the Premium System Warranty are limited to the specific terms and conditions of the respective Warranties. Sample copies of the Mule-Hide Warranties are available from Mule-Hide upon request.

PART 2 - PRODUCTS

2.01 General

- A. The components of the Mechanically Attached Mule-Hide PVC Membrane Roof System are to be products manufactured or supplied by Mule-Hide Products Co. as specified in the contract documents.
- B. Components other than those supplied or manufactured by Mule-Hide may be submitted for review and acceptance by Mule-Hide's Customer Service Department. Mule-Hide's acceptance of any other product is based on chemical compatibility and published performance data. Mule-Hide does not guarantee such products or their performance. Other components may be considered on a job-by-job basis and must be approved in writing by Mule-Hide's Customer Service Department. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the designer for acceptability for use with Mule-Hide PVC roofing products.

2.02 Roofing Membrane

The Mule-Hide Reinforced PVC Membrane is available 50 mils (.050-inch) thick, 60 mils (.060-inch) thick or 80 mils (.080-inch) thick. The Mule-Hide PVC membrane is a polyester scrim reinforced thermoplastic roofing membrane that meets and exceeds the requirements of ASTM D4434 (Type III) Standard Specification for Poly (Vinyl Chloride) Sheet Roofing. Refer to the Product Data Sheets for physical properties and additional information.

2.03 Accessory Materials

- A. PVC Cut-Edge Sealant - a liquid PVC sealing compound, shall have a consistency equal to that of "honey" at room temperature and shall be furnished in 16 oz. bottles.
- B. PVC Bonding Adhesive - a solvent-based adhesive for bonding the Mule-Hide PVC Membrane to various vertical substrates and insulation boards.
- C. Termination Caulk - a single component, non-sag elastomeric polyurethane caulk. Contact Mule-Hide for acceptable brands.
- D. Aluminum Foil Tape - a 3-mil tape with acrylic adhesive used over Mule-Hide PVC roofing system metal joints prior to a PVC flashing strip being welded over the joints.
- E. Slip sheets - Mule-Hide offers a variety of slip sheets dependent upon the particulars of an application. Some of these are the following:

1. A laminated kraft paper with fiberglass scrim reinforcement.
2. Polyester Mat Protection Material 9 oz. - needle-punched polyester fabric.
- F. PVC Membrane Cleaner - a clear liquid available in 5 gallon cans used for cleaning asphalt and dirt from membrane surface.
- G. PVC Non-Reinforced Flashing – an 80-mil PVC Flashing (unreinforced) membrane can be used to complete flashing details.
- H. PVC Coated Metal - 24-gauge galvanized steel to which is laminated 35 mils of Mule-Hide PVC Non-Reinforced Flashing (white) used for flashing and edge metal detailing.
- I. Mule-Hide All-Purpose Bar - an extruded aluminum bar 50-mils thick used to terminate adhered, reinforced membrane base flashings in certain constructions.
- J. Membrane Fasteners and Plates - Mule-Hide offers a variety of membrane fasteners and plates to meet specific job conditions and substrates:
 1. Mule-Hide Steel/Wood Deck Fasteners
 - a. Drill Point-Coated
 - b. Thread Point-Coated
 - c. Stainless Steel Drill Point
 2. Mule-Hide Concrete Fasteners - For Structural Concrete Decks
 3. TL (2 Piece) - (High Density Nylon Auger & Metal Plate) - For Cementitious Fiber Substrates (Tectum, etc.) and Lightweight Concrete or Gypsum Decks
 4. Mule-Hide Metal plates – Mule-Hide offers a variety of metal plates for membrane and insulation attachment.
- K. PVC Walkway Roll - a 90-mil (.090 inch) thick, textured, polyester reinforced PVC membrane for traffic areas.
- L. Prefabricated Details - PVC Universal (inside/outside) Corners, PVC Molded Pipe Seals in sizes to fit pipes from 1" – 6" and PVC Molded Sealant Pockets.
- M. Thermoplastic One-Part Pourable Sealer - a one-part thermoplastic sealant for use in PVC Molded Sealant Pockets.

2.04 Related Materials By Others

- A. Wood Nailers
 1. Nailers shall be #2 or better lumber and shall be pressure treated for rot resistance. Creosote and asphaltic preservatives are not acceptable.
 2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data Sheet 1-49.
 3. Wood nailers shall be installed as specified on the project drawings and shall be of a height sufficient to match the thickness of the insulation being used.

B. Vapor Retarders

1. Vapor retarders shall meet specified code and/or insurance requirements.
2. Vapor retarders shall be compatible with insulation and other accessories.
3. It is the responsibility of the architect or engineer to determine if a vapor retarder is required. However, Mule-Hide follows the NRCA guidelines that recommend a vapor retarder be considered when both of two conditions are anticipated:
 - a. The outside average January temperature is below 40° F, and
 - b. The expected interior winter relative humidity is 45 percent or greater.

C. Insulation

1. Insulation shall be installed as a protection layer over the existing substrate or to obtain a desired thermal value.
2. Insulation shall be compatible with the Mule-Hide PVC Membranes or have an acceptable slipsheet or cover board placed between the insulation and the PVC roof membrane.
3. The following insulation boards are acceptable for use in a Mule-Hide Mechanically Attached Roofing System when a standard warranty is requested:
 - a. Polyisocyanurate insulations having nonasphaltic meeting or exceeding the physical property requirements of Fed. Spec HH-I-1972 and having a minimum compressive resistance of 18 psi. Thickness minimum is 1" or greater as required by insulation manufacturer to span flutes on metal decks.
 - b. High density wood fiberboard with nonasphaltic binders. Boards with asphalt binders or have been coated with asphalt cannot be used in direct contact with the PVC membrane. Contact the insulation manufacturer for minimum thickness requirements when installing this board directly over a steel deck.
 - c. Expanded polystyrene with kraft laminated facers on both sides or with an acceptable slip sheet or cover board placed over non-faced boards. Minimum density of nonfaced boards must be 1.25 PCF and meeting ASTM C578, Type II physical properties. Contact the EPS (expanded) manufacturer for minimum thickness requirements when spanning flutes on steel decks.
 - d. Extruded polystyrene meeting ASTM C578, Types IV, VI or VII physical properties. An acceptable slipsheet or compatible cover board shall be required over the extruded polystyrene. Check with the EPS (extruded) manufacturer for minimum thickness requirements when spanning flutes on steel decks.
4. Insulation manufacturer shall provide its recommendations for use and attachment to the owner with a copy to Mule-Hide Products Co. In addition, the insulation manufacturer shall provide a copy of their specific warranty conditions if required by the building owner.

2.05 Precautions

- A. Consult Material Safety Data Sheets and container labels for specific safety instructions prior to use.
- B. Avoid breathing vapors of solvent, sealant and adhesives. Use with adequate ventilation. Avoid prolonged contact of solvents, sealants and adhesives with skin.
- C. Do not use Mule-Hide PVC roofing products near fire or flame.
- D. Do not use open flames for drying of surfaces, sealants, or adhesives.
- E. Do not use oil-based paint on PVC Coated Metal or membrane. Contact Mule-Hide's Customer Service Department for recommendations.
- F. Do not allow muriatic acid (masonry cleaner) to come in direct contact with the Mule-Hide PVC Membrane or accessory products.

PART 3 - EXECUTION

3.01 General

When installing a Mechanically Attached Mule-Hide Reinforced PVC Membrane Roofing System in cooler weather, it is recommended that liquids such as solvents, sealants, etc. be stored at temperatures between 60°F and 80°F until just prior to use in order to facilitate the installation. Liquid products, if stored outdoors, should be brought up to room temperature prior to use.

3.02 Substrate Conditions

The following general conditions apply to the substrate that will receive a Mechanically Attached Mule-Hide PVC Membrane Roofing System for both reroof and new construction:

- A. The roof deck must be structurally sound to provide proper securement for mechanical fasteners. Areas showing a loss of integrity due to corrosion, rotting, warping, concrete spalling, etc., must be repaired or replaced prior to installing the roofing system.
- B. It is imperative that the roofing contractor performs test cuts at each roof area prior to reroofing. The condition of the substrate must be suitable to receive a Mechanically Attached Mule-Hide PVC Roofing System. Wet insulation must be removed and replaced. See SPRI's guidelines for determining wet insulation.
- C. A determination must be made regarding the presence or absence of coal tar pitch within the existing roof assembly. The presence of coal tar pitch requires a separation layer of insulation a minimum of 1-1/2" thick having a minimum "R" value of 5.0 if the coal tar pitch is 10 years or older. All joints must be butted tightly together or have joints completely taped to prevent volatiles from damaging roof membrane. If the existing assembly is less than 10 years old, specific procedures must be followed. Contact Mule-Hide Customer Service Department for specific requirements.
- D. Contact Mule-Hide Customer Service Department when the substrate is exposed to excessively high humidity and/or a corrosive environment. Special fasteners (i.e., stainless steel) or details may be required.
- E. It is acceptable to install a Mechanically Attached Mule-Hide PVC Membrane Roofing System over the following deck substrates provided that an acceptable insulation, barrier/cover board or an appropriate slip sheet is installed over the substrate as needed:

1. Structural Metal Deck (24-gauge minimum) shall conform to recommendations outlined in Factory Mutual's Loss Prevention Data Sheet 1-28. Pullout tests are required on all decks less than 22 gauge. An insulation or barrier board is required to provide a smooth surface and shall be of sufficient thickness to span the steel flutes without damage from traffic.
2. Plywood should conform to Factory Mutual's requirements should tested (for uplift) assemblies be required. For non-FM assemblies, plywood minimum thickness shall be determined by local code requirements but shall not be less than 15/32" thick. Contact Mule-Hide for maximum membrane sheet widths, fastener sizes and spacing when using plywood, as requirements will change with thickness used. Insulation, barrier board or slipsheet may be required under the membrane.
3. Structural concrete and pre-cast, pre-stressed concrete (3,000 psi minimum) shall be cured and dry to industry standards. Surfaces shall be smooth and free of moisture or frost. All sharp ridges or other projections above the surface shall be removed before roofing. An insulation, barrier board or slip sheet is required under the membrane.
4. Lightweight Insulating Concrete Fill and Metal Formwork (minimum 24-gauge metal formwork) – the roof deck shall be cured and dry to the deck manufacturer's and/or industry standards and shall be smooth and free of ridges and depressions. All necessary venting as recommended by the roof deck manufacturer shall be accomplished. These decks may be acceptable to receive a Mechanically Attached Mule-Hide PVC Membrane Roofing System after pullout tests have been completed and appropriate fasteners have been selected.
5. Wood plank (1" minimum) shall conform to Factory Mutual's requirements for Class I impregnated decks. An insulation, barrier board or slip sheet is required under the membrane.
6. Cementitious Wood Fiber Decks - Certain cementitious wood fiber decks may be acceptable to receive a Mechanically Attached Mule-Hide PVC Membrane Roofing System after pullout tests have been completed and appropriate fasteners have been selected.
7. Gypsum Deck - shall be cured and dry to manufacturer's and/or industry standards. The surface of the deck shall be smooth and free from ridges and depressions. Certain gypsum decks may be acceptable to receive a Mechanically Attached Mule-Hide PVC Membrane Roofing System after pullout tests have been completed and appropriate fasteners have been selected. Insulation, slop sheet or barrier board may be required over rough surfaces or plank decks.
8. Oriented Strand Board (OSB) shall be a minimum 7/16" thick. Contact Mule-Hide for acceptable sheet sizes, fastener types and spacing when using OSB as requirements will change with thickness used. Minimum thicknesses or usage restrictions may change depending on local code requirements. Pullout tests must be performed and submitted to Mule-Hide prior to bidding the project. Minimum pullout values of 250 lbs are required. An insulation, barrier board or slip sheet is required under the membrane. Fasteners and sheet sizes shall be determined by pullout values.

3.03 Preparation of Existing Substrate

A. General

1. To prevent delays or interruptions, coordinate work with other trades or suppliers to ensure that components to be incorporated into the Mechanically Attached Mule-Hide PVC Membrane Roofing System are available as the work progresses. Examine substrates to which the roofing materials are to be applied to ensure that their condition is satisfactory for the Mule-Hide PVC Membrane Roofing System application. Do not permit voids greater than 1/4" width in the substrate.
Concrete substrates shall be cured and free of laitance and curing compounds. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges and debris. Inspect substrates and correct defects before application of roofing membrane.
2. Large blisters on existing roof systems shall be cut and patched to provide a reasonably level substrate surface.
3. Gravel over existing nailers must be totally removed prior to installing new nailers and flashings. Verify that the existing nailers are securely anchored to the roof decks.
4. When an additional thickness of insulation is being added, new nailers must be added to match the height of the new insulation. Nailers must be securely anchored to the roof deck per Section 3.05 of this specification.
5. All roof surfaces shall be free of ponded water, ice, or snow and drain properly. Drainage is the responsibility of the roofing contractor and designer/specifier.
6. Specifier and roofing contractor shall determine the condition of the existing roof deck and roofing. Areas with deteriorated decking or wet insulation or other materials shall have those affected materials removed and replaced.
7. When removing an existing roof during reroofing, remove only that amount of roofing and flashing that can be made watertight with new Mule-Hide PVC materials in a one-day period or prior to the onset of inclement weather.

3.04 Vapor Retarder Installation (where specified)

General

Specific climatic and job conditions may require the use of a vapor retarder. It is the sole responsibility of the design professional to determine the need for a vapor retarder, its type and location in the roofing system. A vapor retarder may often act as an "air barrier" which may have a positive effect in reducing internal air pressure. Air barriers should be strongly considered for buildings subject to high internal air pressures such as airplane hangars and buildings with many loading bays such as warehouse facilities. The National Roofing Contractor's Association recommends the installation of vapor retarders when interior relative humidity is 45% or greater and the outside mean average January temperature is below 40°F.

Contact Mule-Hide Customer Service Department for questions regarding compatibility with Mule-Hide products.

3.05 Wood Nailers

- A. Install nailers at the perimeter of the roof and around all roof penetrations and projections (unless otherwise shown on Mule-Hide standard details).
- B. Nailers shall be firmly anchored to the decks at a maximum 2'-0" o.c. and shall resist a pullout force of 200 lbs./linear foot in any direction. A 1/2" vent space shall be provided between adjacent lengths of nailers. Fasteners shall be installed within 6 inches of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49 or local building code requirements.
- C. Height of nailers shall match the surface level of the insulation and roof membrane.
- D. All woodwork to be reused shall resist a minimum force of 200-lbs./linear foot in any direction and shall be free of rot.

3.06 Insulation Installation

- A. Mule-Hide accepted roof insulations shall be installed in accordance with Mule-Hide specifications or the insulation manufacturer's requirements whichever is more stringent.
- B. Mule-Hide accepted roof insulations shall be secured to the roof deck in accordance with Mule-Hide's requirements utilizing Mule-Hide fasteners or approved compatible fasteners. When more than one layer of insulation is to be used, succeeding layers are to be laid staggered in relation to the previous layer of insulation and all joints shall be staggered. All layers may be fastened as a single layer with one fastener. It is not required that each layer be individually attached.
- C. All roof insulation shall be neatly cut to fit around all penetrations and projections with a maximum allowable gap of 1/4".
- D. Open joints greater than 1/4" wide shall be repaired with like insulation material.
- E. Insulation shall be tapered to provide a sump area a minimum of 36" x 36" where possible at all drains.
- F. Install no more roof insulation in one day than can be covered with the Mule-Hide PVC Membrane or when the onset of inclement weather is anticipated.
- G. Insulation installed over steel decks shall be checked so that no edges are left unsupported along the flutes. All insulations shall be of sufficient thickness and density to prevent breakage under normal roof construction or maintenance traffic.
- H. Tapered insulation shall be installed in accordance with tapered fabricator's shop drawings.

3.07 Membrane Installation

- A. General - Unroll the Mule-Hide PVC Membrane and position without stretching. Allow the membrane to relax at least 15 minutes when the temperature is above 60°F, or 30 minutes when the temperature is below 60°F, prior to installation. Inspect and remove any damaged membrane. Lap sheets a minimum of 5", for In-Lap fastening, leaving space for mechanical fasteners and plates and space for a 1-1/2" minimum weld. Membrane overlaps shall be shingled with the flow of water.

B. In-Lap Fastening

1. Perimeter and corner areas - When installing Mule-Hide PVC Roofing, install a minimum of one (1) Perimeter Sheet (1/2 width sheet) parallel with the perimeter and fastened with Mule-Hide approved fastening system at the predetermined spacing in the lap area in a line centered approximately 1-1/2" from the edge of the sheet leaving 2" of membrane outside the disc. Weld lap area continuously with a minimum weld width of 1-1/2 inches.

Perimeter areas shall be determined by one of the following methods:

- a. 1/10th the lesser plan dimension
or
- b. 4/10th the eave height

Whichever is the lesser may be used.

Corner areas are defined as the intersection of two perimeter areas.

Perimeter sheets are required to be installed in all perimeter and corner areas. Spacing of the rows of fasteners in the perimeter areas shall be reduced to 60% of the spacing of the rows of fasteners in the field sheets. Spacing of the fasteners in the seam shall remain the same distance apart as the spacing of the fasteners in the seams in the field sheets. Spacing of the rows of fasteners in the corners shall be reduced to 40% of the spacing of the rows of fasteners in the field sheets. Spacing of the fasteners in the seams shall remain the same distance apart as the spacing of the fasteners in the seams in the field sheets.

Fastener shall be supplied by Mule-Hide and shall be installed according to fastener manufacturer's instructions and using the fastener manufacturer's recommended fastening tools.

When installing Mule-Hide PVC Membranes using either Mule-Hide's PVC Coated Metal Flashing or PVC Membrane Flashing, the first perimeter sheet shall be a half width sheet. Subsequent sheets may be either Perimeter sheets (half width sheets) or full width sheets as required. If the project requires FM compliance, contact Mule-Hide (prior to bidding the project) to review sheet layouts, sizes and enhancements to address the perimeter and corner areas.

Note: For FM 1-90 or greater compliance, where the perimeter sheets are wider than 3', Perimeter sheets cannot run parallel with the direction of the flutes on steel decks. Full width field sheets are run perpendicular to the edge of the roof (or base of parapet wall) and additional row of fasteners installed running parallel and centered between the field seams.

2. Field Areas

- a. Membrane should run perpendicular to the direction of steel deck flutes and orientation of wood decks.
- b. All membrane overlaps shall be installed to facilitate the flow of water.
- c. All membrane sheets are to be overlapped a minimum of 5" to provide space for fastener and disc placement and for a continuous 1-1/2" wide weld.

- C. The roofing contractor shall check all welded seams for continuity and integrity using a rounded screwdriver or other suitable blunt object. The contractor should perform several sample test seams each day. Prior to welding field seams, the contractor shall, using scrap material, run at least two test seams, each a minimum of 2' long. Each test seam shall be used to determine adequate seam strength and to ensure the equipment has warmed up and is operating properly. This should be done each time the equipment is turned on after a cool down period.

3.08 Welding of Lap Areas

A. General

- 1. Roofing membrane field seams are to be hot air welded.
- 2. All surfaces to be welded shall be clean and dry.

B. Hot-Air Welding

- 1. Machines for hot air welding are available from several different sources. Each manufacturer's instructions for use shall be followed, as well as all local codes regarding electric grounding, supply and other related functions. Since most automatic welding machines require 218 to 230 volts, the use of a portable generator on the roof is recommended for greater flexibility. **Mule-Hide requires the use of automatic welding machines for all field sheet seaming. Only those areas that cannot be completed with an automatic welder may be welded with a hand welder. The seam width must be as wide as one created with an automatic welder (approximately 1-1/2" wide).**
- 2. Hand-held welding equipment is also available. Hand welders (guns) are typically only used to weld flashings and areas where an automatic welder cannot be used. After the preheated nozzle tip is applied in the overlap area and the material starts to flow, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle tip. Angle the hot-air tool so that the flowing air faces the roller. The temperature of the hot-air tool shall be adjusted so that a minimum of smoke is developed and material from the bottom of the sheet begins to soften and flow from the seam. Seam strength may be tested when cool. For best results, testing seams 8 hours after hot air welding is recommended.

C. Quality Control of Seams

- 1. After seaming, the seams are checked for integrity with a blunt-ended probe. Any openings or "fishmouths" are to be repaired with a hand-held hot-air tool fitted with a narrow nozzle tip and with a roller.
- 2. Each day the contractor shall attempt to pull apart several sections of welded seams to test the quality of the welds. Should the welds be deficient, a more thorough examination of the work performed must be carried out and necessary repairs made. Mule-Hide's PVC Cut Edge Sealant is used to seal the membrane edges where reinforcing fabric is cut and exposed.

3.09 Flashing Installation

A. PVC Coated Metal Flashing

- 1. PVC Coated Metal Flashing shall be installed in accordance with Mule-Hide Roofing Systems' standard details.

2. Complete all metalwork concurrently with roofing and flashings so that a watertight condition exists daily.
3. PVC Coated Metal may be used at all peaks, valleys and slope intersections where the net change in slope exceeds 1-1/2" in 12". In some cases reinforced membrane may be sufficient for ridges but should be fastened securely at all transition areas. Contact the Mule-Hide Customer Service Department for specific recommendations.
4. PVC Coated Metal shall be installed to provide adequate resistance to bending and to allow for normal thermal expansion and contraction.
5. All metal joints are to be watertight and staggered over nailer joints to prevent joints in nailers and joints in metal from lining up.
6. Base flashings shall extend a minimum of 8" up vertical surfaces where possible.
7. All metal flashings and terminations shall be securely fastened in the plane of the roof deck with fasteners recommended by Mule-Hide.
8. Fasteners used to secure flashings to wood nailers shall be stainless steel, galvanized metal or other corrosion-resistant material, with a head diameter of not less than 3/8", and with fastener penetration into the wood nailer of at least 3/4".
9. Mule-Hide recommends the use of PVC Coated Metal for scuppers and metal overflows.
10. All Mule-Hide PVC Coated Metal shall be fabricated to form hemmed edges to prevent sharp metal edges from cutting the membrane, except when used in conjunction with wood nailers.

B. PVC Membrane Flashings

1. All membrane flashings are to be installed concurrently with the roof membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Mule-Hide Warranty Department. Should any water penetrate the new roofing because of incomplete flashings, the affected areas shall be removed and replaced at the contractor's expense.
2. All PVC Membrane flashings shall be fully adhered using Mule-Hide's PVC Bonding Adhesive. The following conditions must be met:
 - a. All surfaces to be fully adhered should be compatible, dry and smooth with no excessive surface roughness. If an existing asphalt surface is present, a 1/2" minimum plywood, 9 oz. polyester felt, acceptable insulation board or 26-gauge minimum galvanized metal barrier must be placed over the asphaltic surface.
 - b. After the proper surface has been prepared, Mule-Hide's PVC Bonding Adhesive shall be applied using a minimum 1/2" nap paint roller at a rate of approximately 60 square feet per gallon of "finished surface area" depending on the type of substrate. Apply adhesive in smooth even coats, avoiding globs, puddles or other types of irregularities.

- c. Mule-Hide PVC Membrane used as a flashing shall be cut to a workable length. Adhesive should be applied to the area of substrate to be flashed and to the back of the PVC membrane at a rate of approximately 120 square feet per gallon. **Coverage rates will vary depending on substrate and environmental conditions.** Let adhesive dry sufficiently to be tacky but not produce strings when touched with a dry, clean finger.

Note: When the PVC membrane is mated to the substrate this will provide an approximate "finished coverage rate of 60 square feet per gallon".

- d. Carefully roll the membrane onto the coated substrate. Avoid wrinkling membrane when applying to substrate. The amount of adhesive that can be successfully applied to the membrane will vary depending on ambient temperatures, humidity and manpower. After mating membrane to the substrate, carefully roll the membrane with a 2" wide rubber hand roller to promote maximum positive contact between the membrane and the substrate. Overlap all adjacent flashing sheets a minimum of 2". The PVC Membrane flashings shall extend a minimum of 6" onto the field sheet. There shall be a minimum 1-1/2" hot-air weld in front of the fastener plates. All side laps are to overlap a minimum of 2" and welded.
- e. **Do not apply PVC Bonding Adhesive to seam areas that will be hot air welded together.**

- 3. All flashings shall extend a minimum of 8" above roof membrane level where possible unless previously accepted by the owner or his representative and the Mule-Hide Warranty Department.
- 4. All flashings shall be hot air welded at their connections with the roofing membrane and other PVC flashings.
- 5. Apply PVC Cut-Edge Sealant at all welded edges where the membrane has been cut and scrim is exposed.
- 6. All flashings shall be properly terminated in compliance with Mule-Hide's published Standard Details.

3.10 Walkway Installation

Walkways must be provided in areas where routine rooftop maintenance occurs and in areas where regular rooftop traffic is expected.

A. PVC Walkway Roll Installation

- 1. Install Mule-Hide PVC Walkway Roll material over clean, dry surfaces. Layout areas where the PVC Walkway Roll is to be installed with most of the material being oriented so that it is placed between field seams with each adjacent and abutting section gapped a minimum of 6".
- 2. Heat weld the perimeter of the properly positioned PVC Walkway Roll. Check seams for any voids or inconsistencies that might prevent watertightness.
- 3. Apply PVC Cut-Edge Sealant at all welded edges.

B. Precast Pavers

1. Install precast paver systems acceptable to Mule-Hide over one layer of Polyester Mat Protection Material or an acceptable slip sheet.
2. A sheet of PVC membrane may be used as a protection layer under the precast pavers.
3. Set precast pavers so that they do not cover field seams.

3.11 Temporary Tie-ins

- A. Install temporary cutoffs around incomplete edges of roofing assembly at the end of each day's work and when work must be postponed due to inclement weather. Straighten the insulation line using pieces of insulation loosely laid, and seal the Mule-Hide sheet membrane to the deck or existing membrane. Use a heavy application of roof cement or hot asphalt at least six inches in width overlayed with an embedded reinforcement. Remove the temporary seals completely when work resumes, cutting out the contaminated membrane. Remove all sealant, contaminated membrane, insulation fillers, etc. from the work area and properly dispose off-site.
- B. Other methods of temporary tie-ins may be used. Mule-Hide does not recommend a specific method. This is the responsibility of the roofing contractor.

End of Section

This specification represents the applicable information available at the time of its publication. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide or check the Mule-Hide website (www.mulehide.com) for the latest updates regarding changes or modifications to this specification.



MULE-HIDE PRODUCTS CO., INC

Mechanically Attached Roofing System

SUMMARY SPECIFICATION

PVC Systems

This Summary Specification is a brief overview of Mule-Hide Product's specification and requirements for a Mechanically Attached Mule-Hide Reinforced PVC Roofing System and is intended for use as a submittal in a bid package. Specifier's and Mule-Hide Warranty Eligible Contractors must comply with Mule-Hide Product's specifications and requirements prior to design or bid.

Part 1 General

1.01 Description

The Mule-Hide Mechanically Attached Reinforced PVC Roofing System utilizes a (max) 81" wide, scrim reinforced Mule-Hide PVC membrane in thickness of 50, 60, or 80 mil. Approved insulation is attached to the substrate with either Mule-Hide Insulation fasteners and plates or an approved insulation adhesive, and the PVC membrane is attached to the substrate with System Fasteners and Plates. Adjoining sheets are overlapped approximately 5" and seamed together with a min 1.5" wide heat weld.

1.02 Quality Assurance

- A. The roofing system must be installed by a Mule-Hide Warranty Eligible Contractor in accordance with installation guidelines and detail drawings as approved by Mule-Hide. Prior written approval from the Mule-Hide Warranty Department is required for all deviations from Mule-Hide's published specifications and details.
- B. Projects requesting a Labor and Material Warranty will be inspected by a Mule-Hide Representative to verify that Mule-Hide's installation and material requirements have been met.
- C. Mule-Hide roofing systems offer a variety of Underwriters Laboratories (UL), Factory Mutual (FM) and other ratings. Consult the appropriate approval guides and Mule-Hide Products for specific code approvals.

1.03 Submittals

- A. To ensure compliance with Mule-Hide's warranty requirements contact the Mule-Hide Warranty Department if any of the following conditions exist.
 - 1. Specified wind speed warranty greater than 55 MPH.
 - 2. Building height > 100'
 - 3. Projects located in coastal or high wind zones.
 - 4. Pressurized buildings
 - 5. Cold Storage or Freezer Buildings

6. Membrane exposed to chemicals

- B. Submit a completed Warranty Application form to Mule-Hide prior to bidding. Also include fastener pullout testing results as required for non-standard substrates.
- C. All projects must have a Mule-Hide warranty application number assigned prior to inspection.

1.04 Product Delivery, Storage, and Handling

- A. Deliver materials to the job site in original, unopened containers, with the manufacturer's name, brand name and installation instructions.
- B. Store all materials in a dry, clean area protected from the elements, as per manufacturer's recommendations.

1.05 Job Conditions

- A. All existing wet or damaged roofing materials must be removed and replaced with new materials.
- B. All existing phenolic insulation and sprayed-in-place urethane roofs must be removed.
- C. The specifier must determine the use and placement of vapor retarders. Consult ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) publications.
- E. Coordinate work between all trades to avoid traffic over completed sections of roofing.

1.06 Warranty.

Fees are required for all Labor and Material (System) Warranties. System Warranties must be obtained through a Mule-Hide Warranty Eligible Applicator. All projects requesting a System Warranty must be inspected by a Mule-Hide Representative. Components of the roofing system must be supplied by Mule-Hide. Warranty covers only Mule-Hide supplied materials. Sample warranties are available upon request. Contact Mule-Hide Warranty Department for warranty requirements.

Part 2 Products

2.01 General

The components of this roofing system are to be manufactured, supplied, or approved in writing by Mule-Hide Products.

2.02 Membrane

Mule-Hide White reinforced 50, 60, or 80-mil thick Polyvinyl Chloride (PVC) membrane is used for this system. The membrane is available in 40.5" and 81" widths and in lengths of up to 100' (White membrane). Refer to our Product Data Sheet for physical properties and other information.

2.03 Related Materials

Mule-Hide products include: Reinforced and Non-Reinforced Flashings, Bonding Adhesives, PVC Cut-Edge Sealant, PVC Coated Metal, Membrane fasteners and discs, Thermoplastic One-Part Pourable Sealer, All-Purpose Bar, PVC Walkway Roll, Universal Single Ply Sealant, and other components.

Part 3 Execution

3.01 General

- A. Work should begin at the highest point of the roof level and proceed to the lowest point. Work should be completed on a daily bases including flashings, terminations, and daily seals.
- B. Prepare the existing roof deck or substrate according to Mule-Hide design guides and full-system specifications prior to applying the new roofing system.

3.02 Roof Deck Criteria

- A. A proper substrate shall be provided by the building owner. The structure shall be able to withstand normal construction loads and live loads.
- B. Substrate must allow for drainage so that all water is removed within 48 hours after a rain.

3.03 Substrate Preparation

- A. Re-cover projects - All wet or damaged materials must be removed and replaced with new materials.
- B. Substrate must be clean, level, and smooth so that the insulation lays flat. Fresh applications of bitumen based roof cement must be removed or covered.

3.04 Installation

Refer to the applicable Product Data Sheets and Material Safety Data Sheets for cautions and warnings.

A. Insulation Attachment

Attach roof insulation with Manufacturer supplied roofing fasteners and plates. Attachment rates will vary depending upon type

and size of insulation board installed. Consult Mule-Hide Warranty Department for attachment requirements.

B. Membrane Installation and Hot Air Welding

Place membrane over substrate with minimum 5" overlap at lap seams and positioned so that laps will shed water. Allow membrane to relax. After membrane has relaxed, fold membrane back to expose underlying sheet. Install System Fasteners and Plates along seam edge. Sheet width, as well as spacing of Fasteners and plates will vary depending upon wind uplift requirements. Fold sheet back and hot-air weld seams with automatic welder to achieve a min 1.5" wide heat weld. Consult Mule-Hide Warranty Department for attachment requirements.

C. Additional Membrane Securement

The membrane must be secured at the perimeter of each individual roof area, projection, and any angle change that exceeds 2" per lineal foot. Consult Mule-Hide's published detail drawings.

D. Membrane Flashing

All existing base flashings are to be removed. Install new membrane flashings as per manufactures details and guidelines. Flashings must be terminated along top edge as per appropriate Mule-Hide detail.

E. Other Related Work

1. Walkways should be provided in areas where regular rooftop traffic is expected. Walkways are considered a maintenance item and are excluded from the Mule-Hide warranty.
2. Mule-Hide PVC Walkway Rolls are to be installed over clean, dry surfaces, with a minimum 6" spacing over field seams. Hot air weld the perimeter of the Walkway Roll to the field membrane.
3. Concrete pavers may be used if installed over one layer of HP Protection Mat.
4. Copings, counter flashing and other metal work shall be fastened to resist wind uplift and prevent buckling. Metal should be sealed to prevent moisture infiltration.

This summary specification represents the applicable information available at time of publication. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide Products or visit our website at www.mulehide.com for the latest updates, changes, or modifications to this summary specification.



MULE-HIDE PRODUCTS CO., INC

RhinoBond Roofing System

SUMMARY SPECIFICATION

PVC Systems

This Summary Specification is a brief overview of Mule-Hide Product's specification and requirements for a RhinoBond Mule-Hide Reinforced PVC Roofing System and is intended for use as a submittal in a bid package. Specifier's and Mule-Hide Warranty Eligible Contractors must comply with Mule-Hide Product's specifications and requirements prior to design or bid.

Part 1 General

1.01 Description

The Mule-Hide RhinoBond Reinforced PVC Roofing System utilizes a (max) 10' wide, scrim reinforced Mule-Hide PVC membrane in thickness of 50, 60, or 80 mil. Approved insulation is attached to the substrate with either Mule-Hide Insulation fasteners and plates or an approved insulation adhesive. RhinoBond Plates and fasteners are then installed over the roof insulation and attached to the roof deck. The PVC membrane is loosely laid over the prepared substrate. Adjoining sheets are overlapped approximately 2" and seamed together with a min 1.5" wide heat weld. The PVC membrane is then induction welded to the RhinoBond Plates using a RhinoBond Induction Welder.

1.02 Quality Assurance

- A. The roofing system must be installed by a Mule-Hide Warranty Eligible Contractor in accordance with installation guidelines and detail drawings as approved by Mule-Hide. Prior written approval from the Mule-Hide Warranty Department is required for all deviations from Mule-Hide's published specifications and details.
- B. Projects requesting a Labor and Material Warranty will be inspected by a Mule-Hide Representative to verify that Mule-Hide's installation and material requirements have been met.
- C. Mule-Hide roofing systems offer a variety of Underwriters Laboratories (UL), Factory Mutual (FM) and other ratings. Consult the appropriate approval guides and Mule-Hide Products for specific code approvals.

1.03 Submittals

- A. To ensure compliance with Mule-Hide's warranty requirements contact the Mule-Hide Warranty Department if any of the following conditions exist.
 - 1. Specified wind speed warranty greater than 55 MPH.
 - 2. Building height > 50'
 - 3. Projects located in coastal or high wind zones.
 - 4. Pressurized buildings
 - 5. Cold Storage or Freezer Buildings
 - 6. Membrane exposed to chemicals

- B. Submit a completed Warranty Application form to Mule-Hide prior to bidding. Also include fastener pullout testing results as required for non-standard substrates.
- C. All projects must have a Mule-Hide warranty application number assigned prior to inspection.

1.04 Product Delivery, Storage, and Handling

- A. Deliver materials to the job site in original, unopened containers, with the manufacturer's name, brand name and installation instructions.
- B. Store all materials in a dry, clean area protected from the elements, as per manufacturer's recommendations.

1.05 Job Conditions

- A. All existing wet or damaged roofing materials must be removed and replaced with new materials.
- B. All existing phenolic insulation and sprayed-in-place urethane roofs must be removed.
- C. The specifier must determine the use and placement of vapor retarders. Consult ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) publications.
- E. Coordinate work between all trades to avoid traffic over completed sections of roofing.

1.06 Warranty.

Fees are required for all Labor and Material (System) Warranties. System Warranties must be obtained through a Mule-Hide Warranty Eligible Applicator. All projects requesting a System Warranty must be inspected by a Mule-Hide Representative. Components of the roofing system must be supplied by Mule-Hide. Warranty covers only Mule-Hide supplied materials. Sample warranties are available upon request. Contact Mule-Hide Warranty Department for warranty requirements.

Part 2 Products

2.01 General

The components of this roofing system are to be manufactured, supplied, or approved in writing by Mule-Hide Products.

2.02 Membrane

Mule-Hide White reinforced 50, 60, or 80-mil thick Polyvinyl Chloride (PVC) membrane is used for this system. The membrane is available in widths up to 10' and in lengths of up to 100' (White membrane). Refer to our Product Data Sheet for physical properties and other information.

2.03 Related Materials

Mule-Hide products include: RhinoBond Plates, Reinforced and Non-Reinforced Flashings, Bonding Adhesives, PVC Cut-Edge Sealant, PVC Coated Metal, Membrane fasteners and discs, Thermoplastic One-Part Pourable Sealer, All-Purpose Bar, PVC Walkway Roll, Universal Single Ply Sealant, and other components.

Part 3 Execution

3.01 General

- A. Work should begin at the highest point of the roof level and proceed to the lowest point. Work should be completed on a daily bases including flashings, terminations, and daily seals.
- B. Prepare the existing roof deck or substrate according to Mule-Hide design guides and full-system specifications prior to applying the new roofing system.

3.02 Roof Deck Criteria

- A. A proper substrate shall be provided by the building owner. The structure shall be able to withstand normal construction loads and live loads.
- B. Substrate must allow for drainage so that all water is removed within 48 hours after a rain.

3.03 Substrate Preparation

- A. Re-cover projects - All wet or damaged materials must be removed and replaced with new materials.
- B. Substrate must be clean, level, and smooth so that the insulation lays flat. Fresh applications of bitumen based roof cement must be removed or covered.

3.04 Installation

Refer to the applicable Product Data Sheets and Material Safety Data Sheets for cautions and warnings.

A. Insulation Attachment

Attach roof insulation with Manufacturer supplied roofing fasteners and plates or approved adhesive. Mule-Hide fasteners and plates are installed at min rate if 1 fastener per 5.33 sq. ft.

B. RhinoBond Plates

Position RhinoBond Plates in rows (5' or 10') over substrate spaced max 12" oc as determined by project requirements. Consult Mule-Hide Technical Department for attachment requirements.

C. Membrane Installation and Hot Air Welding

Place membrane over substrate with minimum 2" overlap at lap seams and positioned so that laps will shed water. Allow membrane to relax. After membrane has relaxed, hot-air weld seams with automatic welder to achieve a min 1.5" wide heat weld. Weld PVC membrane to RhinoBond Plates with RhinoBond Induction Welder.

D. Additional Membrane Securement

The membrane must be secured at the perimeter of each individual roof area, projection, and any angle change that exceeds 2" per lineal foot. Consult Mule-Hide's published detail drawings.

E. Membrane Flashing

All existing base flashings are to be removed. Install new membrane flashings as per manufactures details and guidelines. Flashings must be terminated along top edge as per appropriate Mule-Hide detail.

E. Other Related Work

- 1. Walkways should be provided in areas where regular rooftop traffic is expected. Walkways are considered a maintenance item and are excluded from the Mule-Hide warranty.
- 2. Mule-Hide PVC Walkway Rolls are to be installed over clean, dry surfaces, with a minimum 6" spacing over field seams. Hot-air weld the perimeter of the Walkway Roll to the field membrane.
- 3. Concrete pavers may be used if installed over one layer of HP Protection Mat.
- 4. Copings, counter flashing and other metal work shall be fastened to resist wind uplift and prevent buckling. Metal should be sealed to prevent moisture infiltration.

This summary specification represents the applicable information available at time of publication. Mule-Hide reserves the right to change this information at any time. Contact Mule-Hide Products or visit our website at www.mulehide.com for the latest updates, changes, or modifications to this summary specification.

SECTION 5

MULE-HIDE PRODUCTS CO., INC. 20 YEAR WARRANTY SPECIFICATION ENHANCEMENTS

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20 Yr. Premium Mechanically Attached PVC Warranty System Enhancements

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

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MULE-HIDE PRODUCTS CO., INC

20 - Year Warranty Design Enhancements For Fully Adhered PVC

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. This criteria is limited to buildings of 100' in height or less.

Membrane / Adhesive Type / Other

1. Minimum 60-mil Mule-Hide Reinforced PVC or minimum 50-mil PVC KEE HP.
2. Mule-Hide Low-VOC PVC Bonding Adhesive (solvent based) or HydroBOND water-based PVC bonding adhesive.
3. All 'T' joints overlaid with PVC Non-Reinforced Flashing membrane and heat-welded on all sides.
4. All field seams must be heat welded.

Deck Type / Typical Fastener - Refer to Specifications for minimum pullout criteria.

Standard Roof Deck (4)	Insulation Fastener (1)	Insulation Plate
Steel (22 gauge or heavier)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Structural Concrete (3,000 psi)	Mule-Hide HD-14 (2)	Mule-Hide 3" Metal Stress Plates
Plywood (Min 15/32" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Wood Plank (Min 1-1/2" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Fibrous Cement & Gypsum (2)(3)	TL Fasteners by Tru-Fast	3" Galvalume Insulation Plate by Tru-Fast

Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Pullout testing is required, must exceed 360 pounds with TL Fastener.
4. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed

Insulation/Overlayment - Mechanical Attachment into Standard Roof Decks*

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
HD Fiberboard - Min 1/2" - Installed over Approved Insulation	16	24	32
Dens Deck Prime - Min 1/4" - 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. Thicknesses stated are for single layer of material.
2. Consult Specification Manual for list of approved insulations for use under overlayment.
3. Polyisocyanurate less than 1.5" in thickness requires approved overlayment.

MULE-HIDE PRODUCTS CO., INC.
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4. Insulation fastening density shall not be less than 1 per 2 square feet on fibrous cement and gypsum decks.
5. Certain codes may require additional fastening requirements.
6. Factory Mutual defines perimeter areas as the lesser of 0.1 times the building width or 0.4 times the building height. Corners areas are the intersections of the perimeter areas.

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Warranty Application must include a copy of the manufacturers letter of acceptance for the project, including application rates for that specific project. Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be either pre-manufactured by Metal-Era, or constructed with PVC Coated Metal as per approved details.
2. Mule-Hide All Purpose Bar is required when a compression bar termination is specified and must be utilized in conjunction with counterflashing by others.
3. Certain Metal accessories by others may be permitted upon Mule-Hide acceptance prior to construction.
4. The Metal-Era Anchor-Tite System must be used when the sheet metal is to be included under the warranty.
5. Conventional metal edge details that require flanges to be 'stripped in' must be construction from PVC coated sheet metal and stripped in with PVC membrane. All seams are to be heat-welded.
6. All metal scuppers must have welded (soldered) seams.

Other Requirements

1. No 'As-Built' projects. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Florida NOA, Factory Mutual (FM) or Underwriters Laboratory (UL).

Warranty Wind Speed (Maximum Peak Gusts)

Wind speed coverage for a specific project will vary depending on a variety of factors, including the deck type, fastening density, location, height of the roof, and edge details.

Contact Mule-Hide Technical Department for specific requirements.

NOTES:

1. This is a summary of the Mule-Hide PVC Fully Adhered System Specification, as written in the Mule-Hide PVC Specification Manual. Refer to Mule-Hide PVC Specification Manual for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.



MULE-HIDE PRODUCTS CO., INC **20-Year Warranty Design Enhancements** **For Mechanically Attached PVC** **Roofing System Specification**

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. This criteria is limited to buildings of 50' in height and does not include buildings within 20 miles of hurricane coastlines.

Membrane / Other

1. Minimum 60-mil Mule-Hide Reinforced PVC or minimum 50-mil PVC KEE HP.
2. All 'T' joints overlaid with PVC Non-Reinforced Flashing Membrane with heat welded seams.
3. All field seams must be heat welded.

Deck Type / Typical Fastener - Refer to Mule-Hide Specifications for minimum pullout criteria.

Standard Roof Deck (3)	Max Sheet Width	Max Fastener Spacing	Fastener (1)	Seam Plate (1)
Steel - Min 22 ga.	10'	12" OC	HD-14	2.4"
Wood Plank - Min 1" or Plywood - Min 23/32"	10'	12" OC	HD-14	2.4"
Plywood - Min 15/32"	81"	6" OC	HD-14	2.4"
Structural Concrete - Min 3,000 psi	10'	12" OC	HD-14 (2)	2.4"

Notes:

1. Heavier fasteners and/or plates may be required for Factory Mutual, code, or wind warranties.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed and verification by a Independent 3rd party moisture scan

Insulation/Overlayment - Mechanical Attachment*

Insulation Type or Overlay	Board Size	
	4' x 4'	4' x 8'
Approved Polyisocyanurate - Min 1.5" thick (top layer) - Min 20 psi	4	6
HD Fiberboard - Min 1/2" thick- Installed over Approved Insulation	4	8
Dens Deck Prime - Min 1/4" thick - Installed over Approved Insulation	4	8

***NOTES:**

1. Gypsum board or suitable base sheet may be approved as needed to meet required fire code.
2. Consult Specification Manual for list of approved insulations for use under overlayment.
3. Contact Mule-Hide Technical Department for Polyisocyanurate less than 1.5" in thickness.
4. Certain codes may require additional fastening requirements.

MULE-HIDE PRODUCTS CO., INC
20 - Year Warranty Design Enhancements
For Mechanically Attached PVC
Roofing System Specification

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be either pre-manufactured by Metal-Era, or constructed with PVC Coated Metal as per approved details.
2. Mule-Hide All Purpose Bar is required when a compression bar termination is specified and must be utilized in conjunction with counterflashing by others.
3. Certain Metal accessories by others may be permitted upon Mule-Hide acceptance prior to construction.
4. The Metal-Era Anchor-Tite System must be used when the sheet metal is to be included under the warranty.
5. Conventional metal edge details that require flanges to be 'stripped in' must be construction from PVC coated sheet metal and stripped in with PVC membrane. All seams are to be heat-welded.
6. All metal scuppers must have welded (soldered) seams.

Other Requirements

1. No 'As-Built'. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Factory Mutual (FM) or Underwriters Laboratory (UL).

Warranty Wind Speed (Maximum Peak Gusts)

Wind speed coverage for a specific project will vary depending on the deck type, fastening density, location and height of the roof. Certain codes may require additional fastening requirements.

Contact Mule-Hide Technical Department for specific requirements such as sheet width and fastener spacing.

NOTES:

1. These are enhancements to the Mule-Hide PVC Mechanically Attached System Specification, as written in the Mule-Hide PVC Specification Manual. Refer to the Mule-Hide PVC Specification Manual for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.



MULE-HIDE PRODUCTS CO., INC

20 - Year Premium Warranty Design Enhancements For Fully Adhered PVC

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. This criteria is limited to buildings of 100' in height or less.

Membrane / Adhesive Type / Other

1. Minimum 60-mil Mule-Hide Reinforced PVC or minimum 50-mil PVC KEE HP.
2. Mule-Hide Low-VOC PVC Bonding Adhesive (solvent based) or HydroBOND water-based PVC bonding adhesive.
3. All 'T' joints overlaid with PVC Non-Reinforced Flashing membrane and heat-welded on all sides.
4. All field seams must be heat welded.

Deck Type / Typical Fastener - Refer to Specifications for minimum pullout criteria.

Standard Roof Deck (4)	Insulation Fastener (1)	Insulation Plate
Steel (22 gauge or heavier)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Structural Concrete (3,000 psi)	Mule-Hide HD-14 (2)	Mule-Hide 3" Metal Stress Plates
Plywood (Min 15/32" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Wood Plank (Min 1-1/2" thick)	Mule-Hide DP #12	Mule-Hide 3" Metal Stress Plates
Fibrous Cement & Gypsum (2)(3)	TL Fasteners by Tru-Fast	3" Galvalume Insulation Plate by Tru-Fast

Notes:

1. Heavier gauge fasteners may be required to meet Factory Mutual or code requirements.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Pullout testing is required, must exceed 360 pounds with TL Fastener.
4. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed

Insulation/Overlayment - Mechanical Attachment into Standard Roof Decks*

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

*NOTES:

1. Thicknesses stated are for single layer of material.
2. Premium Warranty requires the use of Mule-Hide Polyisocyanurate insulation.
3. Polyisocyanurate less than 1.5" in thickness requires approved overlayment.

MULE-HIDE PRODUCTS CO., INC.

20 - Year Premium Warranty Design Enhancements For Fully Adhered PVC

4. Insulation fastening density shall not be less than 1 per 2 square feet on fibrous cement and gypsum decks.
5. Certain codes may require additional fastening requirements.
6. Factory Mutual defines perimeter areas as the lesser of 0.1 times the building width or 0.4 times the building height. Corners areas are the intersections of the perimeter areas.

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Warranty Application must include a copy of the manufacturers letter of acceptance for the project, including application rates for that specific project. Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be either pre-manufactured by Metal-Era, or constructed with PVC Coated Metal as per approved details.
2. Mule-Hide All Purpose Bar is required when a compression bar termination is specified and must be utilized in conjunction with counterflashing by others.
3. Certain Metal accessories by others may be permitted upon Mule-Hide acceptance prior to construction.
4. The Metal-Era Anchor-Tite System must be used when the sheet metal is to be included under the warranty.
5. Conventional metal edge details that require flanges to be 'stripped in' must be construction from PVC coated sheet metal and stripped in with PVC membrane. All seams are to be heat-welded.
6. All metal scuppers must have welded (soldered) seams.

Other Requirements

1. No 'As-Built' projects. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Florida NOA, Factory Mutual (FM) or Underwriters Laboratory (UL).

Warranty Wind Speed (Maximum Peak Gusts)

Wind speed coverage for a specific project will vary depending on a variety of factors, including the deck type, fastening density, location, height of the roof, and edge details.

Contact Mule-Hide Technical Department for specific requirements.

NOTES:

1. This is a summary of the Mule-Hide PVC Fully Adhered System Specification, as written in the Mule-Hide PVC Specification Manual. Refer to Mule-Hide PVC Specification Manual for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.



MULE-HIDE PRODUCTS CO., INC
20-Year Premium Warranty Design Enhancements
For Mechanically Attached PVC
Roofing System Specification

PVC Systems

All products specified for this roofing system must be manufactured or approved by Mule-Hide Products Co. This criteria is limited to buildings of 50' in height and does not include buildings within 20 miles of hurricane coastlines.

Membrane / Other

1. Minimum 60-mil Mule-Hide Reinforced PVC or minimum 50-mil PVC KEE HP.
2. All 'T' joints overlaid with PVC Non-Reinforced Flashing Membrane with heat welded seams.
3. All field seams must be heat welded.

Deck Type / Typical Fastener - Refer to Mule-Hide Specifications for minimum pullout criteria.

	Max Sheet Width	Max Fastener Spacing	Fastener (1)	Seam Plate (1)
Standard Roof Deck (3)				
Steel - Min 22 ga.	10'	12" OC	HD-14	2.4"
Wood Plank - Min 1" or Plywood - Min 23/32"	10'	12" OC	HD-14	2.4"
Plywood - Min 15/32"	81"	6" OC	HD-14	2.4"
Structural Concrete - Min 3,000 psi	10'	12" OC	HD-14 (2)	2.4"

Notes:

1. Heavier fasteners and/or plates may be required for Factory Mutual, code, or wind warranties.
2. Other fasteners may be considered, submit request to Mule-Hide prior to bidding.
3. Contact Mule-Hide Technical Department for other roof decks or non-standard roof decks.

Slope Requirement/Drainage

1. Positive drainage required (no ponding 48 hours after a rain)
2. 1/4" per horizontal foot preferred
3. 1/8" slope with sufficient number of drains and crickets/saddles may be considered

Construction Type

1. New Construction
2. Reroof - with full tear-off
3. Recover - all wet materials removed and verification by a Independent 3rd party moisture scan

Insulation/Overlayment - Mechanical Attachment*

Insulation Type or Overlay	Board Size	
	4' x 4'	4' x 8'
Mule-Hide Polyisocyanurate - Min 1.5" thick (top layer) - Min 20 psi	4	6
HD Fiberboard - Min 1/2" thick- Installed over Mule-Hide Polyisocyanurate	4	8
Dens Deck Prime - Min 1/4" thick - Installed over Mule-Hide Polyisocyanurate	4	8

***NOTES:**

1. Gypsum board or suitable base sheet may be approved as needed to meet required fire code.
2. Premium Warranty requires the use of Mule-Hide Polyisocyanurate insulation.
3. Contact Mule-Hide Technical Department for Polyisocyanurate less than 1.5" in thickness.
4. Certain codes may require additional fastening requirements.

MULE-HIDE PRODUCTS CO., INC
20 - Year Premium Warranty Design Enhancements
For Mechanically Attached PVC
Roofing System Specification

Insulation/Overlayment - Adhesive Attachment

1. Insta-Stik by Dow Chemical Company - Other Manufactures may be considered, submit prior to bidding.

Metal Accessories

1. All Metal copings, gravel stops, fascia, and drip aprons must be either pre-manufactured by Metal-Era, or constructed with PVC Coated Metal as per approved details.
2. Mule-Hide All Purpose Bar is required when a compression bar termination is specified and must be utilized in conjunction with counterflashing by others.
3. Certain Metal accessories by others may be permitted upon Mule-Hide acceptance prior to construction.
4. The Metal-Era Anchor-Tite System must be used when the sheet metal is to be included under the warranty.
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Other Requirements

1. No 'As-Built'. All projects are to be reviewed and approved prior to installation.
2. Shop drawings must include all pertinent details.
3. Contact Mule-Hide Technical Department for specific code requirements such as Factory Mutual (FM) or Underwriters Laboratory (UL).

Warranty Wind Speed (Maximum Peak Gusts)

Wind speed coverage for a specific project will vary depending on the deck type, fastening density, location and height of the roof. Certain codes may require additional fastening requirements.

Contact Mule-Hide Technical Department for specific requirements such as sheet width and fastener spacing.

NOTES:

1. These are enhancements to the Mule-Hide PVC Mechanically Attached System Specification, as written in the Mule-Hide PVC Specification Manual. Refer to the Mule-Hide PVC Specification Manual for complete specification and details.
2. The information contained in this document is general information. Requirements may be different for each specific job based on the conditions of each building. Always contact Mule-Hide Technical Department to review the specific job conditions prior to bidding the project.

SECTION 6

MULE-HIDE PRODUCTS CO., INC.

PVC Technical Bulletins

TABLE OF CONTENTS

Bulletin	Title
07-0601	Membrane and Insulation Fastener Spacing Requirements – Fully Adhered Systems
07-1001	Attaching membrane flashings to Pre-Painted Metal
07-1003	Pactiv GreenGuard Roof Insulation
07-1101	Cold Weather Installation
07-1301	Mule-Hide EDGE METAL
07-1302	InsulFoam Insulation
07-1303	Blue Ridge Structodek HD (with Red Primer)
07-1304	Revised LTTR Values (2014 Change)

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

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Mule-Hide Technical Bulletin

PVC FA01-2006

(Revised Feb 2009)
Issued January 1, 2006

Membrane and Insulation Fastener Spacing Requirements - Fully Adhered Systems

Membrane Attachment:

- A. PVC membrane attachment at the base of all walls, parapet walls, curbs and penetrations unless otherwise specified in the published details shall be 12" o.c. using the Mule-Hide HD Fastener and 2" Seam Plate or HD Seam Plate (2.4" dia.). This is based on attachment into the deck. Vertical attachment at the base of vertical surfaces shall be as specified in the published details.
- B. Fasteners installed in steel decks and plywood decks must penetrate through the deck a minimum 1/2 inch. Fasteners installed in wood plank decks must penetrate into the deck a minimum of 1-1/2 inches. 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.**
- C. Mechanical attachment of the membrane in the field is not required for fully adhered roofing systems. The membrane is adhered directly to the approved insulation, cover board or other approved substrate.

Insulation Attachment:

- A. Mule-Hide minimum standard insulation attachments: Individual project requirements may require more fasteners per sheet size than what is listed below. It is the contractor's sole responsibility to ensure the system being installed is in compliance with the State and local building code.
 - 1. For approved insulation measuring 2' x 4', the minimum attachment is 4 fasteners per board.
 - 2. For approved insulation measuring 4' x 4', the minimum attachment is 8 fasteners per board.
 - 3. For approved insulation measuring 4' x 8', the minimum attachment is 16 fasteners per board for boards up to 2" thick.
 - 4. For approved polyisocyanurate insulation measuring 4' x 8', the minimum attachment is 8 fasteners per board for boards 2 inches thick or greater in the field of the roof. In wind zones designated by the IBC as being greater than 90 mph, increased attachment in the perimeter (50%) and corners (100%) shall be required. Local building code requirements shall supercede these minimums.
 - 5. When using multiple layers of insulation or combining different board types, the thickness of the top layer and type of insulation determines the minimum number of fasteners required.
- C. Buildings higher than 60 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) shall require increased attachment rates. Contact Mule-Hide Technical Department prior to bidding projects with these requirements for project specific fastener rates.
- D. Mule-Hide defines the minimum perimeter area as 8' in from the roof edge along all exterior roof edges.
- E. Those contractors wishing to install a roof system following Factory Mutual guidelines for projects not requiring FM compliance. The perimeter areas shall have an increase of fasteners of 50% and the corner areas shall have an increase of 100%. The perimeter is defined by the lesser of the following calculations:
 - 1. 0.1 x the lesser plan dimension (building width) =
 - or
 - 2. 0.4 x the height of the building =

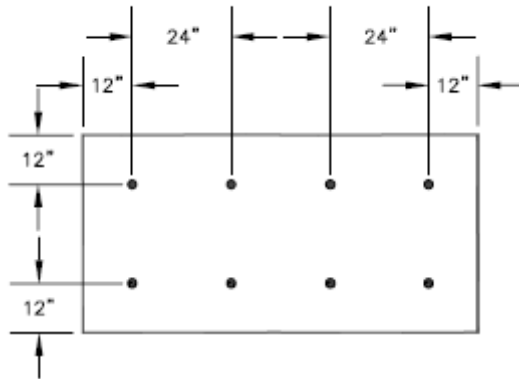
Contact Mule-Hide Technical Department for attachments that require compliance with Factory Mutual (FM) requirements. Requirements change with deck types, building locations, roof heights, insulation used, etc..

Mule-Hide Technical Bulletin # PVC FA01-2006

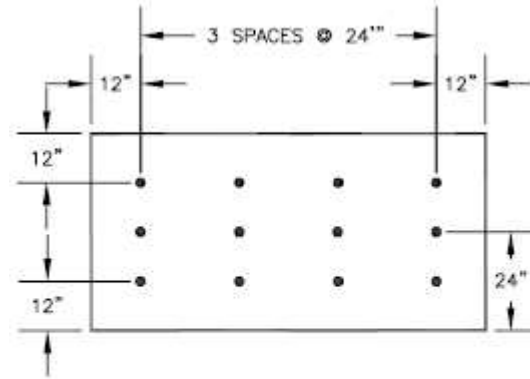
Page 2

Illustration 1, Typical Fastener layouts for 4' x 8' Boards

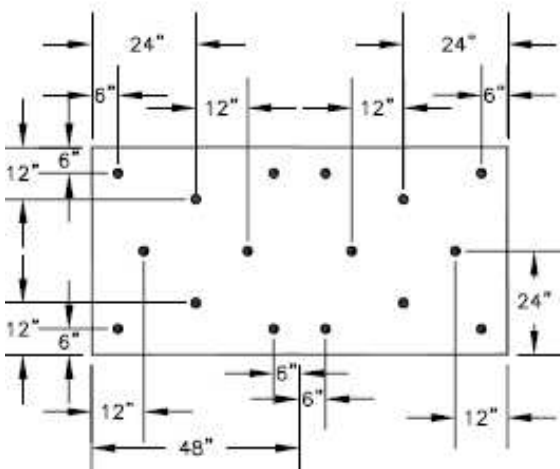
Fully Adhered



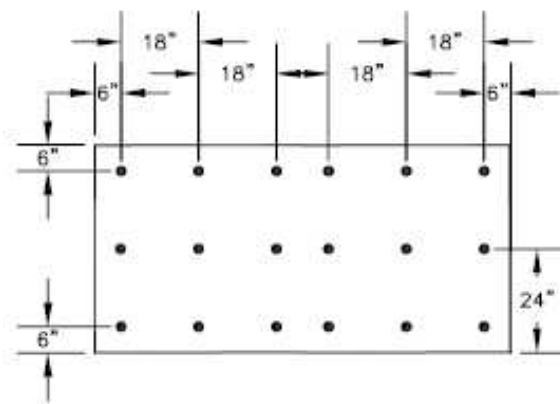
8 Fasteners per 4' x 8' board



12 Fasteners per 4' x 8' board



16 Fasteners per 4' x 8' board



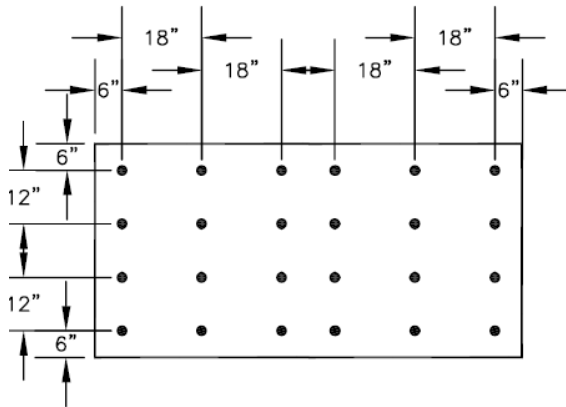
18 Fasteners per 4' x 8' board

Mule-Hide Technical Bulletin # PVC FA01-2006

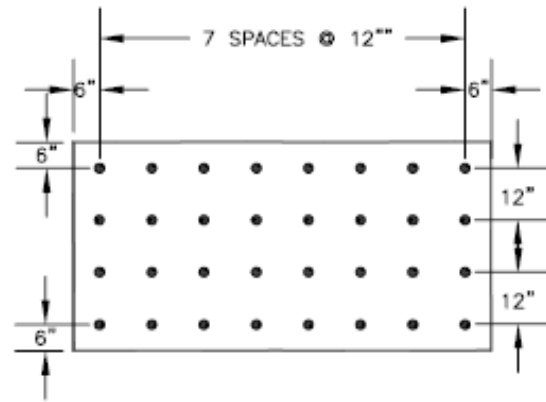
Page 3

Illustration 1, Typical Fastener layouts for 4' x 8' Boards

Fully Adhered



24 Fasteners per 4' x 8' board



32 Fasteners per 4' x 8' board

Note: See attached details MHFM-208, MHFM-212, and MHFM-216 for examples of Factory Mutual attachment patterns.

Due to new changes in the FM Global Property Loss Prevention Data Sheet 1-29, new requirements for perimeter and corner attachments are in effect as of January, 2006. The new requirements cause substantial changes to fully adhered systems. To summarize the changes, for those systems requiring FM 1-90 compliance or greater shall be handled in one of two methods.

Mule-Hide Technical Bulletin

PVC FA01-2006

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Due to new changes in the FM Global Property Loss Prevention Data Sheet 1-29, new requirements for perimeter and corner attachments are in effect as of January, 2006. The new requirements cause substantial changes to fully adhered systems. To summarize the changes, for those systems requiring FM 1-90 compliance or greater shall be handled in one of two methods.

New FM Guidelines (per FM 1-29)

Prior to January 2006, based on tested assemblies, FM permitted increasing the number of fasteners required in the perimeter and corner areas by 50% and 75% respectively.

As of January 2006, for those tested assemblies with ratings of 1-75 or less, increase of the number of fasteners is still acceptable but with the following changes:

For FM ratings of 1-75 or less:

Perimeter Areas require 50% more than the number tested in the field, but at least 1 fastener per 2 sf (this is a minimum of 16 fasteners per 4' x 8' board).

Corner Areas require 100% more than the number tested in the field, but at least 1 fastener per 1 sf (this is a minimum of 32 fasteners per 4' x 8' board).

For FM ratings of 1-90 or greater:

There are two acceptable methods to address the perimeter and corner areas on adhered systems utilizing mechanically attached insulations. This also includes multiple layers of insulation where the bottom layer is mechanically attached and subsequent layers are attached with adhesive.

Method 1

Install the field of the roof fully adhered with the required rating. Install the perimeter and corner areas with a fully adhered assembly that meets the uplift ratings as specified in Table 1 on page 5 of the FM Data sheet 1-29.

Example: All areas fully adhered

An FM 1-90 rating requires a 1-90 tested assembly to be used in the field of the roof, a 1-150 tested assembly in the perimeter areas and a 1-225 tested assembly in the corners.

Mule-Hide Technical Bulletin # PVC FA01-2006

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Method 2

Install the field of the roof fully adhered with the required rating. Install the perimeter and corner areas with a mechanically attached assembly following the guidelines specified in Section 2.2.7.2 of 1-29 which is the same as the previous publication of 1-29.

Example: Field is fully adhered while perimeters and corners are mechanically attached base on an equivalent rating.

Assuming the field rating for the fully adhered assembly is 1-90, the perimeter and corner layouts and attachments are determined using any mechanically attached assembly that has passed an FM 1-90 rating.

Assume a 9-1/2' row to row spacing (using a 10' wide membrane) with fasteners spaced 6" on center has passed an FM 1-90. The perimeter row-to-row spacing will be 60% of the tested spacing or a maximum of 5.7'. The corner row-to-row spacing will be 40% of the tested spacing or a maximum of 3.8'. All fastener spacing in the rows will remain at 6" on center.

The membrane may be adhered across the entire roof area, with mechanical attachments in the perimeter and corner areas through the top of the membrane. The spacing of the attachment and the fastener spacing must be based on a tested mechanically attached assembly.

Note: FM 1-29 requirements for perimeter and corner attachment for adhered assemblies that utilize hot asphalt or cold adhesive for attachment of all insulation layers have not changed.

FM's January 2006 Loss Prevention Data Sheet 1-29 is available from FM Global. Be sure to review this document and contact Mule-Hide for assembly configurations prior to starting or bidding any projects requiring FM compliance.

Always consult the Mule-Hide web site at www.mulehide.com for updates and most current information.

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Technical Bulletin

No. 10-01

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.



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Technical Bulletin

No. 10-03

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

October 22, 2010

Revised July-2013

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	NON FM – 1 per 12 sq. ft. – Fig 2 2 per 2' x 4' panel – FM pattern - Fig 3
	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 5
	PB38, PB38FA or PB38FA90	8 per 4' x 8' board – FM pattern – Fig 4
PVC ⁽³⁾ (Light Colored)	PB6W	NON FM – 1 per 12 sq. ft. – Fig 2
		2 per 2' x 4' panel – FM pattern - Fig 3

(1) TPO (White, Tan, Gray)

(2) Reinforced EPDM

(3) PVC (White, Tan, Gray)

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

MULE-HIDE PRODUCTS CO., INC.

1195 Prince Hall Dr.
Beloit, WI 53511-5481

608-365-3111 • Fax: 608-365-7852 • www.mulehide.com

P.O. Box 1057
Beloit, WI 53512-1057

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 7
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

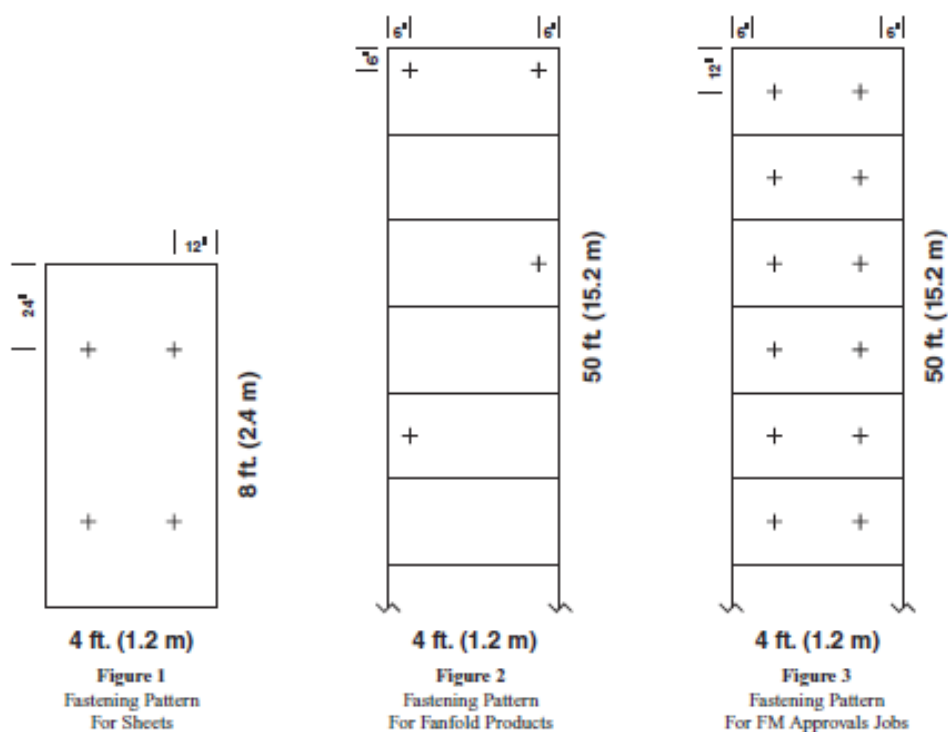
(7) These adhesives have not been tested with Pactiv Insulation.

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

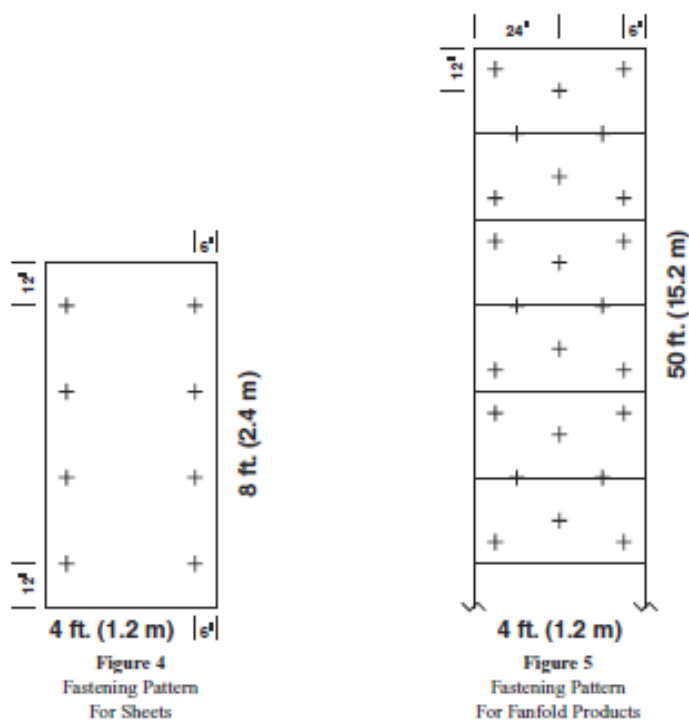
Always check with local code bodies to ensure that this assembly meets local building code requirements. Not for use in high wind uplift areas. Contact Mule-Hide Technical Department for additional information.

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.

MULE-HIDE PRODUCTS CO., INC.

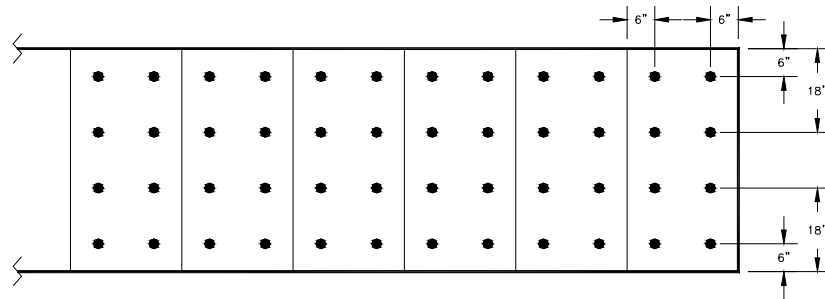


Fastening Patterns for GreenGuard® Roofing Recovery Boards Used Under Light-Colored Roof Membranes

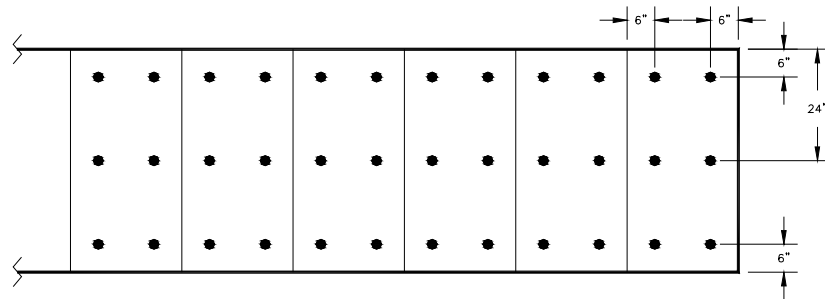


Fastening Patterns for GreenGuard® Roofing Recovery Boards Used Under Dark-Colored Roof Membranes

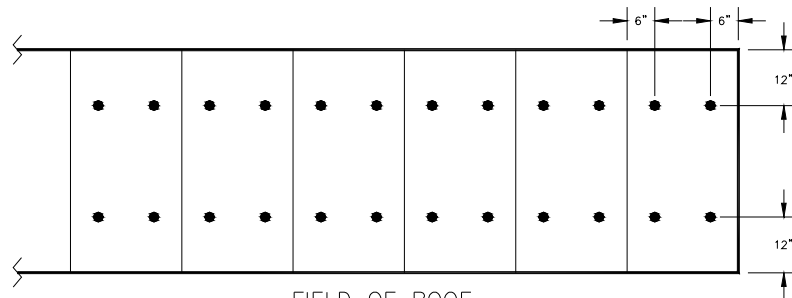
MULE-HIDE PRODUCTS CO., INC.



CORNERS



PERIMETERS



FIELD OF ROOF

Figure 6

4' X 50' PB6FA FANFOLD INSULATION

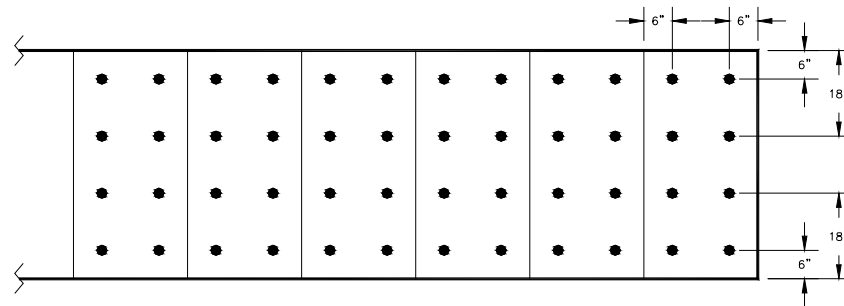
FASTENING PATTERN FOR GREENGARD® PB6FA ROOFING RECOVERY BOARDS
USED UNDER FULLY ADHERED ROOF MEMBRANES TO ACHIEVE FM I-60

MULE-HIDE PRODUCTS CO., INC.

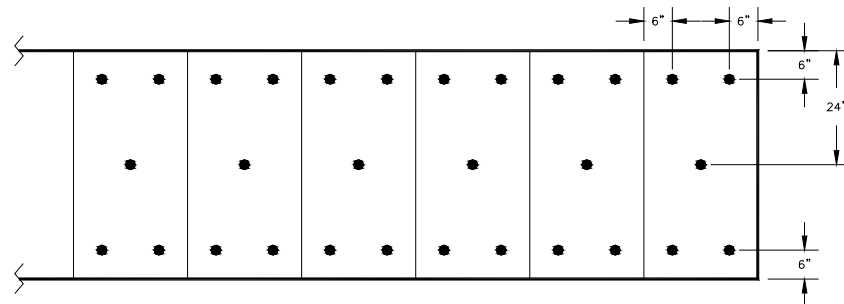
1195 Prince Hall Dr.
Beloit, WI 53511-5481

608-365-3111 • Fax: 608-365-7852 • www.mulehide.com

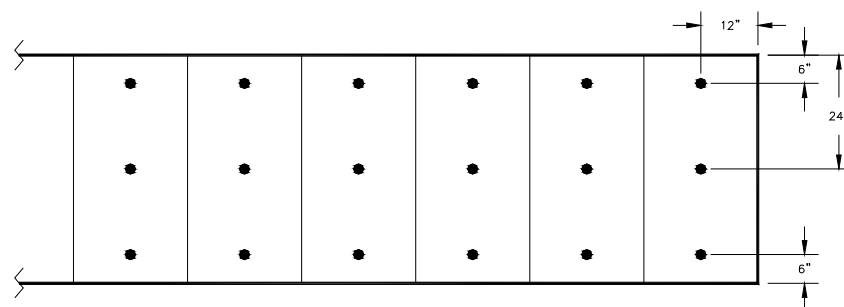
P.O. Box 1057
Beloit, WI 53512-1057



CORNERS



PERIMETERS



FIELD OF ROOF

Figure 7

4' X 50' PB6FA90 FANFOLD INSULATION

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

MULE-HIDE PRODUCTS CO., INC.

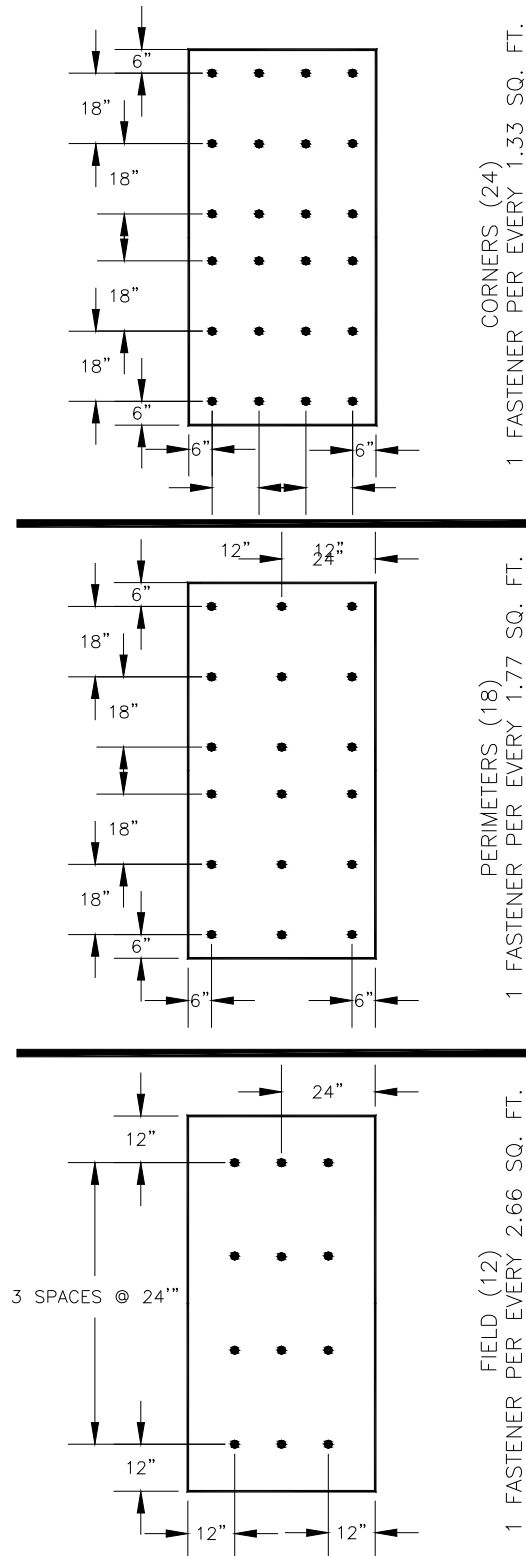
1195 Prince Hall Dr.
Beloit, WI 53511-5481

608-365-3111 • Fax: 608-365-7852 • www.mulehide.com

P.O. Box 1057
Beloit, WI 53512-1057

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
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 50% FOR PERIMETERS AND 100% FOR CORNERS.



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

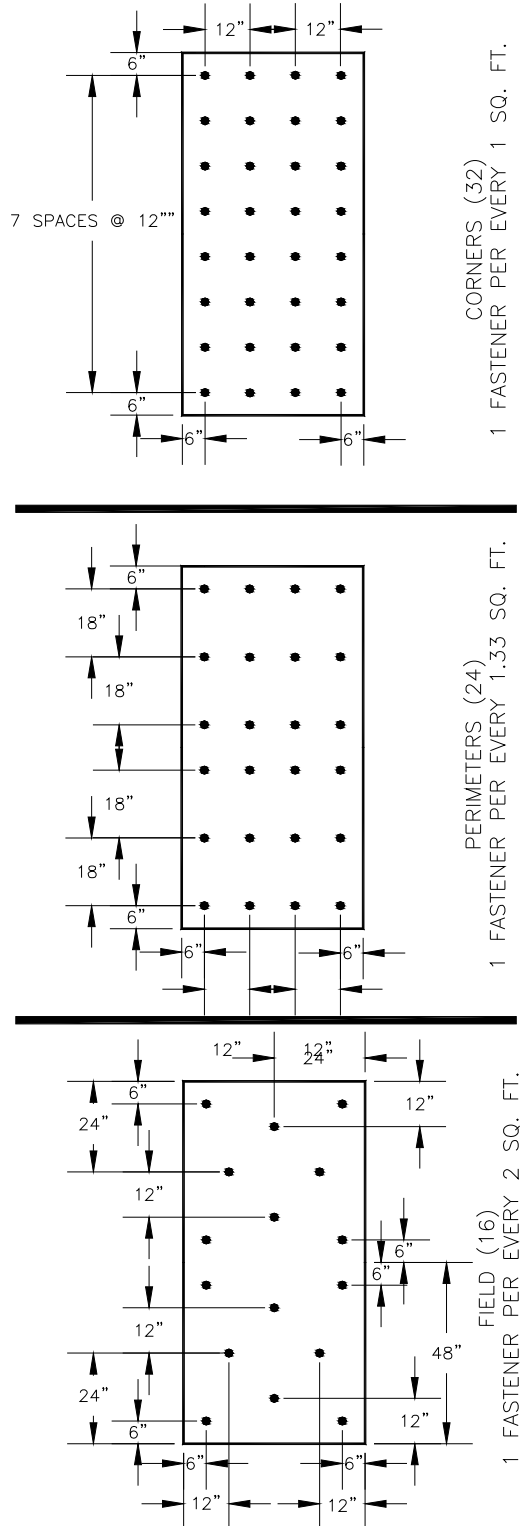
**FM - 12 FIELD FASTENERS
PER 4' X 8' BOARD PATTERN LAYOUT**
SYSTEMS:
ALL SYSTEMS

DETAIL NO:
MHFM-212

MULE-HIDE PRODUCTS CO., INC.

NOTES:

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3. REFER TO MULE-HIDE WIND UPLIFT RATINGS FOR APPROPRIATE FASTENER DENSITY REQUIRED.
4. FASTENER DENSITY INCREASES BASED ON 50% FOR PERIMETERS AND 100% FOR CORNERS.



MULE-HIDE
PRODUCTS CO., INC.
04/01/2007

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

*SYSTEMS:
ALL SYSTEMS*

*DETAIL NO:
MHFM-216*

MULE-HIDE PRODUCTS CO., INC.

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Technical Bulletin

No. 1101

Mule-Hide Membranes and Adhesives - Cold Weather Installation

Revised Oct-2014

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 60°F and 80°F 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 (40°F 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 & HydroBond

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 60°F and 90°F prior to application. In general, these products should be installed when temperatures are 45°F 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 60°F and 90°F for 24 hours prior to use. Storage at temperatures over 90°F 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.



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 warranty³

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 coverage³

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.

Insulation Attachment

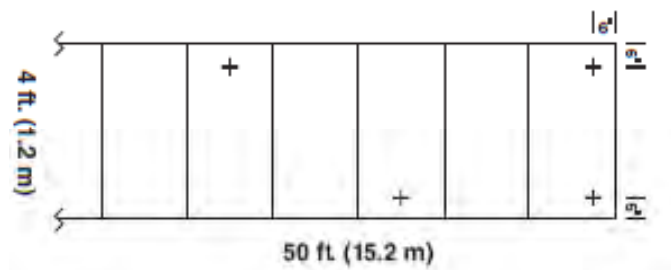
Fully Adhered Systems – Attachment will vary depending upon type and thickness of cover board, type of roof deck and wind uplift requirements. Contact the Mule-Hide Technical Department for acceptable attachment patterns.

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.



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

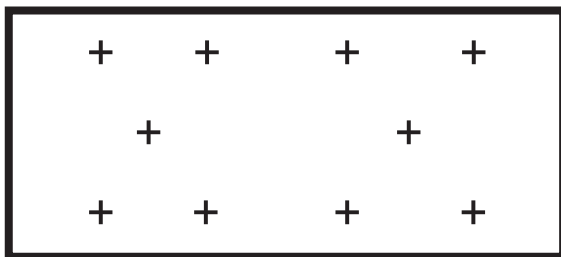
Do not expose to open flame or excessive heat. May smolder if ignited. If ignited, extinguish completely. Do not apply flame directly to material when installing a modified bitumen system. Material must be kept dry at all times; in storage and during application. Apply only as much STRUCTODEK HD with 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.

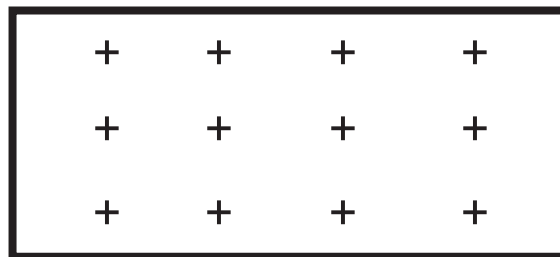
LEED INFORMATION

May help contribute to LEED credits:

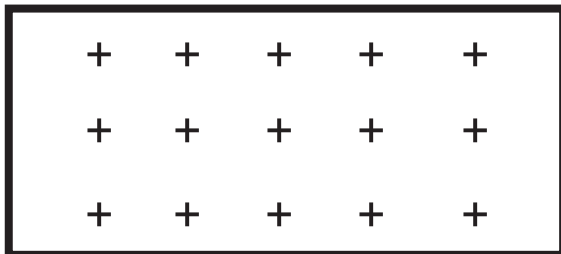
- MR Credit 2: Construction Waste Management
- MR Credit 4: Recycled Content
- MR Credit 5: Regional Materials
- MR Credit 6: Rapidly Renewable Materials
- IEQ Credit 4.4: Low-Emitting Materials – Composite Wood and Agrifiber Products



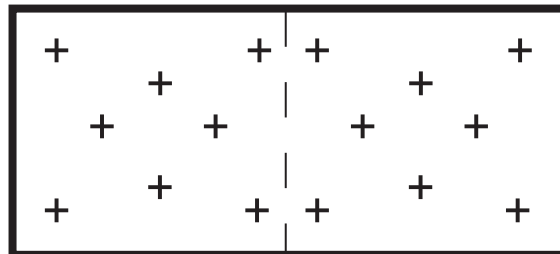
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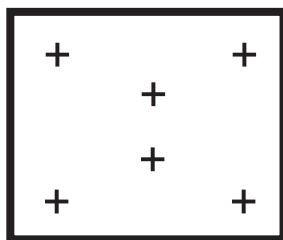
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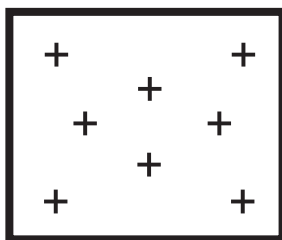
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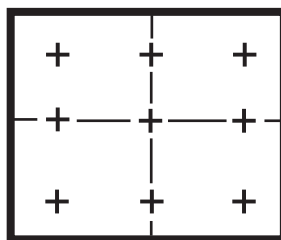
16 FASTS/BD.



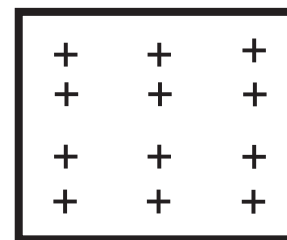
6 FASTS/BD.



8 FASTS/BD.



9 FASTS/BD.



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 RIDGE 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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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.

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 ⁵ / ₈
1.5	38	9.0	8.5	4 ³ / ₈
1.6	41	9.6	9.1	4 ³ / ₈
1.7	43	10.3	9.6	4 ³ / ₈
2.0	51	12.1	11.4	4 ³ / ₈
2.5	64	15.3	14.4	4 ³ / ₈
2.7	69	16.6	15.6	4 ³ / ₈
3.0	76	18.5	17.4	4 ³ / ₈
3.3	84	20.4	19.2	4 ³ / ₈
3.5	89	21.7	20.5	4 ³ / ₈
3.6	91	22.4	21.1	4 ³ / ₈
4.0	102	25.0	23.6	4 ³ / ₈
<p>*Long Term Thermal Resistance Values are based on ASTM C1289 and CAN/ULC S770 which provides for a 15-year time weighted average.</p> <p>**LTTR (Long Term Thermal Resistance) determined in accordance with <i>updated</i> 2014 ASTM C1289 Standard.</p> <p>***Other thicknesses available upon special request.</p>				

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 ⁵ / ₈
1.5	38.1	9.0	8.5	4 ³ / ₈
2.0	50.8	12.1	11.4	4 ³ / ₈
2.5	63.5	15.3	14.4	4 ³ / ₈
3.0	76.2	18.5	17.4	4 ³ / ₈
3.1	78.8	19.1	18.0	4 ³ / ₈
3.3	83.8	20.4	19.2	4 ³ / ₈
4.0	101.6	25.0	23.6	4 ³ / ₈
<p>*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.</p> <p>**LTTR (Long Term Thermal Resistance) determined in accordance with <i>updated</i> 2014 ASTM C1289 Standard.</p> <p>***Other thicknesses available upon special request.</p>				

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SECTION 7

MULE-HIDE PRODUCTS CO., INC. PVC STANDARD DETAILS

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PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST CURRENT
INFORMATION AT WWW.MULEHIDE.COM

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MULE-HIDE PRODUCTS CO., INC.

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Drip Edge – PVC Metal - MA.....	MHP-105
Drip Edge – AP Bar	MHP-105A
Gutter Termination – PVC Metal - FA.....	MHP-106
Gutter Termination – PVC Metal - MA.....	MHP-107
Gutter Termination – AP Bar	MHP-107A
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Seam Intersection – Fully Adhered	MHP-111
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Plate and Fastener Placement	MHP-113
Seam Intersection – Mech. Att.	MHP-114

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Parapet Flashing.....	MHP-120
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Roof Drain (Page 2 of 2).....	MHP-132
Coated Metal Scupper.....	MHP-133
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Roof Drain.....	MHP-135
Coated Metal Scupper (soldered).....	MHP-136

Pipe Flashings

Pre-Molded Pipe Flashing	MHP-140
Field Fabricated Pipe Flashing	MHP-141
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Molded Sealant Pocket.....	MHP-143

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Tie-In to Existing Single Ply	MHP-160
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Reglet Counterflashing	MHP-171
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Termination Bar at Tilt-Up Panel	MHP-197
Termination Bar at Corner	MHP-198

Mechanically Attached Sheet Layout

Field Membrane Layout	MPH-300
Perimeter Attachment	MPH-301

Insulation Attachment

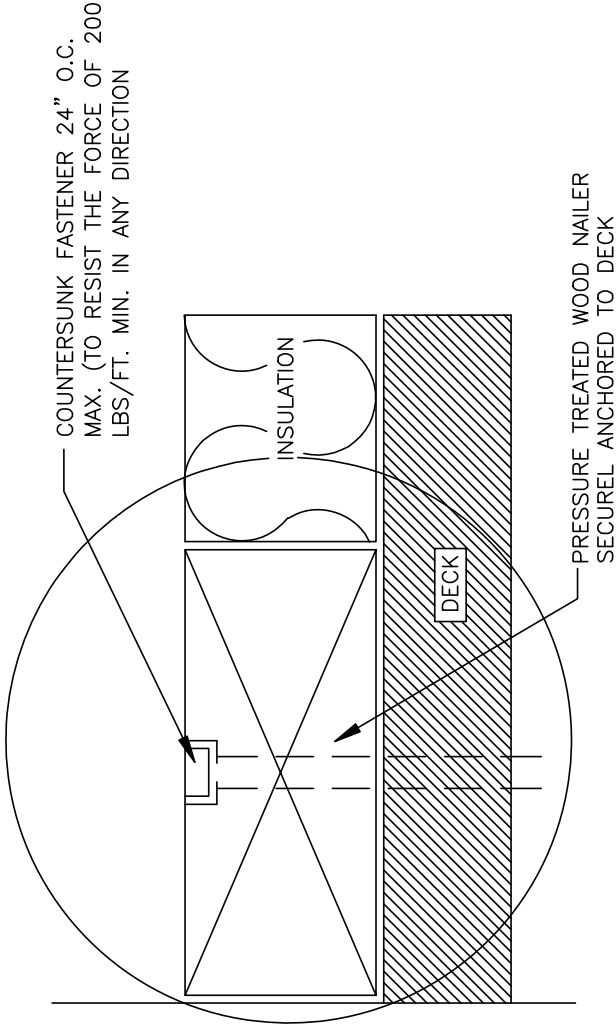
Extruded Polystyrene Insulations	MHT-MA-700
Insulation Attachment Patterns.....	MHT-MA-701
Mule-Hide – 8 Field Fasteners.....	MHT-FA-720
Mule-Hide – 12 Field Fasteners.....	MHT-FA-721
Mule-Hide – 16 Field Fasteners.....	MHT-FA-722
Mule-Hide – 17 Field Fasteners.....	MHT-FA-723
Factory Mutual - 8 Field Fasteners	MHT-FM-724
Factory Mutual - 12 Field Fasteners	MHT-FM-725
Factory Mutual - 16 Field Fasteners	MHT-FM-726
Factory Mutual - 17 Field Fasteners	MHT-FM-727

PLEASE CONSULT THE MULE-HIDE WEBSITE FOR THE MOST CURRENT INFORMATION
AT WWW.MULEHIDE.COM

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NOTES:

- 1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
- 2. ACCORDING TO PROJECT CONDITIONS, THE SPECIFIER AND/OR APPLICATOR MUST DETERMINE THE APPROPRIATE METHOD TO SECURE THE WOOD NAILER, SO AS TO MEET MULE-HIDE SPECIFICATIONS AND COMPLY WITH CURRENT FM LOSS PREVENTIONS DATA SHEET 1-49.
- 3. SUBSTRATE STRUCTURE TO WHICH NAILER IS ATTACHED MUST BE ABLE TO RESIST A FORCE OF 200 LBS/FT. MINIMUM IN ALL DIRECTIONS.

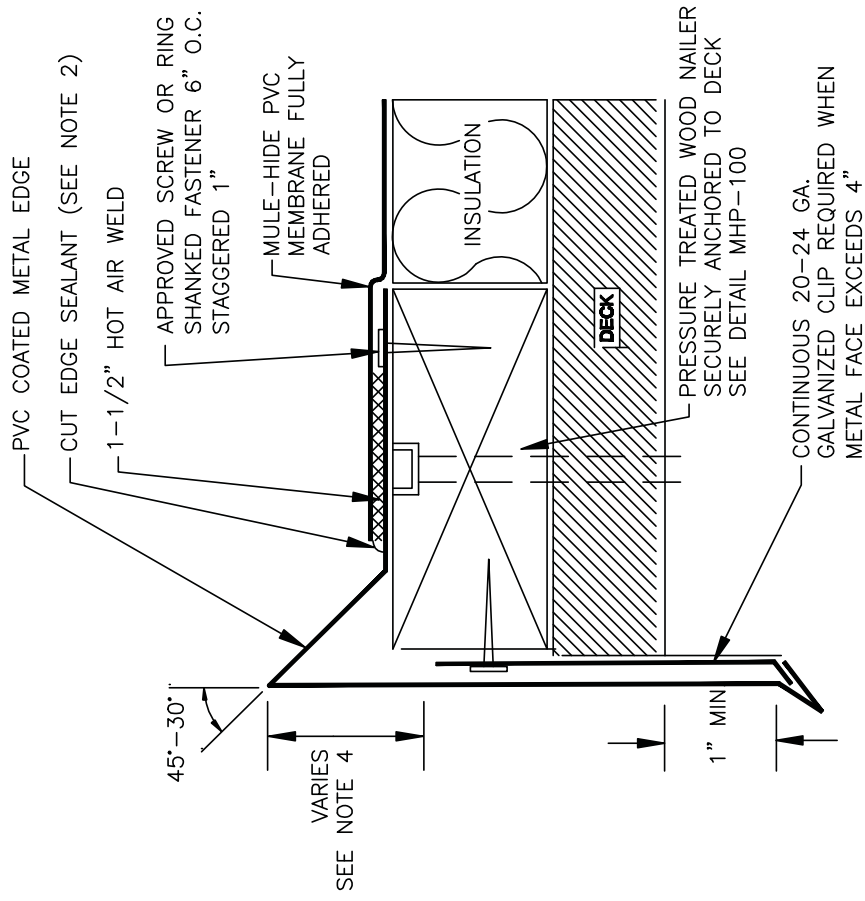


**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**WOOD NAILER ATTACHMENT
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-100**

- NOTES:
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
 3. FOR COATED METAL JOINT SEE MULE-HIDE DETAIL MHP-109.
 4. APPLICATOR/SPECIFIER TO DETERMINE HEIGHT REQUIRED TO PREVENT WATER FROM CASCADING OVER BUILDING EDGE.



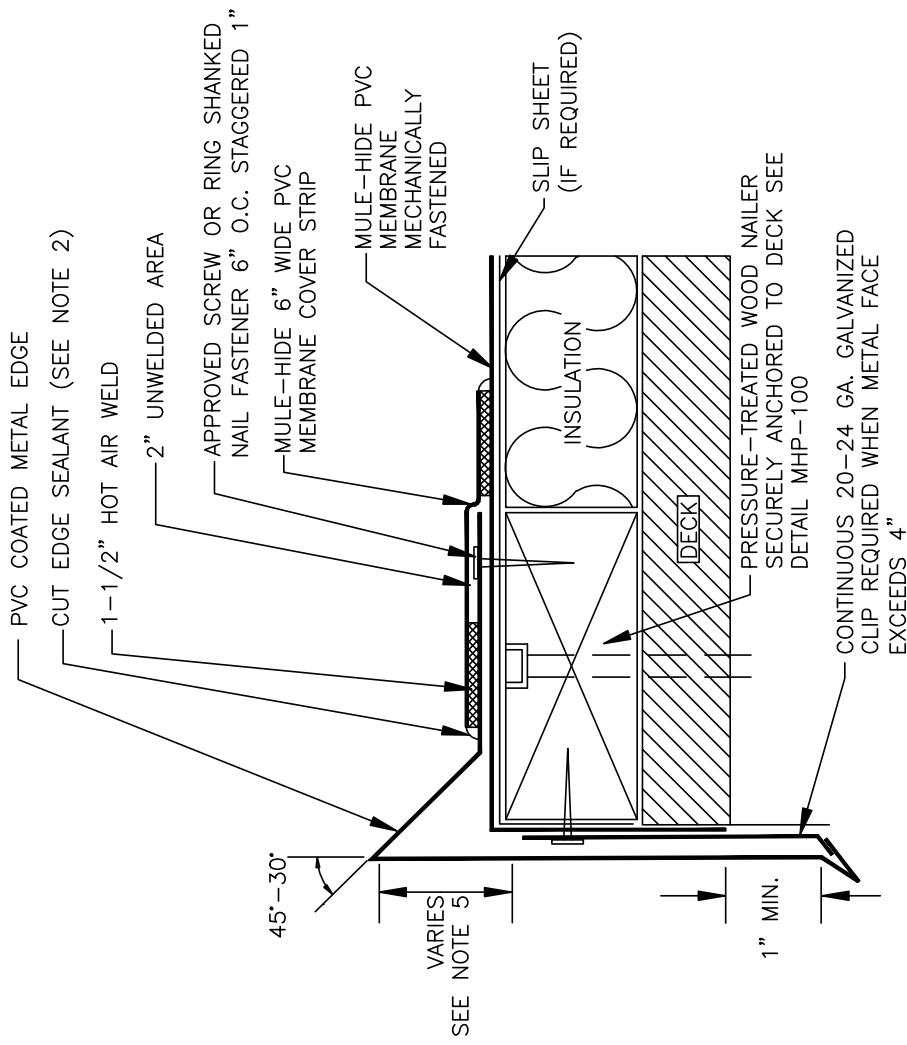
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**DETAIL NO:
MHP-101**

**PVC COATED METAL GRAVEL STOP
SYSTEMS:
FULLY ADHERED PVC**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FOR COATED METAL JOINT, SEE DETAIL MHP-109.
4. PRECAUTIONS MUST BE TAKEN TO ASSURE THAT THE MINIMUM 6" WIDE MEMBRANE COVER STRIP IS NOT WELDED SOLID. A 2" WIDE UNWELDED AREA MUST BE MAINTAINED BETWEEN THE 2 WELDED EDGES OF THE COVER STRIP.
5. APPLICATOR/SPECIFIER TO DETERMINE HEIGHT REQUIRED TO PREVENT WATER FROM CASCADING OVER BUILDING EDGES.



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

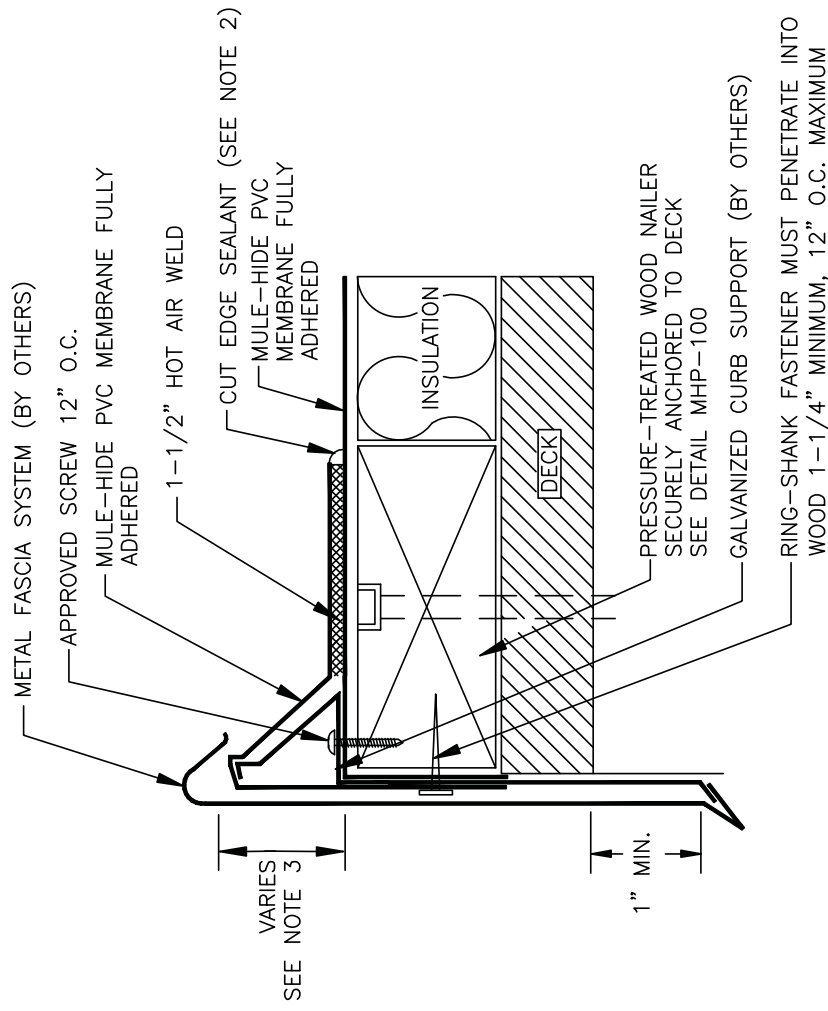
PVC COATED GRAVEL STOP

SYSTEMS:

MECHANICALLY FASTENED PVC

DETAIL NO:

MHP-102



NOTES:

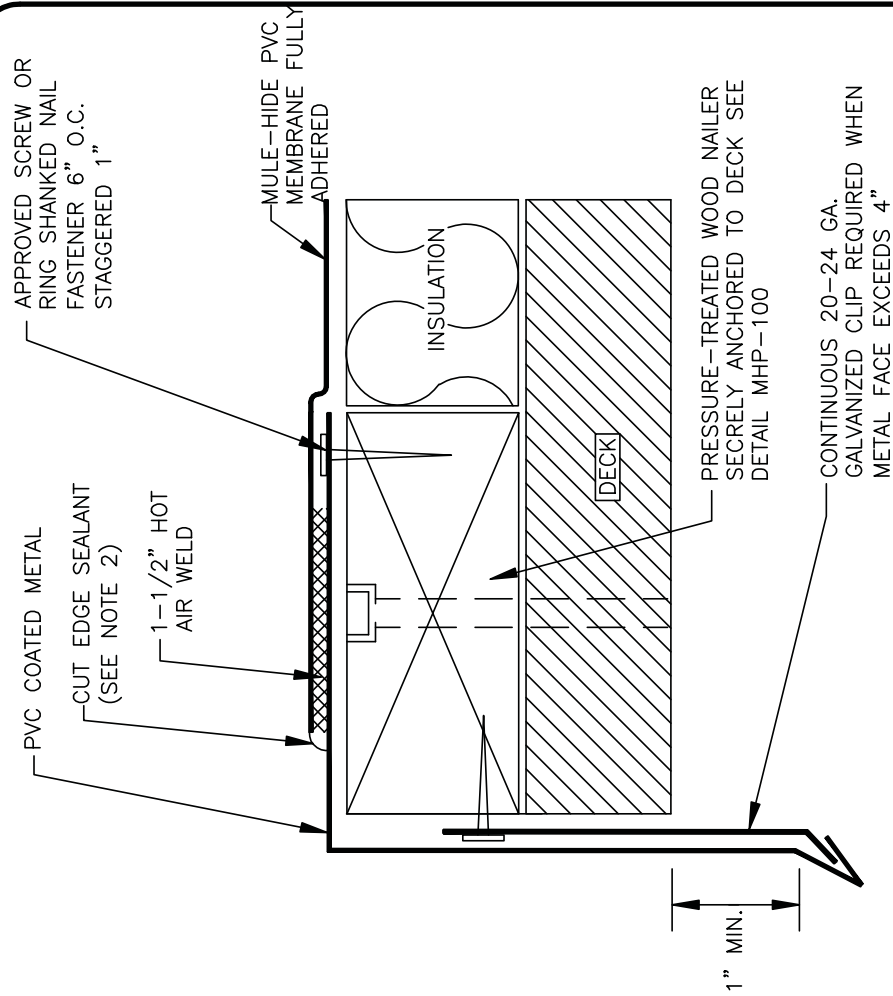
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. APPLICATOR/SPECIFIER TO DETERMINE HEIGHT REQUIRED TO PREVENT WATER FROM CASCADING OVER BUILDING EDGE.

**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**SNAP-ON FASCIA (BY OTHERS)
SYSTEMS:
FULLY ADHERED PVC**

**DETAIL NO:
MHP-103**

- NOTES:
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
 3. FOR COATED METAL JOINT, SEE DETAIL MHP-109



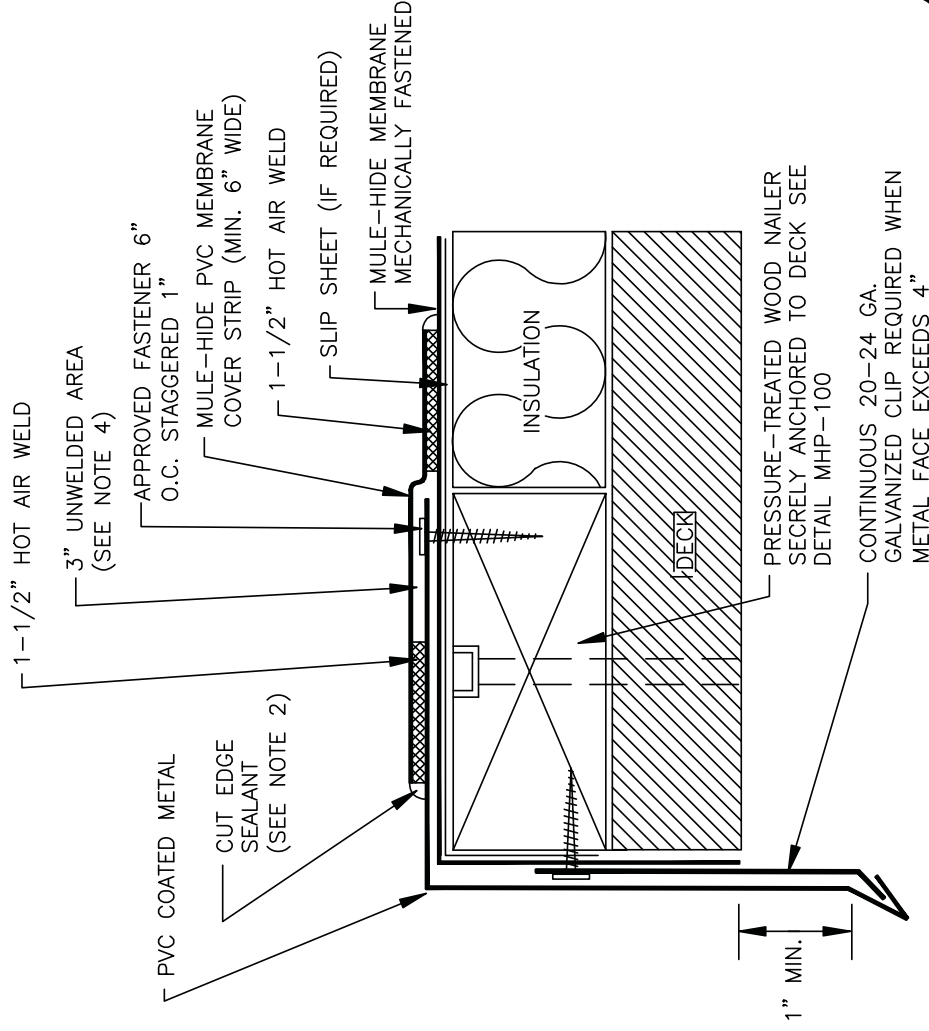
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**DRIP EDGE
SYSTEMS:
FULLY ADHERED PVC**

**DETAIL NO:
MHP-104**

NOTES:

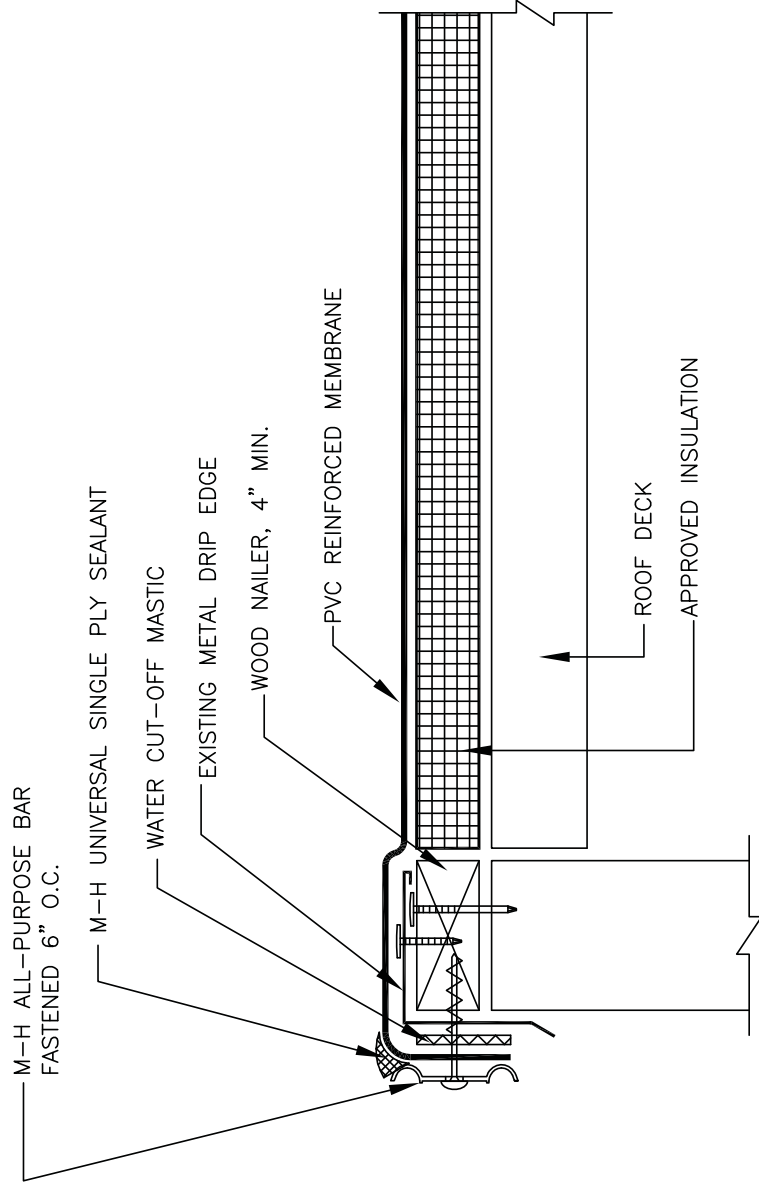
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FOR COATED METAL JOINT, SEE DETAIL MHP-109.
4. PRECAUTIONS MUST BE TAKEN TO ASSURE THAT THE MINIMUM 6" WIDE MEMBRANE COVER STRIP IS NOT WELDED SOLID. A 3" WIDE UNWELDED AREA MUST BE MAINTAINED BETWEEN THE 2 WELDED EDGES OF THE COVER STRIP.



**MULE-HIDE
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04/01/2007**

**DRIP EDGE
SYSTEMS:
MECHANICALLY FASTENED PVC**

**DETAIL NO:
MHP-105**

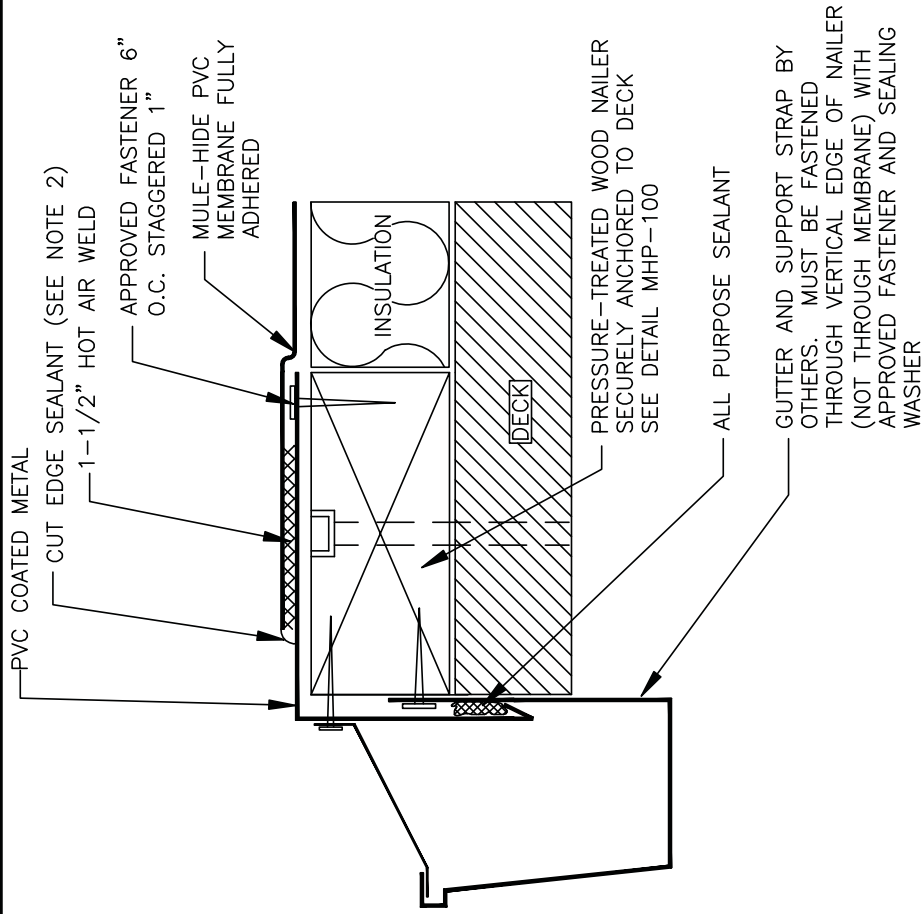


NOTE:
THIS DETAIL IS ACCEPTABLE FOR USE IN A
20-YEAR WARRANTED SYSTEM

MULE-HIDE PRODUCTS CO., INC.	EDGE TERMINATION ALL-PURPOSE BAR		DETAIL NO.: MHP-105A
	SYSTEMS: ALL RECOVER PVC SYSTEMS		REVISION DATE: 01/2013

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FOR COATED METAL JOINT SEE MULE-HIDE DETAIL MHP-109.
4. ACCORDING TO PROJECT CONDITIONS, THE SPECIFIER AND/OR APPLICATOR MUST DETERMINE THE APPROPRIATE GUTTER DESIGN AND SECUREMENT METHOD.



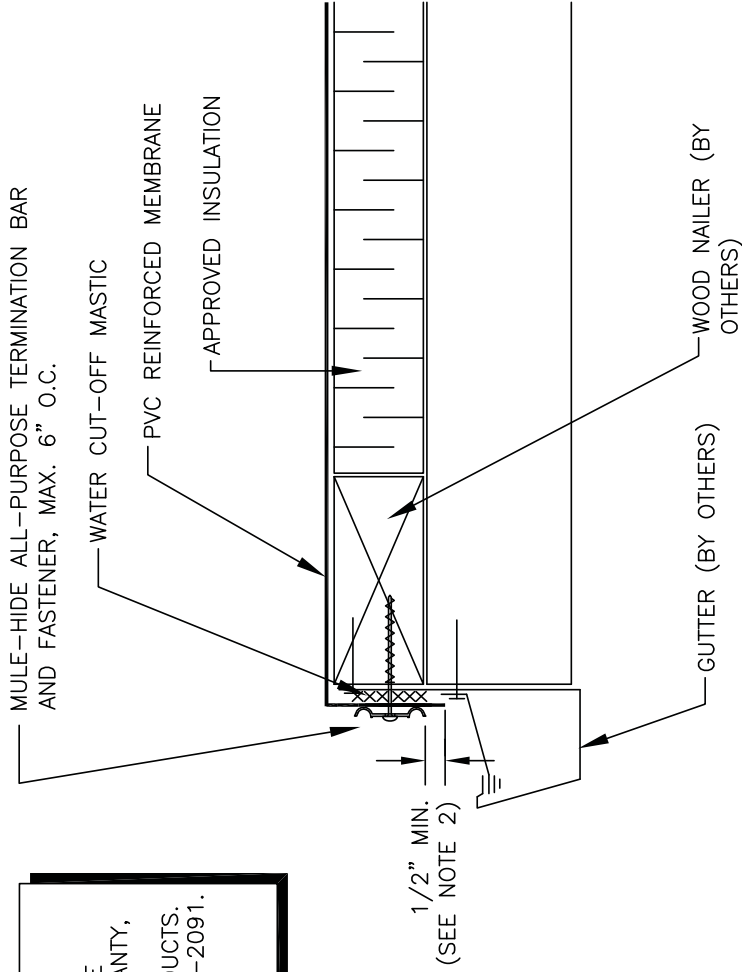
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**GUTTER TERMINATION
SYSTEMS:
FULLY ADHERED PVC**

**DETAIL NO:
MHP-106**

NOTE:

IF SHEETMETAL IS TO BE INCLUDED IN THE WARRANTY, CONTRACTOR MUST USE MULE-HIDE METAL PRODUCTS. REFER TO DETAIL MHSM-2091.



NOTES:

1. FASTENING OF ALL-PURPOSE BAR MUST PROVIDE CONSTANT COMPRESSION ON WATER CUT-OFF MASTIC.
2. ALL PURPOSE BAR IS INSTALLED WITH "BUMPS" DOWN, FACING THE MEMBRANE.
3. ALLOW MEMBRANE SHEET TO EXTEND 1/2" MINIMUM BELOW ALL-PURPOSE BAR TO ENSURE FASTENER PENETRATION THROUGH SCRIM REINFORCEMENT.

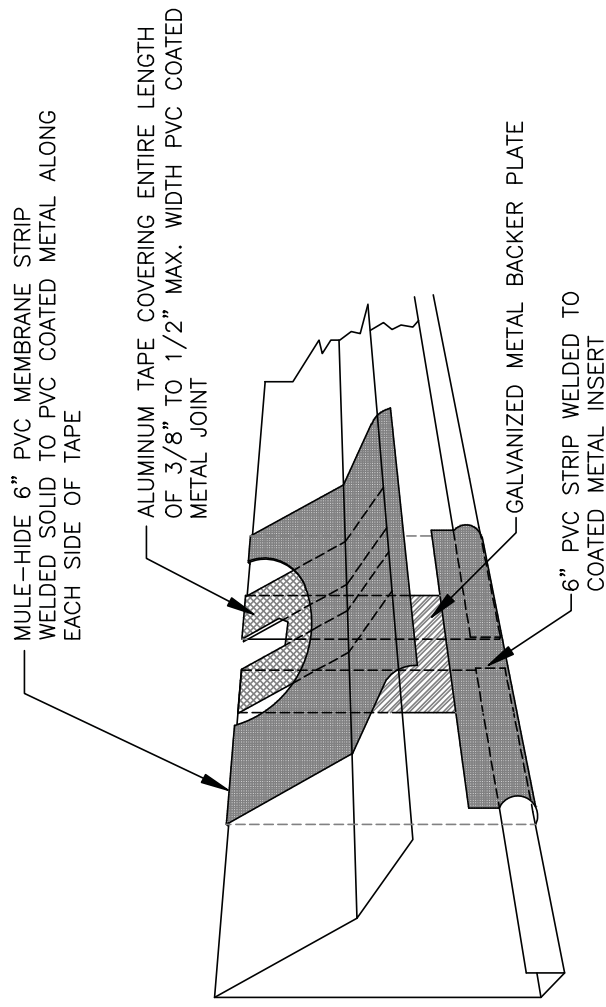
NOTE:

THIS DETAIL IS ACCEPTABLE FOR USE IN A 20-YEAR WARRANTED SYSTEM

MULE-HIDE PRODUCTS CO., INC.	ALL - PURPOSE BAR EDGE TERMINATION SYSTEMS:		DETAIL NO.: MHP-107A
	ALL PVC SYSTEMS		REVISION DATE: 10/2013

NOTES:

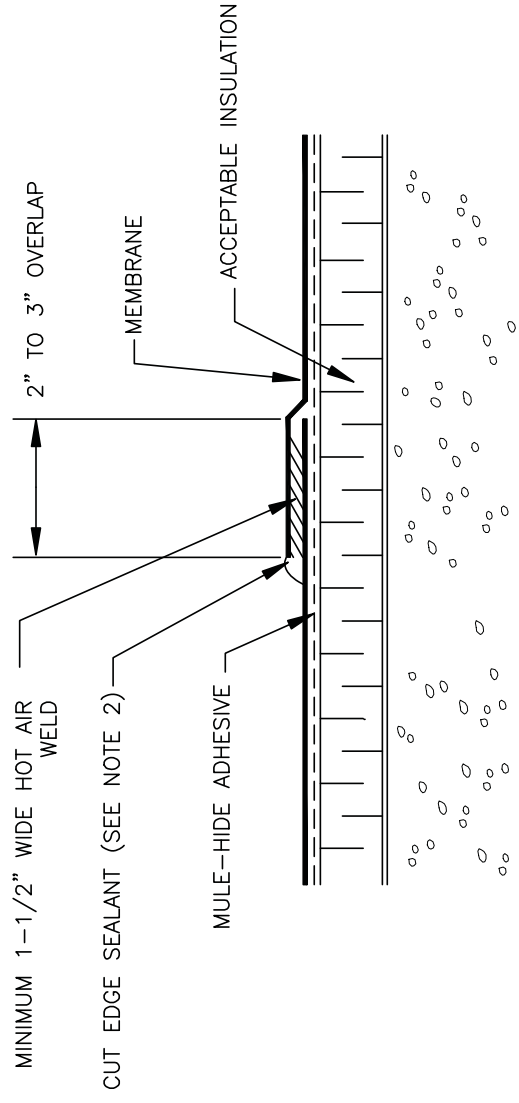
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. A HEAT GUN WILL FACILITATE WELDING AT THE METAL BENDS



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**DETAIL NO:
MHP-108**

**COATED METAL BUTT JOINT
SYSTEMS:
ALL PVC**



- NOTES:
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.

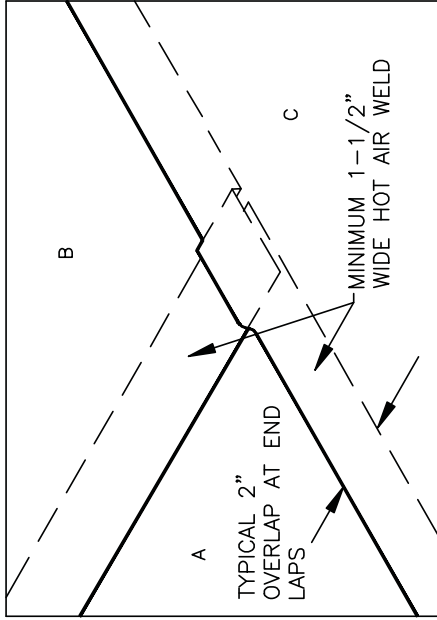
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**LAP CROSS SECTION
SYSTEMS:
FULLY ADHERED PVC**

**DETAIL NO:
MHP-110**

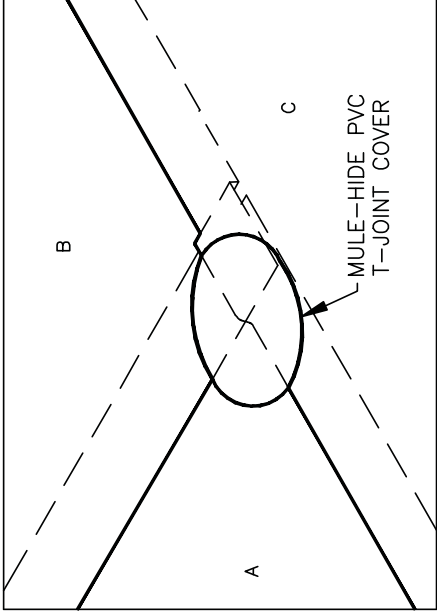
NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.



POSITION SHEETS AND HOT AIR WELD THE MEMBRANE
A MINIMUM OF 1-1/2" INCHES.

.050" (1.270 mm) OR .060" (1.524 mm) THICK MEMBRANES



INSTALL A MULE-HIDE T-JOINT COVER CENTERED
OVER SPLICE INTERSECTION ("T-JOINT") AS SHOWN.

.080" (2.032 mm) THICK MEMBRANE ONLY

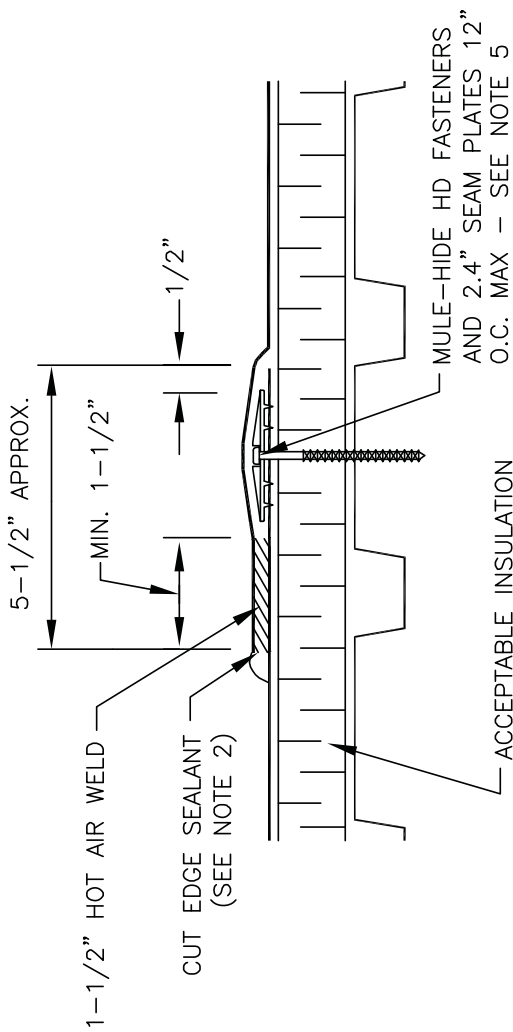
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**SEAM INTERSECTION
SYSTEMS:
FULLY ADHERED PVC**

**DETAIL NO:
MHP-111**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. REFER TO SPECIFICATIONS FOR ACCEPTABLE FASTENERS FOR OTHER DECK TYPES. IF A FACTORY MUTUAL RATING IS REQUIRED, REFER TO MULE-HIDE CODE APPROVAL GUIDE FOR SPECIFIC REQUIREMENTS.
4. POSITION 2.4" SEAM PLATES BEYOND NON-REINFORCED ENCAPSULATED EDGE.
5. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



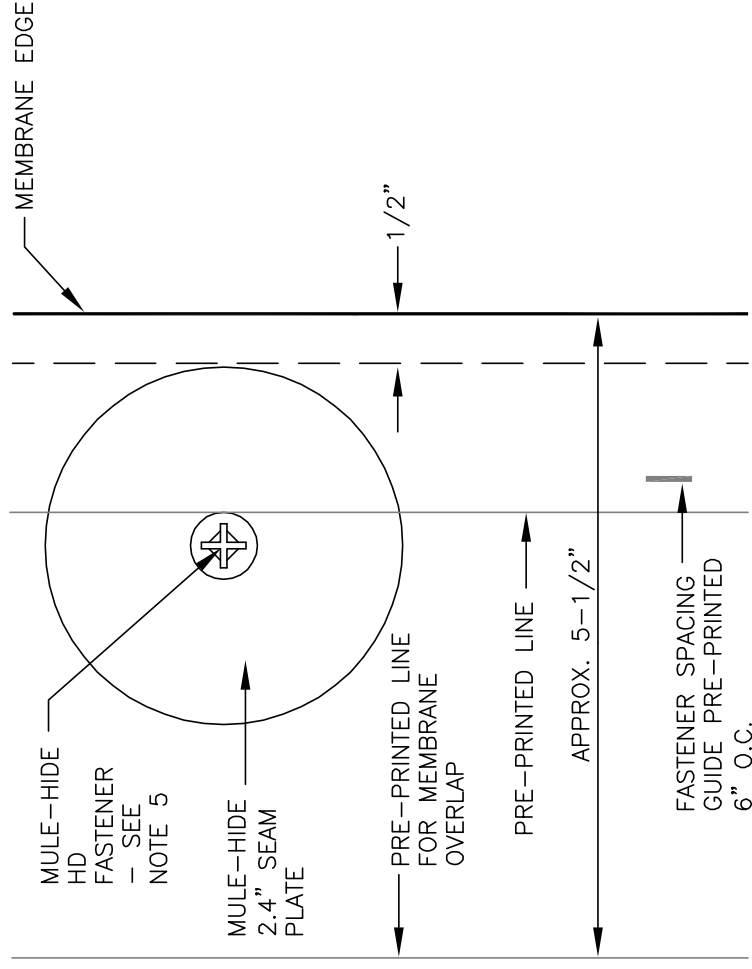
**MULE-HIDE
PRODUCTS CO., INC.
2010**

**DETAIL NO:
MHP-112**

**LAP CROSS SECTION
SYSTEMS:
MECHANICALLY FASTENED PVC**

NOTE:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. MULE-HIDE HD FASTENERS AND 2.4" SEAM PLATES ARE REQUIRED OVER STEEL, CONCRETE, AND WOOD DECKS. REFER TO SPECIFICATIONS FOR ACCEPTABLE FASTENERS AND PLATES FOR OTHER DECK TYPES.
4. POSITION SEAM FASTENING PLATES BEYOND NON-REINFORCED ENCAPSULATED EDGE.
5. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

PLATE AND FASTENER PLACEMENT

SYSTEMS:

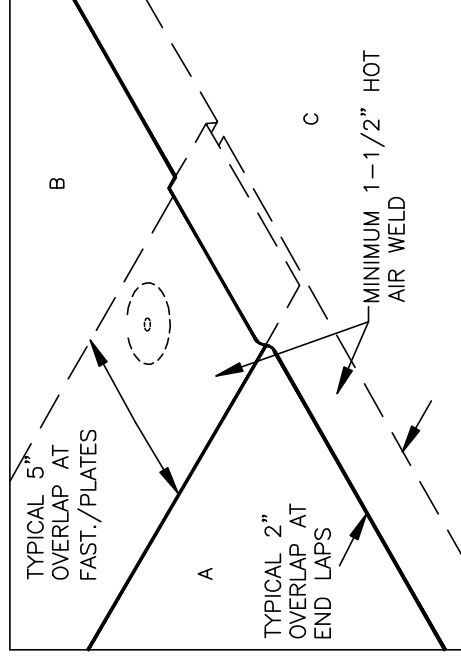
MECHANICALLY FASTENED PVC

DETAIL NO:

MHP-113

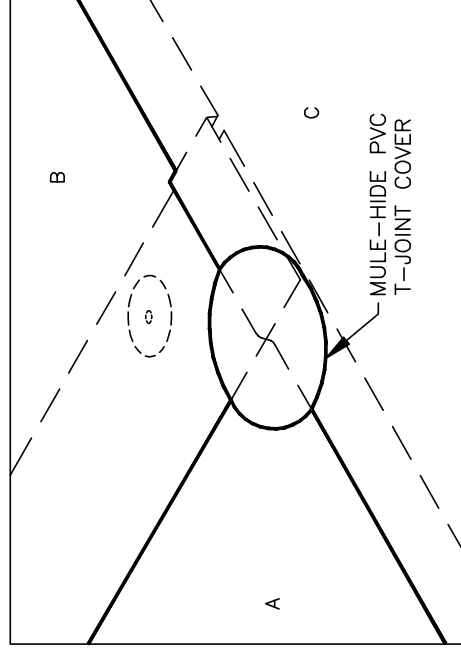
NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.



POSITION SHEETS AND HOT AIR WELD THE MEMBRANE A MINIMUM OF 1-1/2".

.050" (1.270 mm) OR .060" (1.524 mm) THICK MEMBRANES



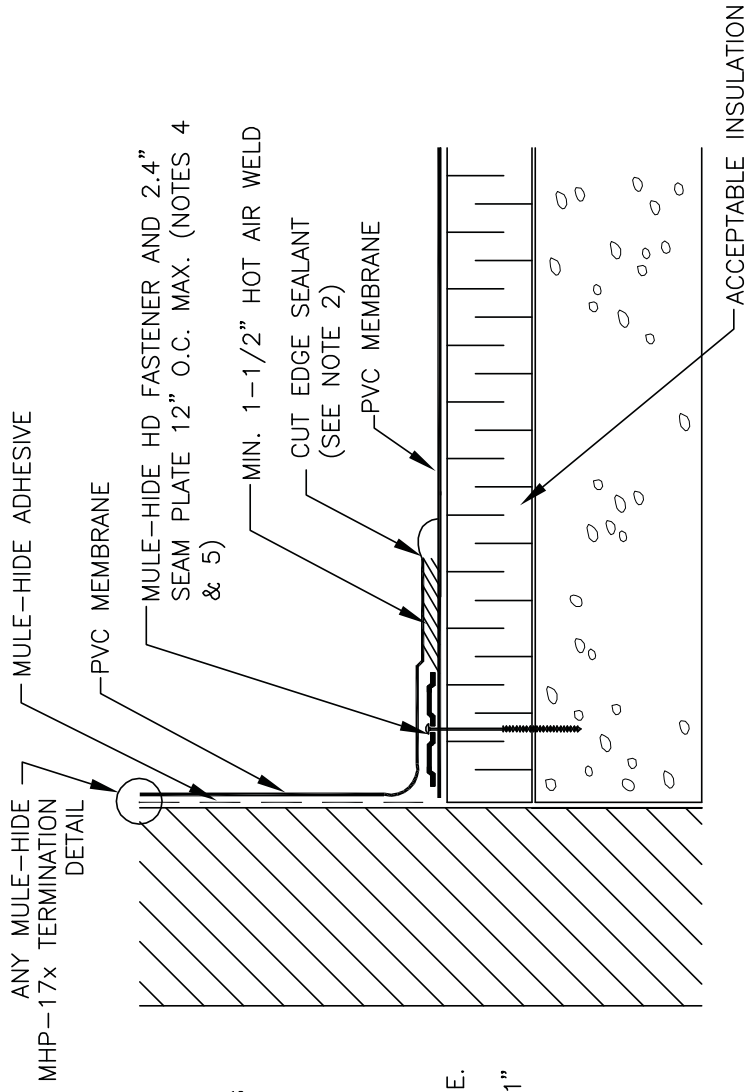
INSTALL A MULE-HIDE PVC T-JOINT COVER CENTERED OVER SPLICE INTERSECTION ("T-JOINT") AS SHOWN.

.080" (2.032 mm) THICK MEMBRANE ONLY

**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**SEAM INTERSECTION
SYSTEMS:
MECHANICALLY FASTENED PVC**

**DETAIL NO:
MHP-114**



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. POSITION SEAM PLATES 1/2" TO 1" FROM EDGE OF DECK MEMBRANE.
4. SEAM PLATES CAN BE INSTALLED VERTICALLY.
5. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.

**MULE-HIDE
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2010**

**PARAPET FLASHING
SYSTEMS:**

ALL PVC

**DETAIL NO:
MHP-120**

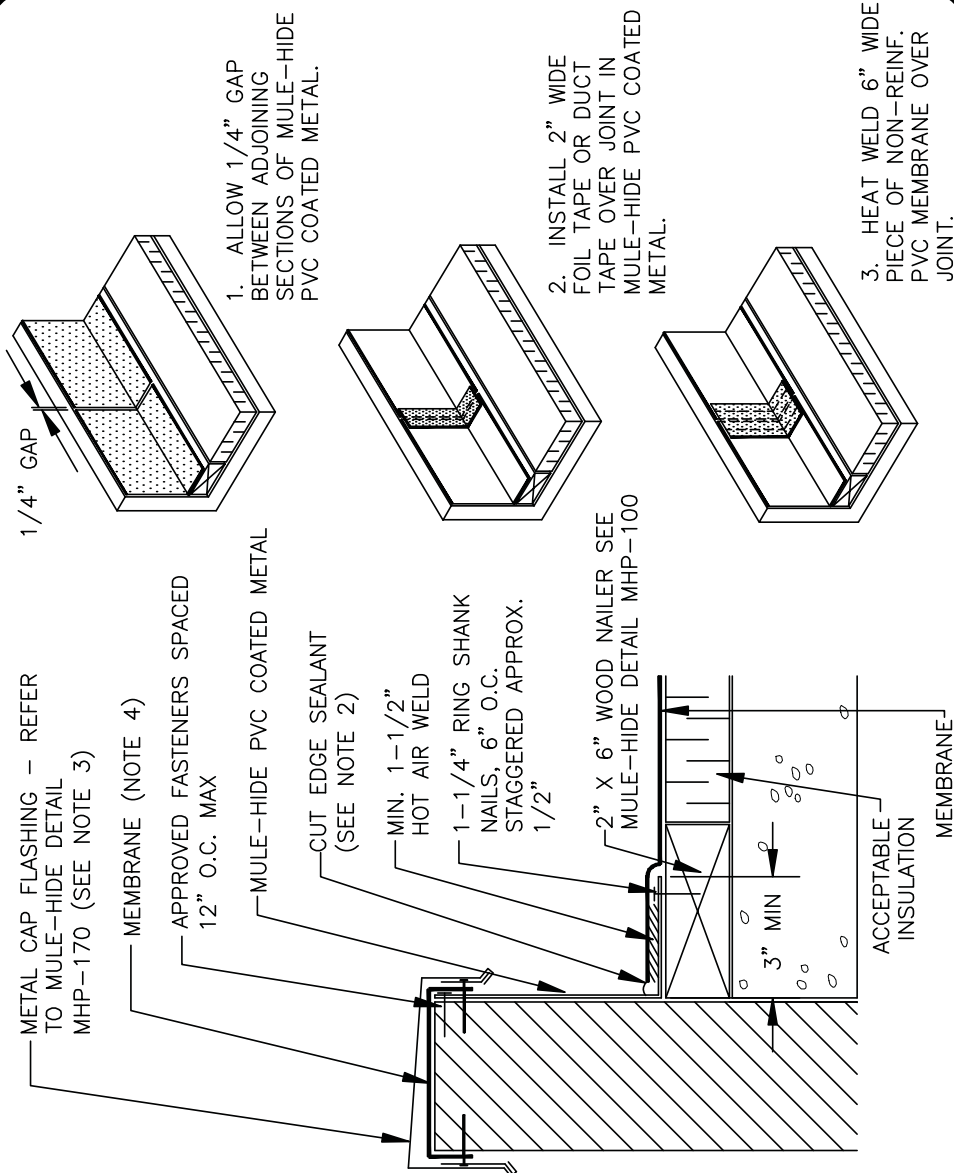
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC:

2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.

3. A COUNTERFLASHING TERMINATION MAY BE USED IN LIEU OF METAL CAP FLASHING. REFER TO MULE-HIDE DETAIL MHP-171.

4. PLACE A LAYER OF MULE-HIDE PVC MEMBRANE UNDER THE METAL CAP TO PROTECT AGAINST MOISTURE INFILTRATION AT JOINTS.

5. DUCT TAPE MAY BE SUBSTITUTED FOR FOIL TAPE.



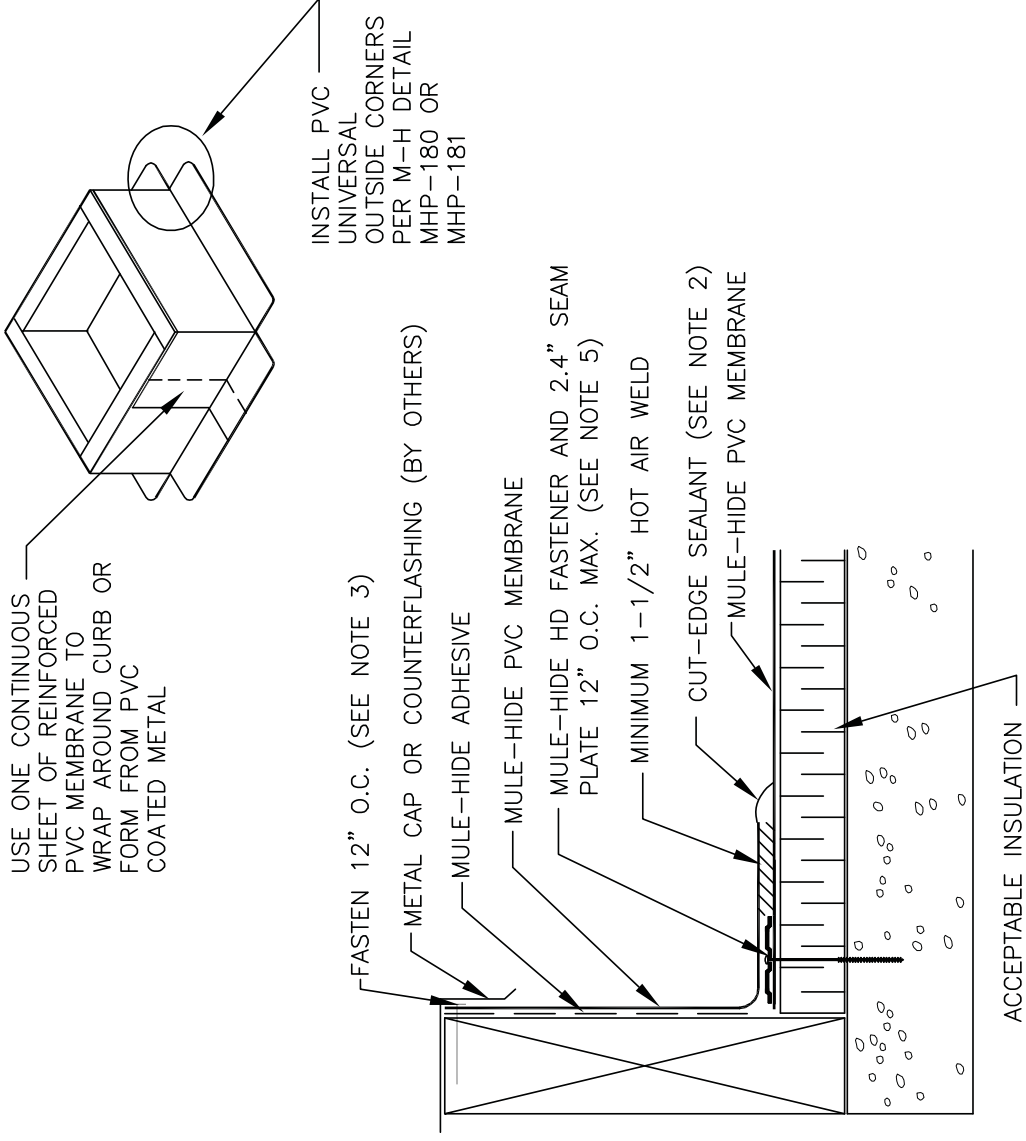
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**PVC COATED WALL FLASHING
SYSTEMS:
ALL PVC**

DETAIL NO:
MHP-121

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FLASHING MEMBRANE FASTENED APPROXIMATELY 12" ON CENTER UNDER COUNTERFLASHING. IF FASTENER PENETRATES METAL COUNTERFLASHING, USE NEOPRENE WASHER OR APPLY WATER CUT-OFF MASTIC UNDER COUNTERFLASHING OR CAULK FASTENER HEAD.
4. FOR CORNER FLASHING, REFER TO APPLICABLE MULE-HIDE DETAIL MHP-180 OR MHP-181.
5. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



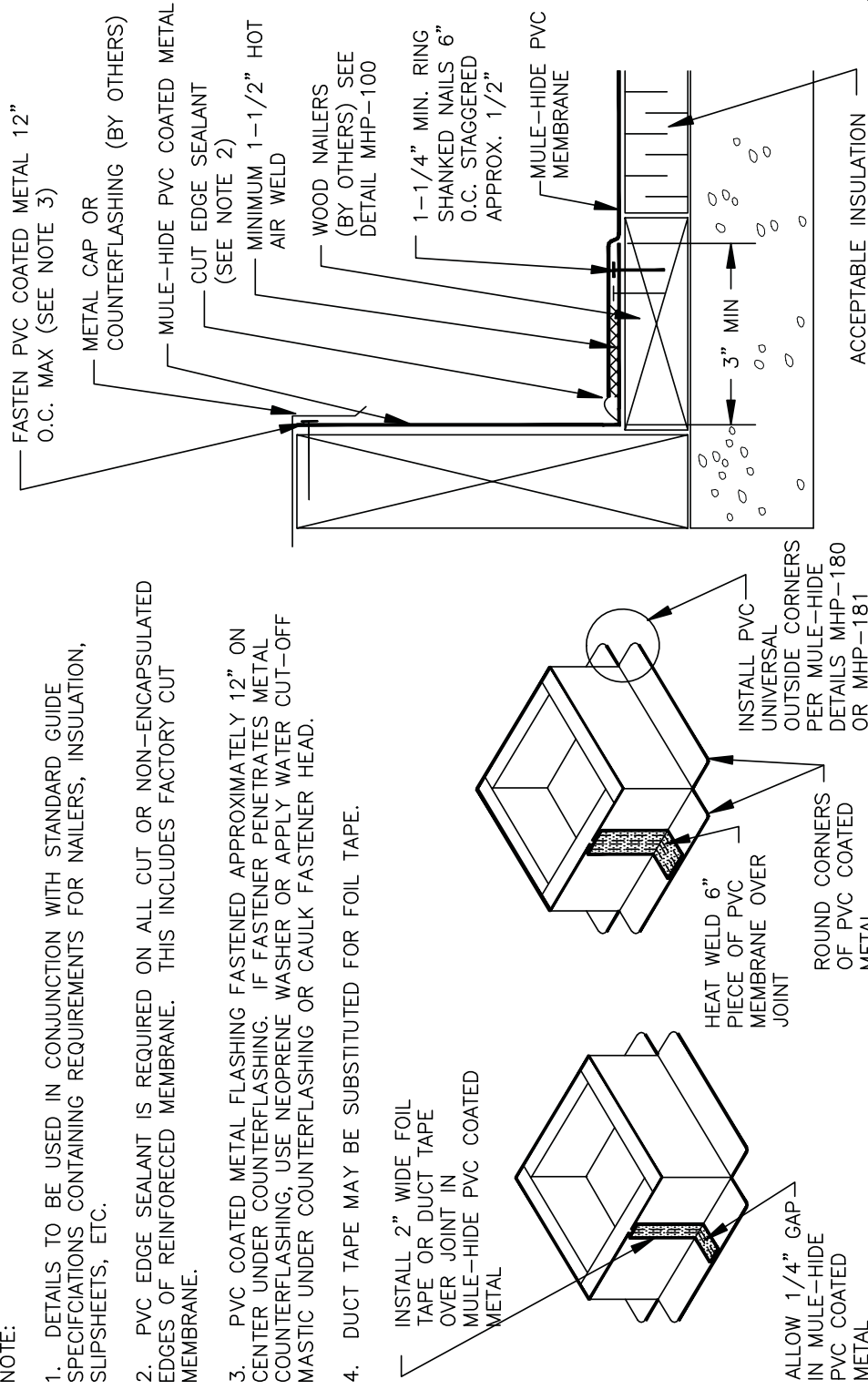
**MULE-HIDE
PRODUCTS CO., INC.
2010**

**DETAIL NO:
MHP-122**

**CURB FLASHING
SYSTEMS:
ALL PVC**

NOTE:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. PVC COATED METAL FLASHING FASTENED APPROXIMATELY 12" ON CENTER UNDER COUNTERFLASHING. IF FASTENER PENETRATES METAL COUNTERFLASHING, USE NEOPRENE WASHER OR APPLY WATER CUT-OFF MASTIC UNDER COUNTERFLASHING OR CAULK FASTENER HEAD.
4. DUCT TAPE MAY BE SUBSTITUTED FOR FOIL TAPE.



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

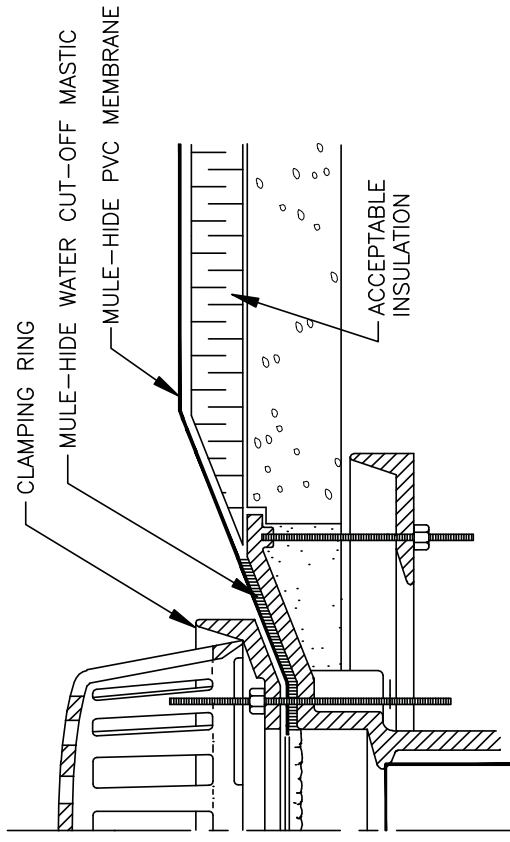
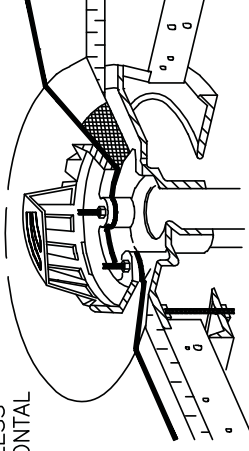
**PVC COATED METAL
CURB FLASHING
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-123**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. REMOVE ALL LEAD AND OTHER FLASHING.
4. ALL BOLTS AND CLAMPS MUST BE IN PLACE TO PROVIDE CONSTANT COMPRESSION ON WATER CUT-OFF MASTIC.
5. CUT THE MEMBRANE SO IT EXTENDS A MINIMUM OF 1/2" FROM THE ATTACHMENT POINTS OF THE DRAIN CLAMPING RING.
6. FOR DRAIN SUMPS WITH SLOPES GREATER THAN 3" IN 12" REFER TO MULE-HIDE DETAIL MHP-131 OR MHP-132.
7. IT IS PREFERRED TO LOCATE SPLICES AT LEAST 6" OUTSIDE DRAIN SUMP. IF SPLICES EXTEND UNDER CLAMPING RING, ENTIRE SPLICE OVERLAP MUST BE HOT AIR WELDED.

FOR DRAINS WITH TAPERED INSULATION AT DRAIN SUMP LESS THAN 3 INCHES TO 1 HORIZONTAL FOOT



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

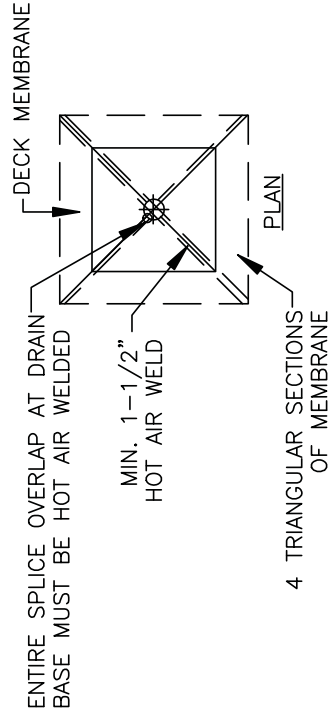
**ROOF DRAIN FOR DRAIN SUMPS
SLOPED LESS THAN 3" PER FOOT**

**DETAIL NO:
MHP-130**

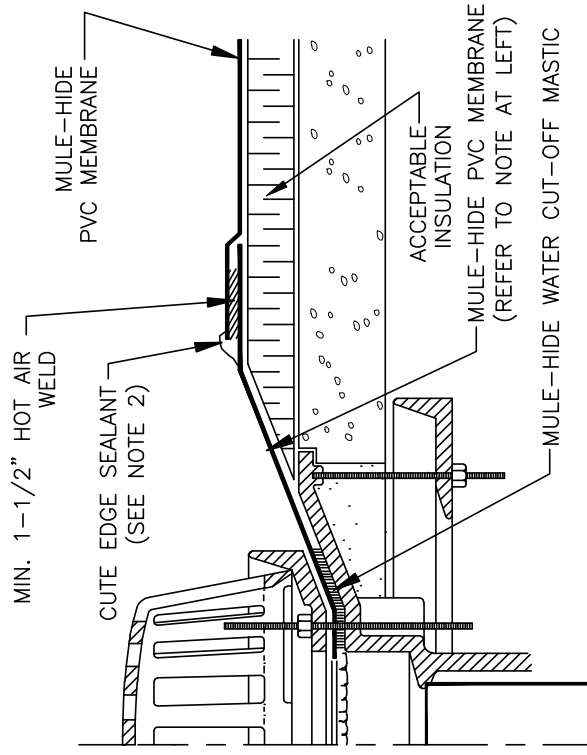
**SYSTEMS:
ALL PVC**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. EXTEND THE REINFORCED MEMBRANE APPROXIMATELY 5-1/2" OUT OF THE SUMP AREA.
4. REMOVE ALL LEAD AND OTHER FLASHING.
5. ALL BOLTS OR CLAMPS MUST BE IN PLACE TO PROVIDE COMPRESSION ON WATER CUT-OFF MASTIC.
6. CUT THE MEMBRANE SO IT EXTENDS A MINIMUM OF 1/2" FROM THE ATTACHMENT POINTS OF THE DRAIN CLAMPING RING.



FOR DRAINS WITH TAPERED INSULATION AT DRAIN SUMP GREATER THAN 3" TO 1 HORIZONTAL FOOT



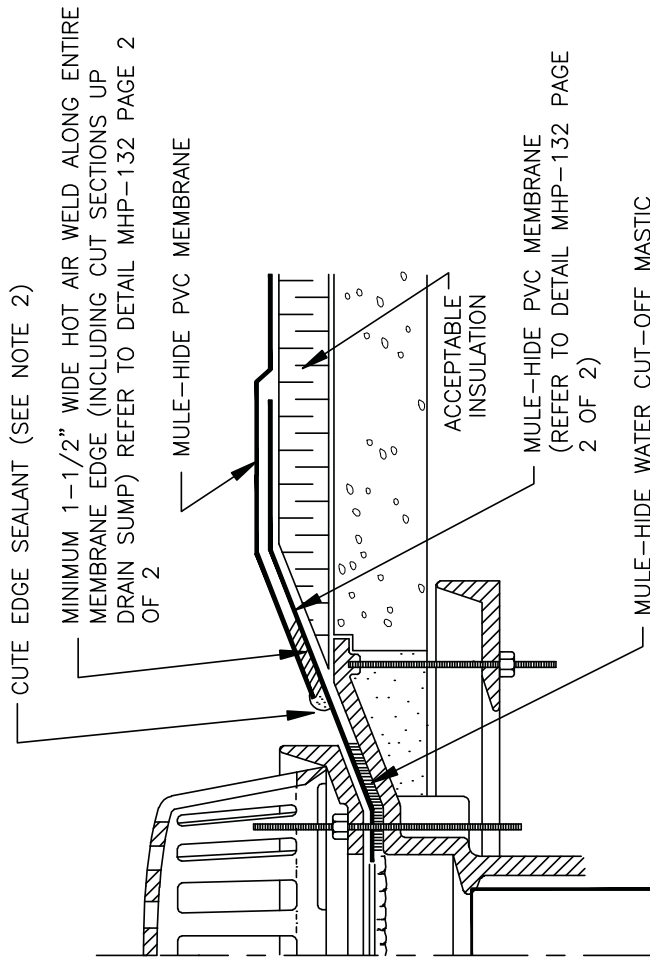
MULE-HIDE
PRODUCTS CO., INC.
04/01/2007

ROOF DRAIN FOR DRAIN SUMPS
SLOPED MORE THAN 3" PER FOOT
SYSTEMS:

FULLY ADHERED PVC

DETAIL NO:
MHP-131

FOR DRAINS WITH TAPERED INSULATION AT DRAIN SUMP
GREATER THAN 3" TO 1 HORIZONTAL FOOT



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. REMOVE ALL LEAD AND OTHER FLASHING.
4. ALL DRAIN BOLTS OR CLAMPS MUST BE IN PLACE TO PROVIDE COMPRESSION ON WATER CUT-OFF MASTIC.
5. CUT MEMBRANE SO IT EXTENDS A MINIMUM OF 1/2" FROM ATTACHMENT POINTS OF THE CLAMPING RING.

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04/01/2007

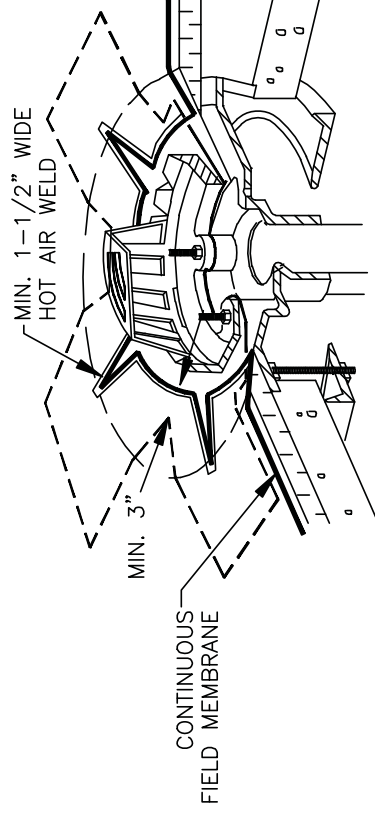
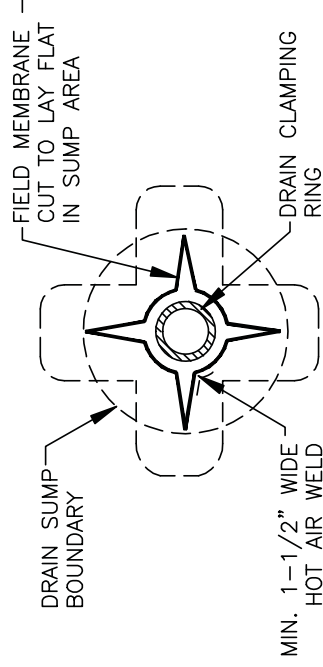
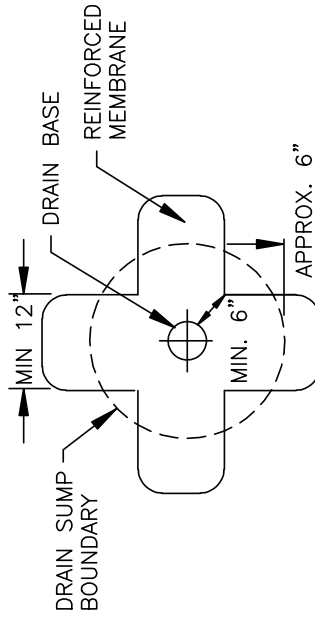
**ROOF DRAIN FOR DRAIN SUMPS
SLOPED MORE THAN 3" PER FOOT**

**SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-132**
(PAGE 1 OF 2)

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.

2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.



CUT SECTION OF REINFORCED MEMBRANE AS SHOWN AND POSITION INTO DRAIN SUMP. EXTEND MEMBRANE OUT OF DRAIN SUMP APPROXIMATELY 6" AND ROUND CORNERS.

EXTEND FIELD MEMBRANE ONTO MEMBRANE SECTION POSITIONED AT DRAIN SUMP AND CUT AS SHOWN TO LAY FLAT IN SUMP. HOT AIR WELD A MINIMUM OF 1-1/2" COMPLETELY SURROUNDING AREA.

**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

**ROOF DRAIN FOR DRAIN SUMPS
SLOPED MORE THAN 3" PER FOOT**

SYSTEMS:

ALL PVC

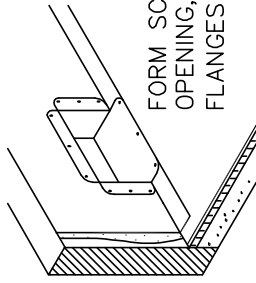
DETAIL NO:

MHP-132

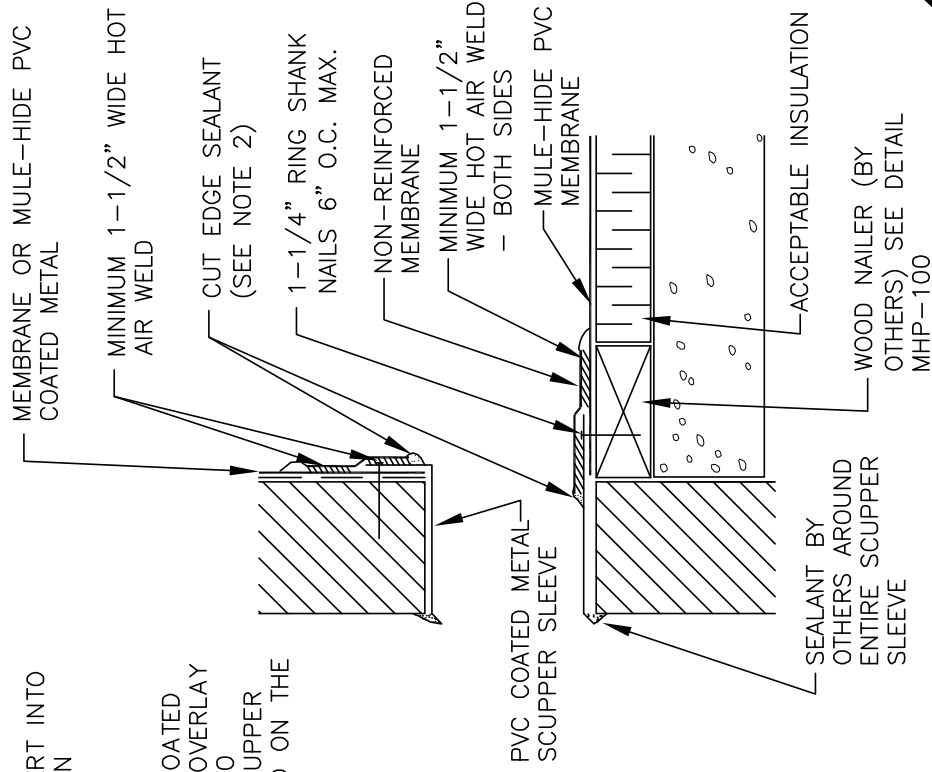
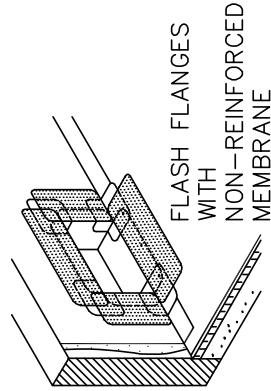
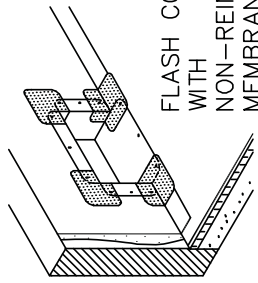
PAGE 2 OF 2

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF DECK FLANGE.
4. INSTALL WALL FLASHING PRIOR TO SCUPPER INSTALLATION.
5. DISCONTINUE FASTENING PLATES AT SCUPPER OPENING AS SHOWN.
6. MINIMUM 1-1/2" HOT AIR WELD FROM NAIL HEAD.



NOTE: FORM SCUPPER BOX OF PVC COATED METAL, TAPE THE METAL SEAM, AND OVERLAY WITH FLASHING BEFORE INSERTING INTO SCUPPER OPENING. POSITION THE SCUPPER BOX SO THE METAL SEAM IS LOCATED ON THE TOP OR SIDES OF THE SCUPPER.



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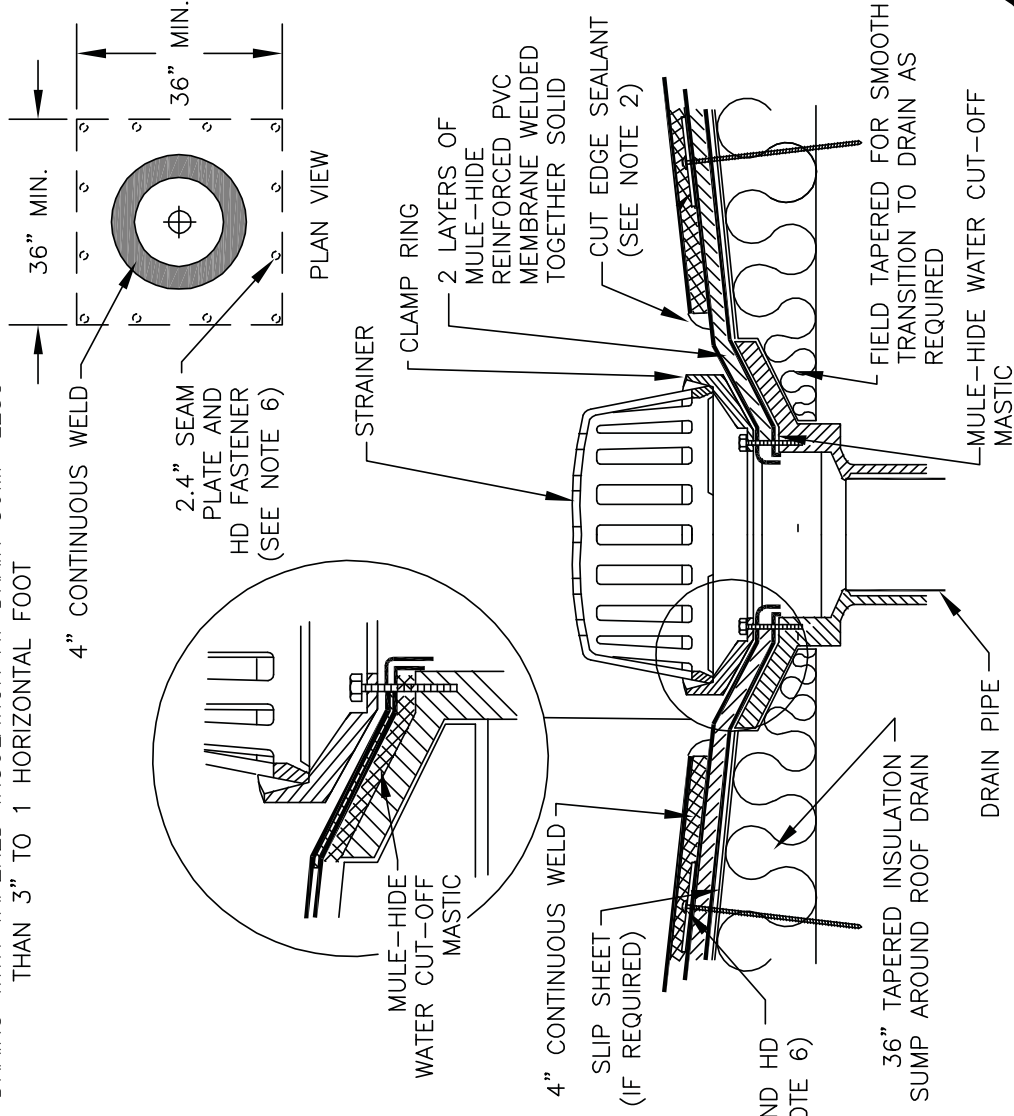
**SCUPPER WITH COATED METAL
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-133**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FIELD MEMBRANE SEAMS MUST NOT RUN THROUGH DRAIN BOWL.
4. ALL MEMBRANE CUTS MUST BE ROUNDED TO PREVENT TEARING.
5. FOR REROOF APPLICATION, OLD LEADS MUST BE REMOVED AND FLANGE CLEANED OF ASPHALT.
6. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.

FOR DRAINS WITH TAPERED INSULATION AT DRAIN SUMP LESS THAN 3" TO 1 HORIZONTAL FOOT



MECHANICALLY FASTENED TARGET

ROOF DRAIN

SYSTEMS:

MECHANICALLY FASTENED PVC

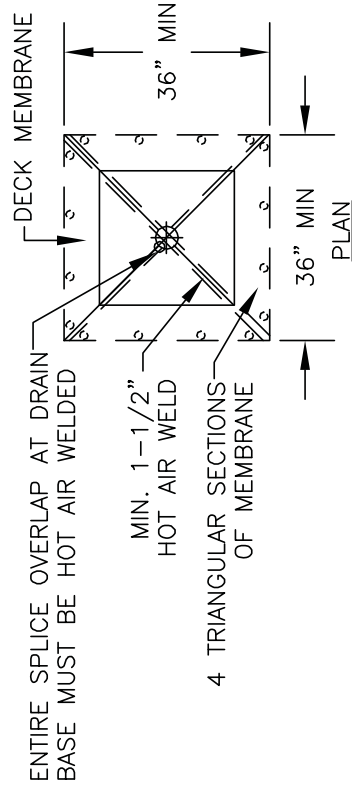
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MHP-134

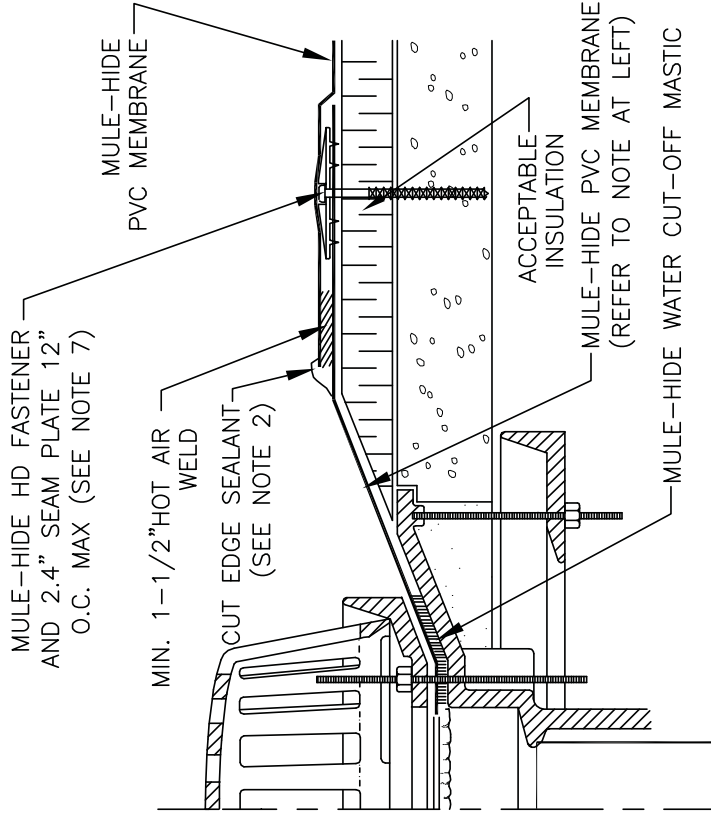
**MULE-HIDE
PRODUCTS CO., INC.
2010**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. EXTEND THE REINFORCED MEMBRANE APPROXIMATELY 5-1/2" OUT OF THE SUMP AREA.
4. REMOVE ALL LEAD AND OTHER FLASHING.
5. ALL BOLTS OR CLAMPS MUST BE IN PLACE TO PROVIDE COMPRESSION ON WATER CUT-OFF MASTIC.
6. CUT THE MEMBRANE SO IT EXTENDS A MINIMUM OF 1/2" FROM THE ATTACHMENT POINTS OF THE DRAIN CLAMPING RING.
7. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



FOR DRAINS WITH TAPERED INSULATION AT DRAIN SUMP
GREATER THAN 3" TO 1 HORIZONTAL FOOT



**MULE-HIDE
PRODUCTS CO., INC.
2010**

**ROOF DRAIN FOR DRAIN SUMPS
SLOPED MORE THAN 3" PER FOOT**

SYSTEMS:

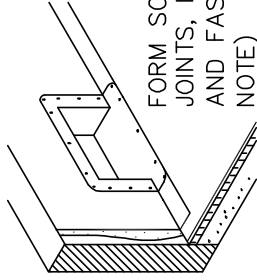
MECHANICALLY FASTENED PVC

DETAIL NO:

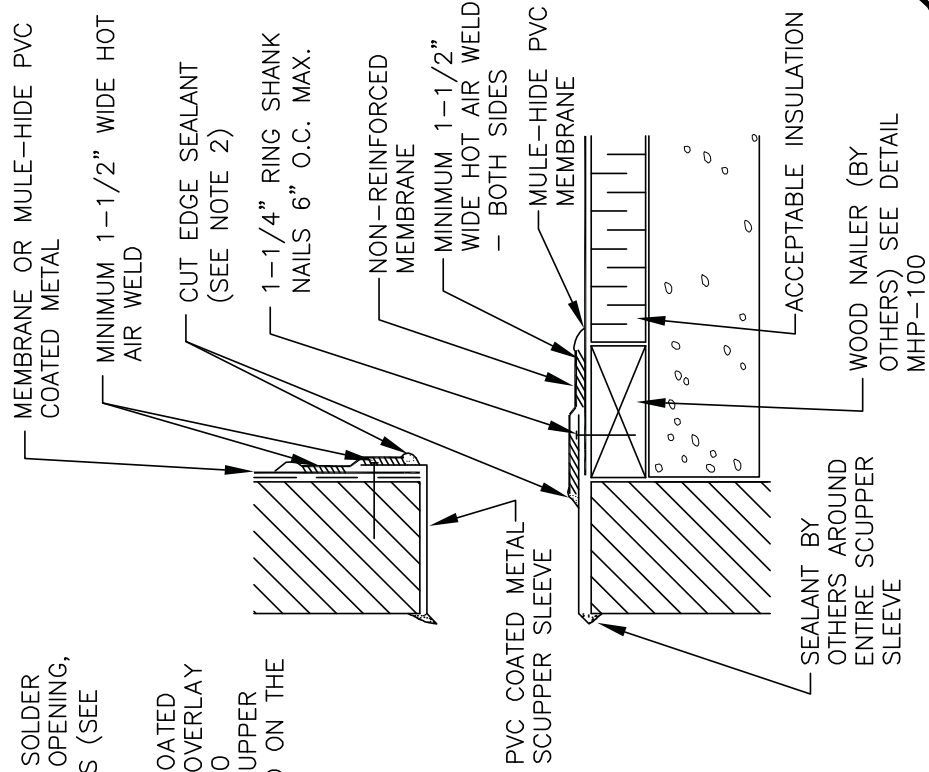
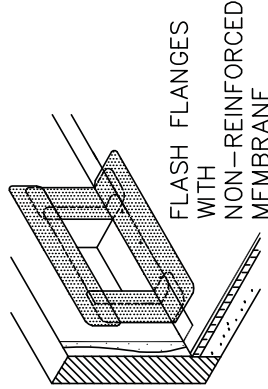
MHP-135

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF DECK FLANGE.
4. INSTALL WALL FLASHING PRIOR TO SCUPPER INSTALLATION.
5. DISCONTINUE FASTENING PLATES AT SCUPPER OPENING AS SHOWN.
6. MINIMUM 1-1/2" HOT AIR WELD FROM NAIL HEAD.



NOTE: FORM SCUPPER BOX OF PVC COATED METAL, TAPE THE METAL SEAM, AND OVERLAY WITH FLASHING BEFORE INSERTING INTO SCUPPER OPENING. POSITION THE SCUPPER BOX SO THE METAL SEAM IS LOCATED ON THE TOP OR SIDES OF THE SCUPPER.



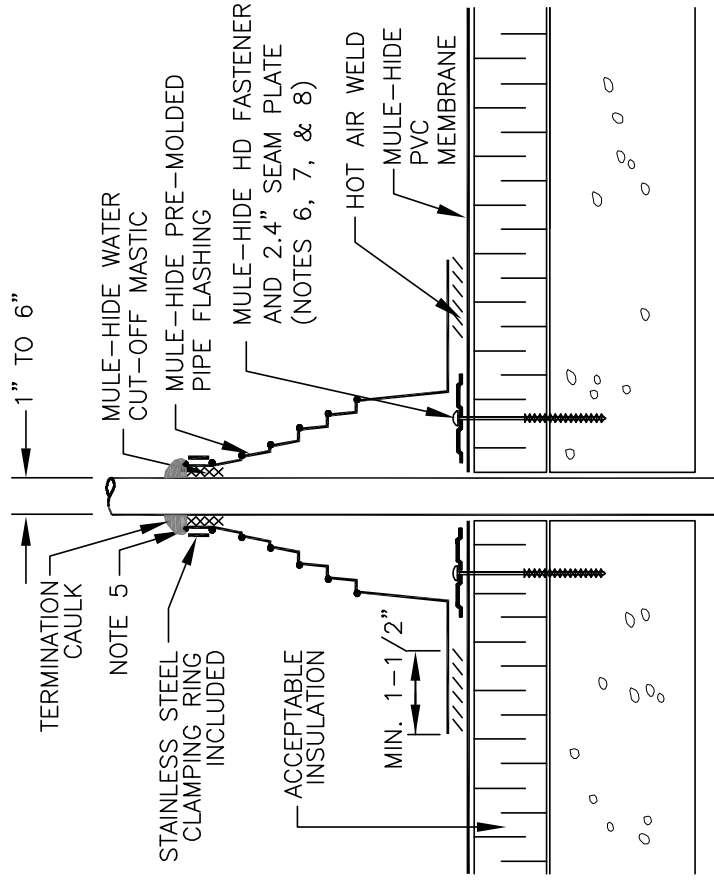
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**(SOLDERED JOINTS)
SCUPPER WITH COATED METAL
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-136**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
 3. REMOVE ALL LEAD AND OTHER FLASHING.
 4. TEMPERATURE OF PIPE MUST NOT EXCEED 180° F.
 5. PIPE SEAL MUST HAVE INTACT RIB AT TOP EDGE, REGARDLESS OF PIPE DIAMETER.
 6. INSTALL 3 FASTENERS AND SEAM PLATES AROUND PIPE EQUALLY SPACED. FASTENERS MAY ALSO BE POSITIONED MAXIMUM 12" FROM PIPE, FASTENED 12" ON CENTER AND FLASHED WITH MULE-HIDE PVC REINFORCED MEMBRANE.
- FASTENERS/PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS UNLESS PIPE DIAMETER EXCEEDS 18".
7. IF PLATES CANNOT BE INSTALLED AS SHOWN THEY CAN BE POSITIONED OUTSIDE THE PIPE FLASHING FLANGE AND FLASHED WITH 6" WIDE REINFORCED MEMBRANE.
 8. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



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PRODUCTS CO., INC.
04/01/2007**

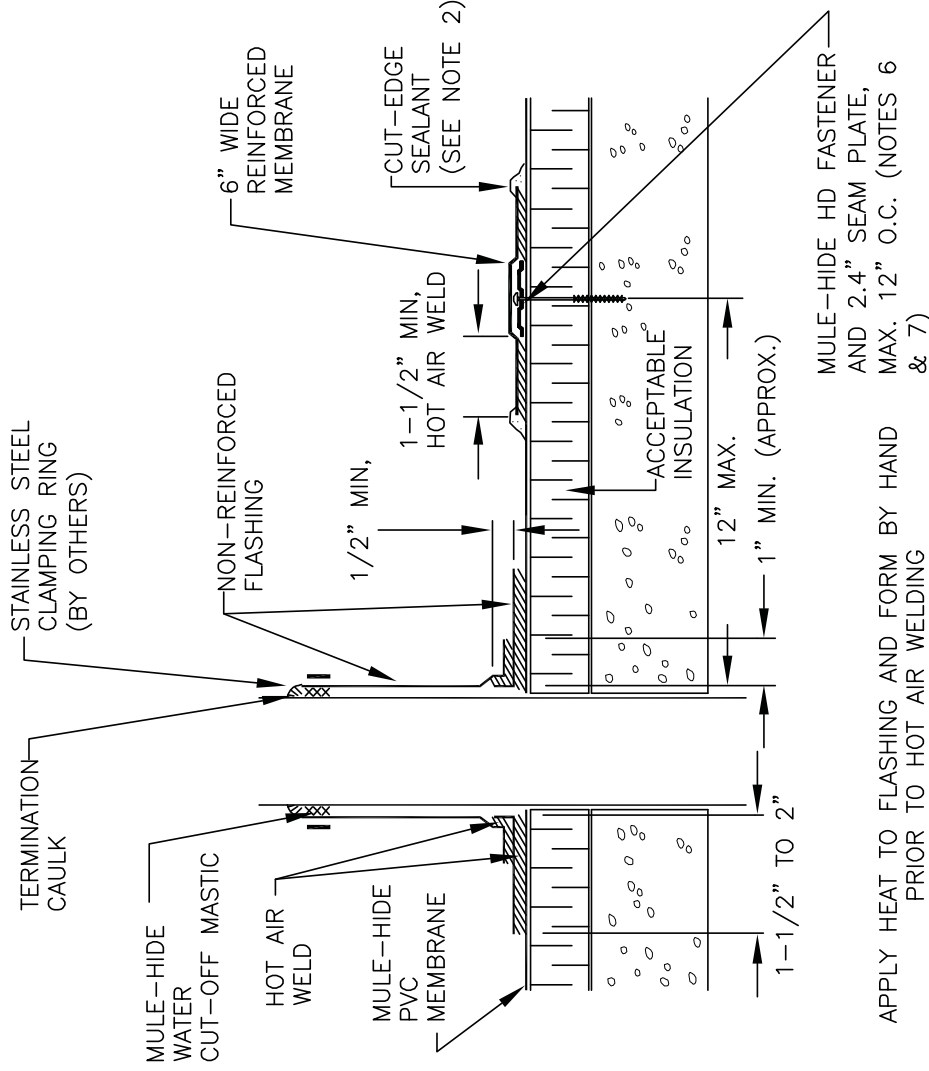
**PVC PRE-MOLDED PIPE FLASHING
SYSTEMS:
MECHANICALLY ATTACHED PVC**

**DETAIL NO:
MHP-140**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. REMOVE ALL LEAD AND OTHER FLASHING BEFORE INSTALLING FIELD FABRICATED PIPE SEAL.
4. TEMPERATURE OF PIPE MUST NOT EXCEED 180° F.
5. NON-REINFORCED MEMBRANE WRAPPED AROUND PIPE SHALL HAVE MINIMUM 1-1/2" VERTICAL HOT AIR WELD.
6. INSTALL A MINIMUM OF 4 2.4" SEAM PLATES AROUND PIPES WITH A DIAMETER UP TO 6". ADDITIONAL SEAM PLATES WILL BE REQUIRED FOR PIPES GREATER THAN 6" IN DIAMETER AND SHALL BE SPACED 12" ON CENTER MAXIMUM.

FASTENERS/PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS UNLESS PIPE DIAMETER EXCEEDS 18".
7. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



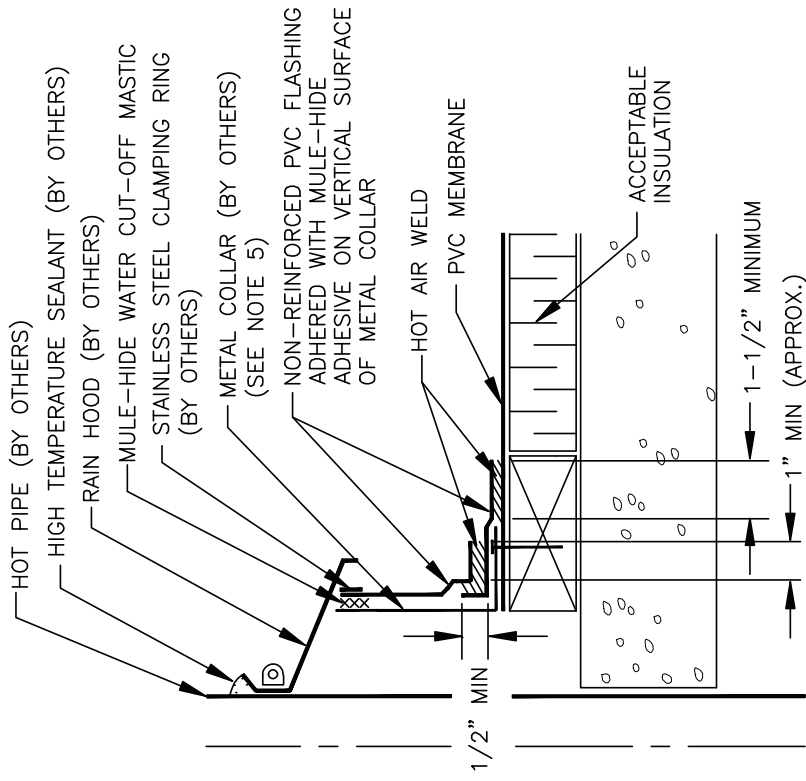
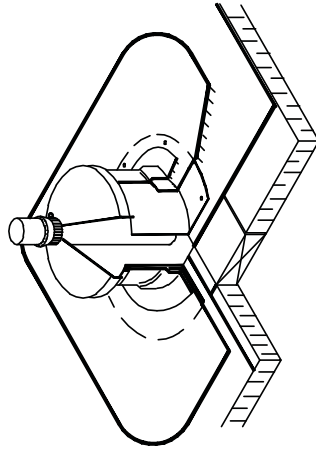
MULE-HIDE
PRODUCTS CO., INC.
04/01/2007

FIELD FABRICATED PIPE FLASHING
SYSTEMS:
FULLY ADHERED AND
MECHANICALLY ATTACHED PVC

DETAIL NO:
MHP-141

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FIELD-FABRICATED PIPE SEAL FOR USE WITH HOT PIPE, 120° F OR HOTTER.
4. NON-REINFORCED MEMBRANE WRAPPED AROUND PIPE SHALL HAVE MINIMUM 1-1/2" VERTICAL HOT AIR WELD.
5. TEMPERATURE OF METAL COLLAR MUST NOT EXCEED 120° F.



APPLY HEAT TO FLASHING AND FORM BY HAND PRIOR TO HOT AIR WELDING

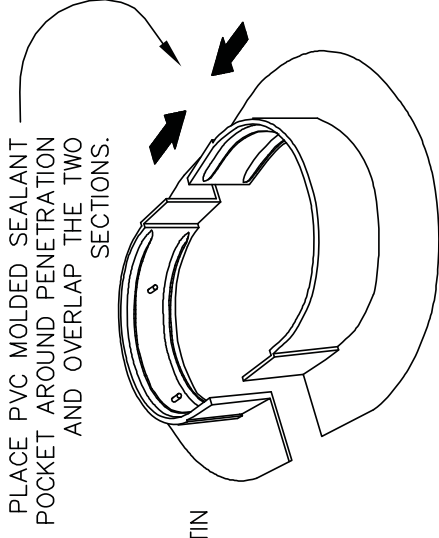
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**FIELD FABRICATED HOT PIPE
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-142**

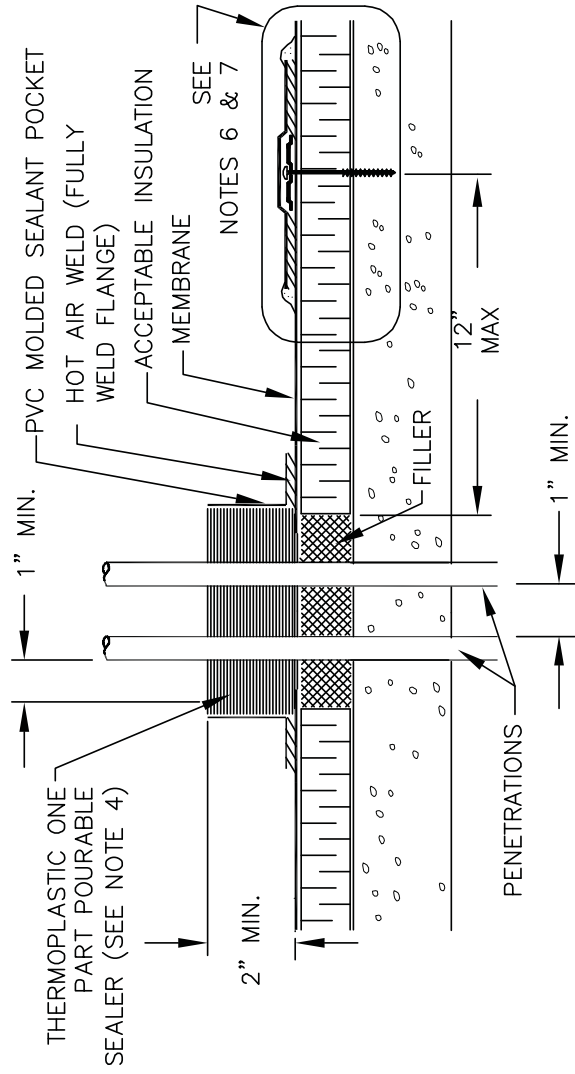
NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. TEMPERATURE OF PIPE MUST NOT EXCEED 180° F.
4. FILL POCKET COMPLETELY WITH THERMOPLASTIC ONE PART POURABLE SEALER UNTIL RIM IS COVERED WITH SEALANT; ENSURE ALL VOIDS ARE FILLED.
5. SEALANT POCKET TO BE MINIMUM 1" FROM PENETRATION ON ANY SIDE.
6. ON MECHANICALLY-FASTENED SYSTEMS, INSTALL A MINIMUM OF 4 2.4" SEAM PLATES AROUND SEALANT POCKETS. FASTENERS/PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS.
7. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



PLACE PVC MOLDED SEALANT POCKET AROUND PENETRATION AND OVERLAP THE TWO SECTIONS.

REFER TO TECHNICAL DATA BULLETIN (TDB) FOR STEP-BY-STEP INSTALLATION PROCEDURES



**MULE-HIDE
PRODUCTS CO., INC.
2010**

**DETAIL NO:
MHP-143**

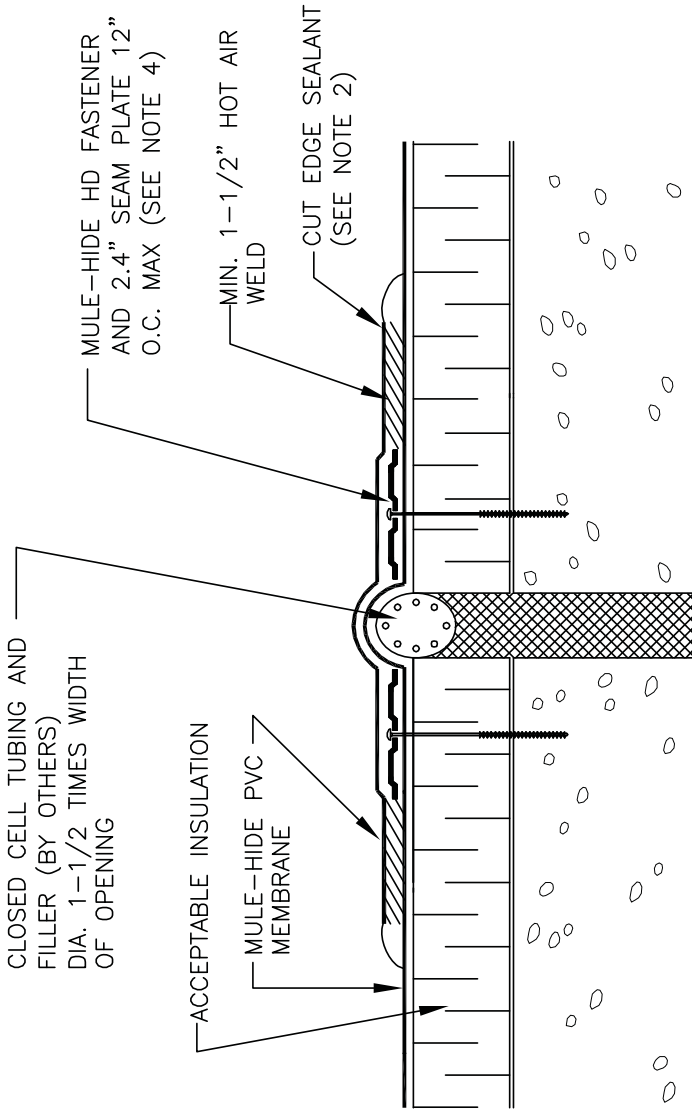
MOLDED SEALANT POCKET

SYSTEMS:

ALL PVC

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. POSITION SEAM PLATES $1\frac{1}{2}$ " MINIMUM TO 1" MAXIMUM FROM EDGE OF FIELD MEMBRANE.
4. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

**EXPANSION JOINT
DECK TO DECK**

SYSTEMS:

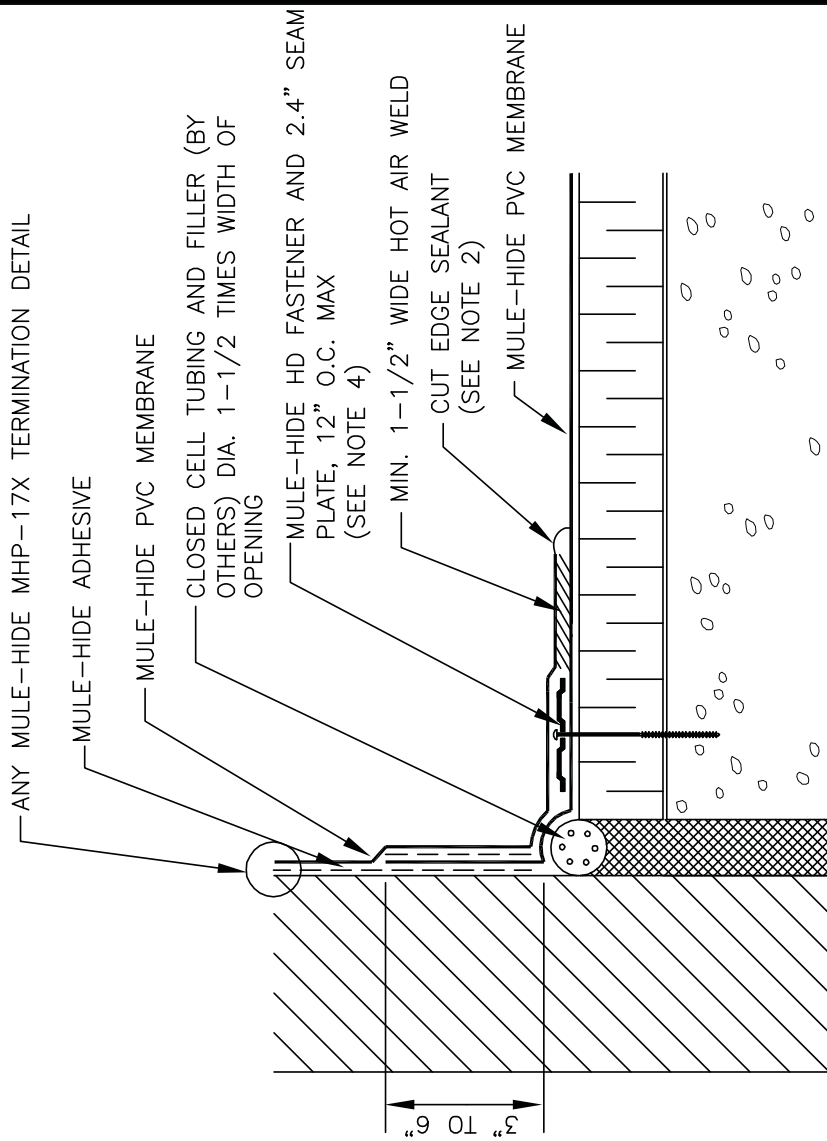
ALL PVC

DETAIL NO:

MHP-150

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. POSITION SEAM PLATES 1/2" MINIMUM TO 1" MAXIMUM FROM EDGE OF DECK FLANGE.
4. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

**EXPANSION JOINT AT JUNCTION
OF DECK AND WALL**

SYSTEMS:

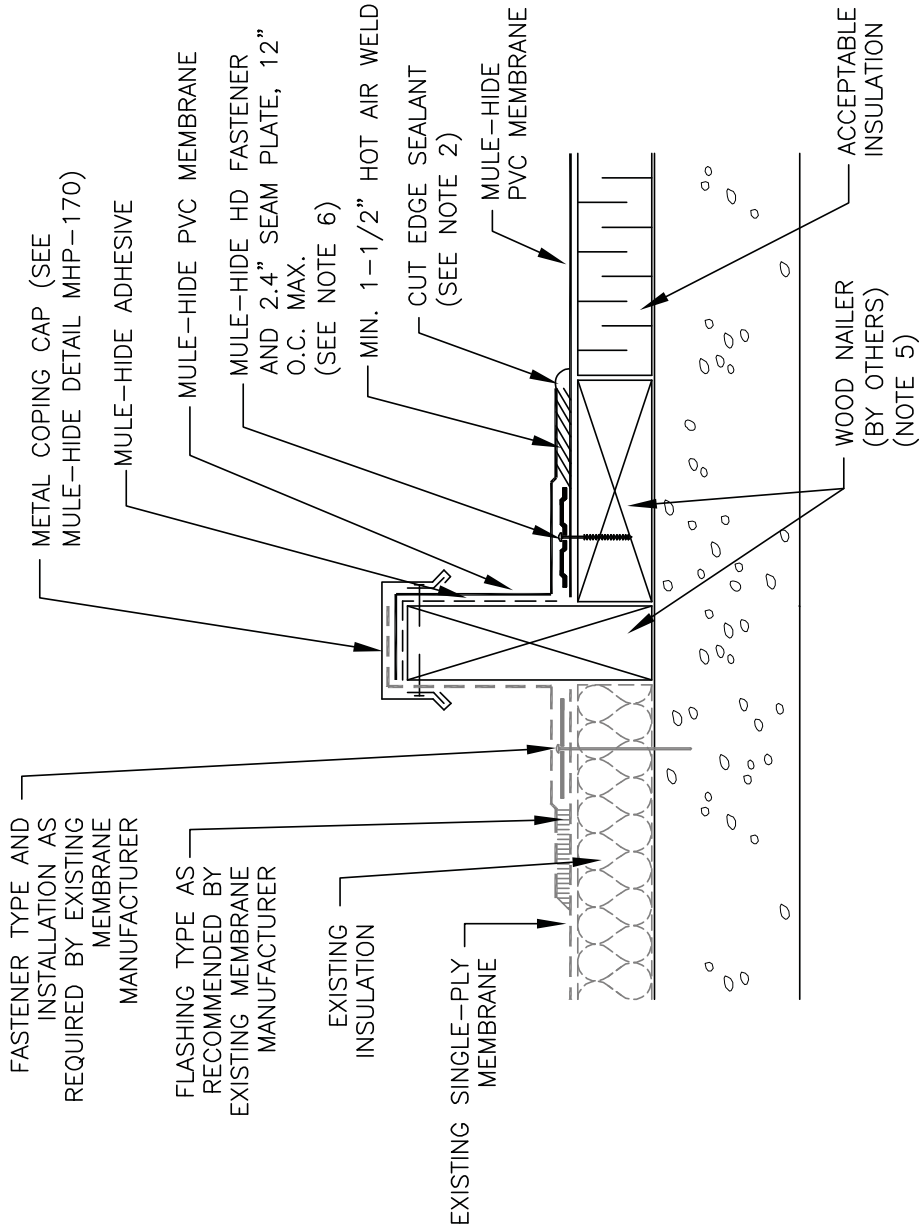
ALL PVC

DETAIL NO:

MHP-151

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. POSITION 2.4" SEAM PLATES 1/2" TO 1" FROM EDGE OF FIELD MEMBRANE.
4. SEAM PLATES CAN BE INSTALLED VERTICALLY.
5. IF A WOOD NAILER IS NOT PRESENT, THE FASTENER MUST ENGAGE THE STRUCTURAL ROOF DECK.
6. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

DETAIL NO:
MHP-160

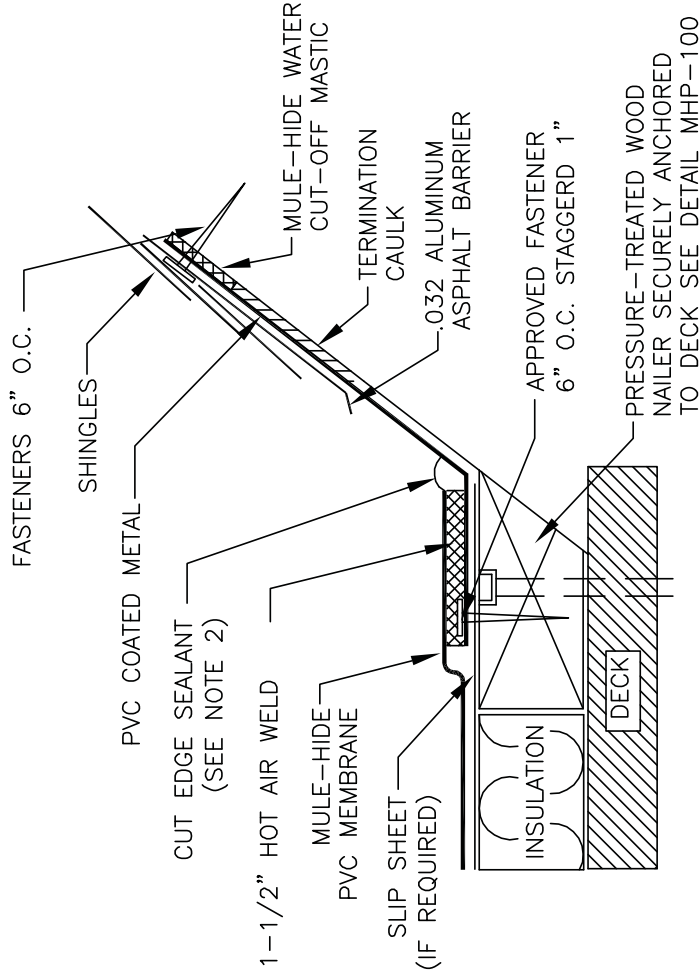
TIE-IN TO EXISTING SINGLE-PLY

SYSTEMS:

ALL PVC

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT EDGES OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. ACCORDING TO PROJECT CONDITIONS, THE SPECIFIER AND/OR APPLICATOR MUST DETERMINE THE REQUIRED VERTICAL FLASHING HEIGHT BASED ON REGIONAL CLIMATIC CONDITIONS.
4. COATED METAL FLASHINGS MUST EXTEND UNDER A MINIMUM OF TWO (2) COURSES OF SHINGLES.
5. THE ROOFING SHEET MAY BE ATTACHED WITH APPROVED FASTENERS AND PLATES AS A BASE TIE-IN. SEE DETAIL MHP-120.



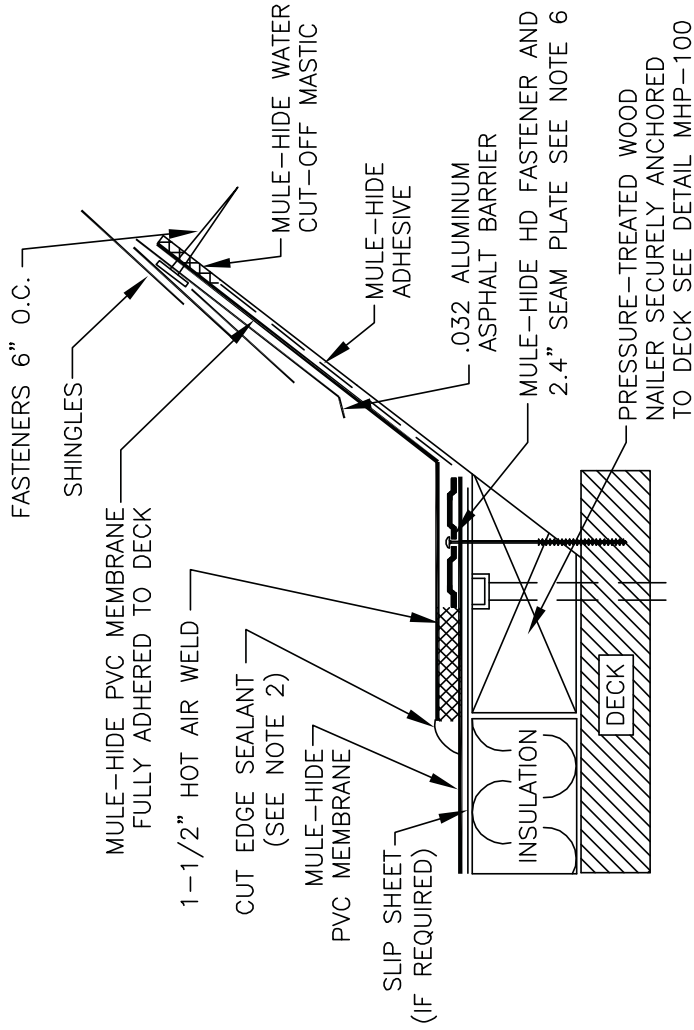
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**COATED METAL
TRANSITION TO SHINGLE ROOF
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-161**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT EDGES OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. ACCORDING TO PROJECT CONDITIONS, THE SPECIFIER AND/OR APPLICATOR MUST DETERMINE THE REQUIRED VERTICAL FLASHING HEIGHT BASED ON REGIONAL CLIMATIC CONDITIONS.
4. COATED METAL FLASHINGS MUST EXTEND UNDER A MINIMUM OF TWO (2) COURSES OF SHINGLES.
5. THE ROOFING SHEET MAY BE ATTACHED WITH APPROVED FASTENERS AND PLATES AS A BASE TIE-IN. SEE DETAIL MHP-120.
6. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

**MEMBRANE FLASHING
TRANSITION TO SHINGLE ROOF
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-162**

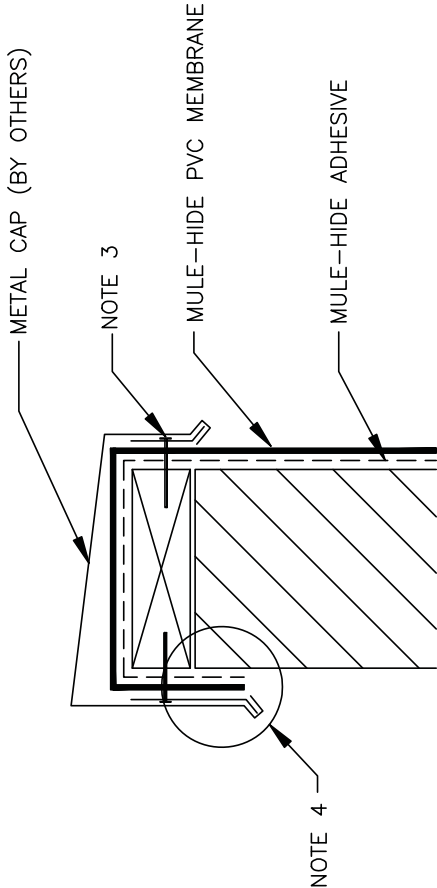
NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.

2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.

3. FACE FASTENING WITH GROMMETTED FASTENERS SPACED 18" O.C. MAX ON INSIDE FACE OF METAL CAP IS ACCEPTABLE IN LIEU OF CONCEALED CLIP.

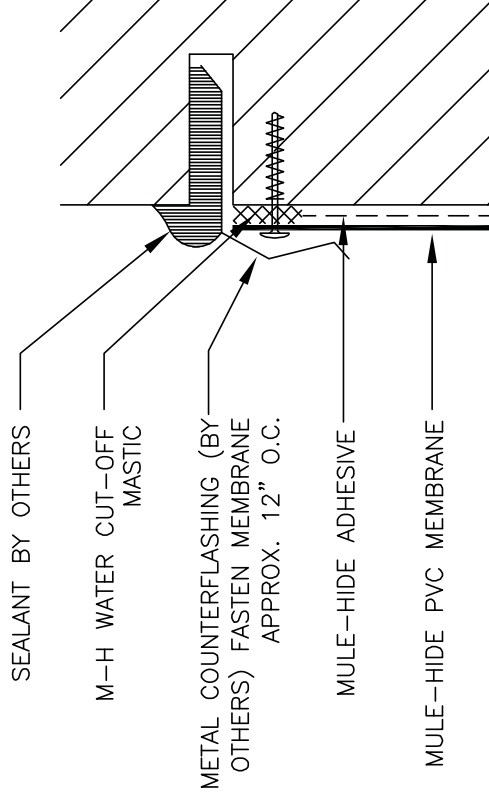
4. OUTSIDE FACE OF METAL CAP AND PVC MEMBRANE TO EXTEND DOWN BELOW BOTTOM EDGE OF WOOD NAILER MINIMUM OF 1-1/2".



**MULE-HIDE
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04/01/2007**

**METAL CAP TERMINATION
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-170**



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. COUNTERFLASHING SHALL BE ELEVATED ABOVE PONDED WATER.
4. NOT FOR USE ON 15 OR 20 YEAR WARRANTY PROJECTS (REFER TO MULE-HIDE DETAIL MHP-174).

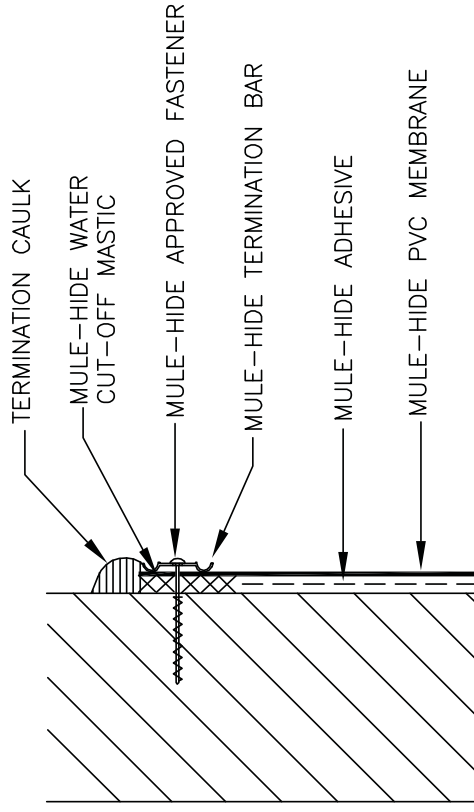
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**REGLET COUNTERFLASHING
TERMINATION**

**SYSTEMS:
ALL PVC**

DETAIL NO:

MHP-171



NOTES:

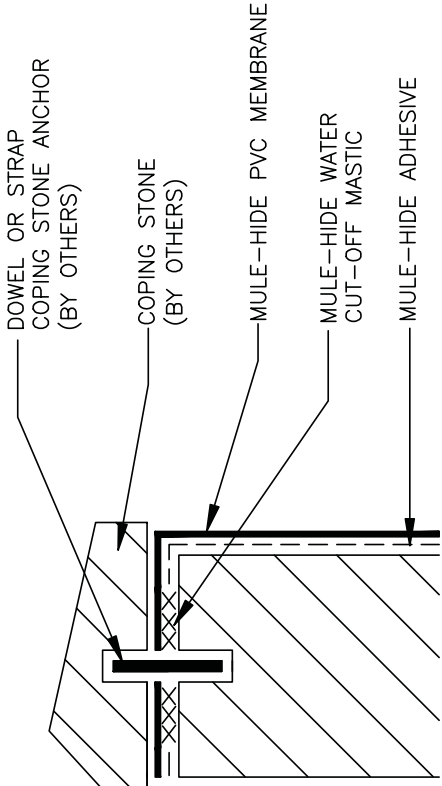
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. FASTENERS OF METAL BAR MUST PROVIDE CONSTANT COMPRESSION ON WATER CUT-OFF MASTIC.
4. ALLOW 1/4" TO 1/2" SPACING BETWEEN CONSECUTIVE LENGTHS OF TERMINATION BAR.

**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

TERMINATION BAR SYSTEMS: ALL PVC	DETAIL NO: MHP-172
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NOTES:

- 1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
- 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.

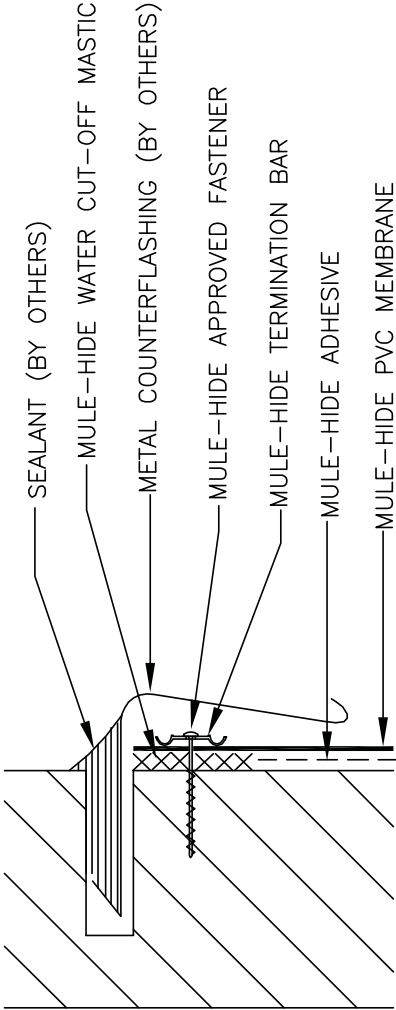


**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**COPING STONE
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-173**

FOR USE ON 15 AND 20 YEAR WARRANTY PROJECTS.
TERMINATION BAR IS NOT REQUIRED ON 10 YEAR
WARRANTY PROJECTS (REFER TO MULE-HIDE DETAIL
MHP-171)



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. APPLY ON HARD SMOOTH SURFACE ONLY; NOT FOR USE ON WOOD.
4. DO NOT WRAP COMPRESSION TERMINATION AROUND CORNERS.

**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

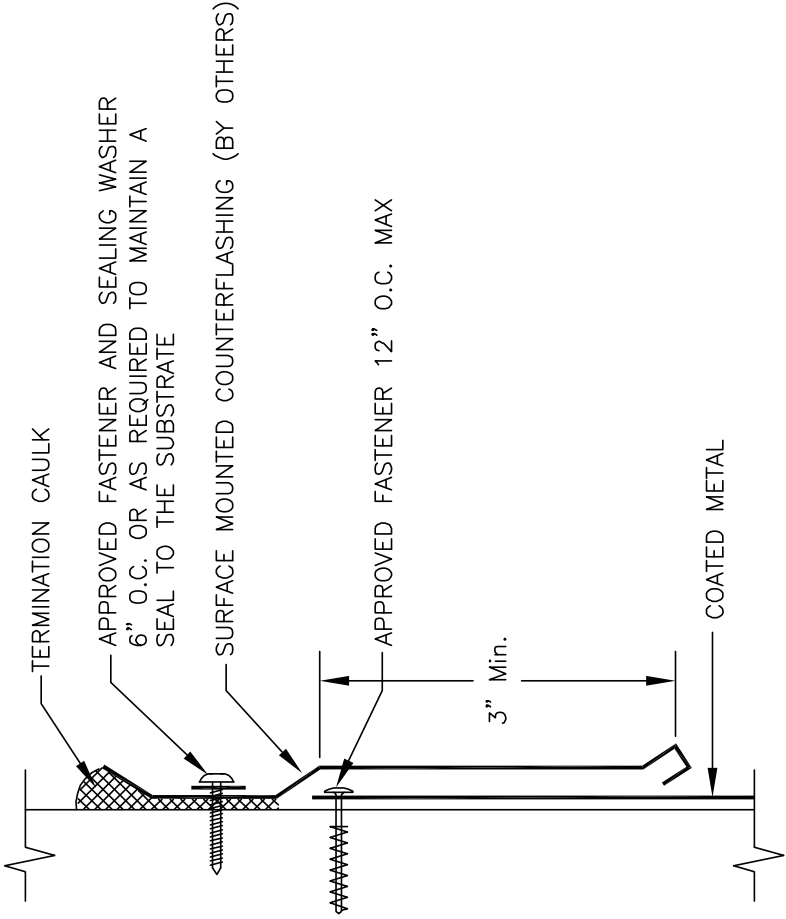
**15 AND 20 YEAR WARRANTY
MECHANICAL TERMINATION**

**SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-174**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIP SHEETS, ETC.
2. SURFACE MOUNTED COUNTERFLASHING MUST BE INSTALLED TO HARD, SMOOTH NON-POROUS SUBSTRATE.
3. DO NOT APPLY ALL PURPOSE SEALANT OVER ASPHALT OR OTHER MATERIALS THAT WILL PREVENT PROPER ADHESION.



**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

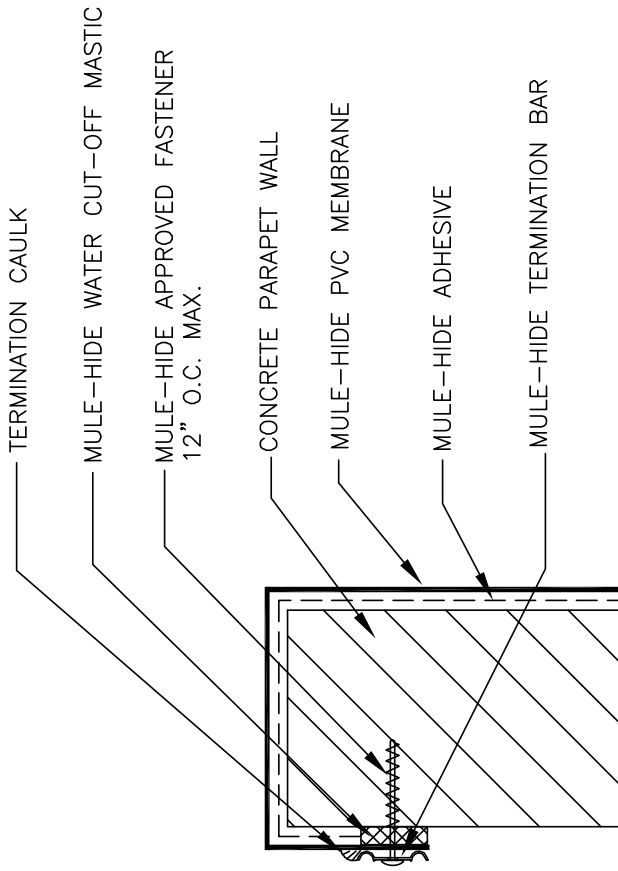
**SURFACE MOUNTED
METAL COUNTERFLASHING**

**SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-175**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. MEMBRANE TO EXTEND ONTO OUTSIDE FACE OF WALL MINIMUM OF 2" TO PREVENT SPALLING OF CONCRETE WHILE DRILLING.

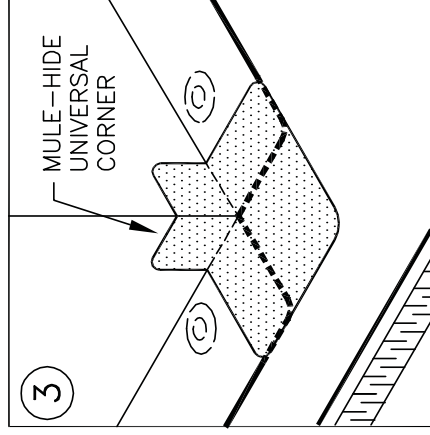
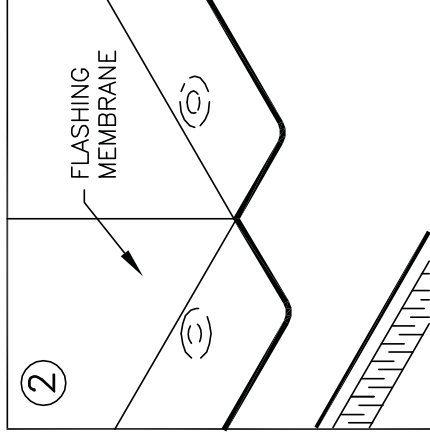
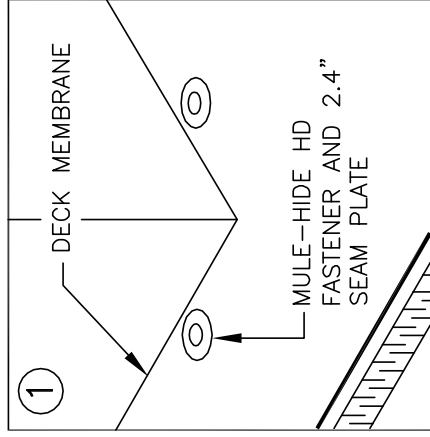


**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**CONCRETE PARAPET WALL
WITH TERMINATION BAR**

**SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-176**



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. BEGIN INSTALLATION OF SEAM PLATES APPROXIMATELY 6" FROM CORNER.
4. POSITION SEAM PLATES 1/2" TO 1" FROM EDGE OF FIELD MEMBRANE.

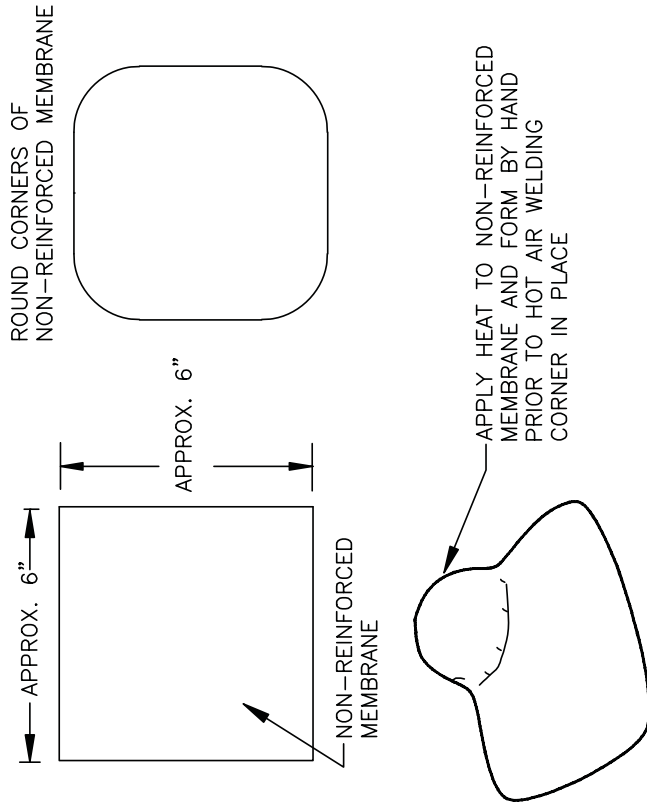
**MULE-HIDE
PRODUCTS CO., INC.
2010**

**DETAIL NO:
MHP-180**

PRE-MOLDED OUTSIDE CORNER

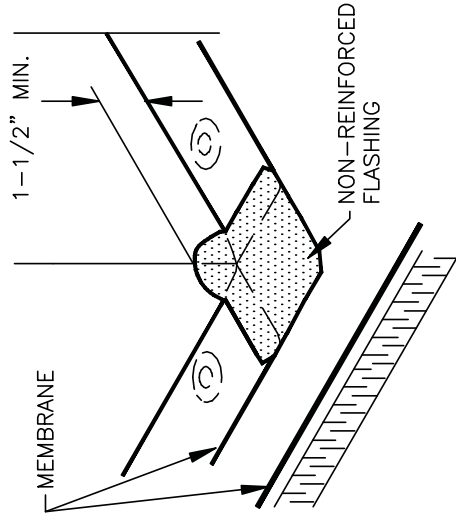
SYSTEMS:

ALL PVC



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.



POSITION AND HEAT WELD
CORNER IN PLACE AS SHOWN

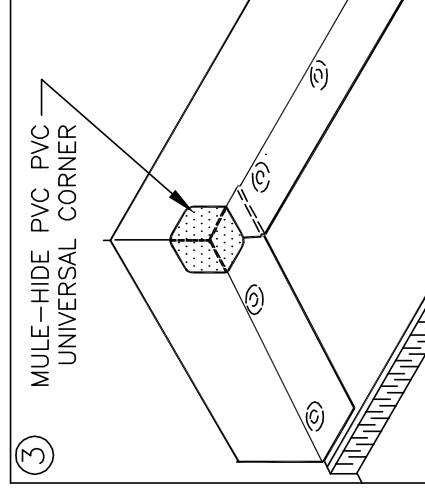
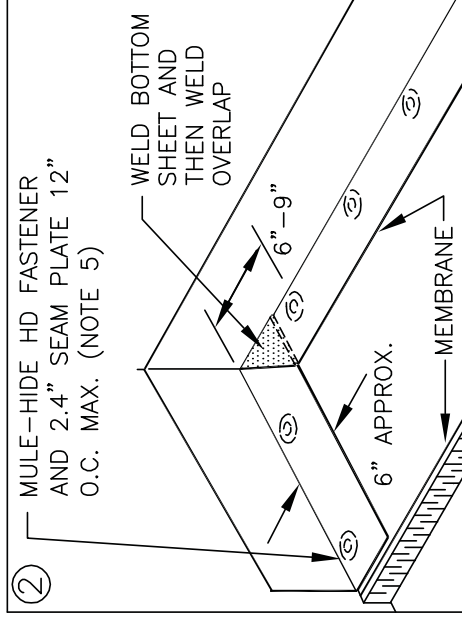
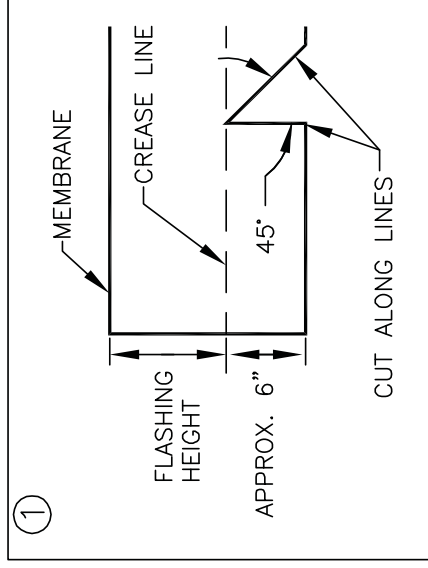
**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

**FIELD FABRICATED
OUTSIDE CORNER**

**DETAIL NO:
MHP-181**

SYSTEMS:

ALL PVC



NOTES:

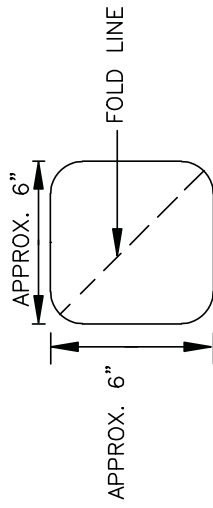
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. BEGIN INSTALLATION OF SEAM PLATES 6" TO 9" FROM THE CORNER.
4. POSITION SEAM PLATES 1/2" TO 1" FROM EDGE OF MEMBRANE.
5. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.

**MULE-HIDE
PRODUCTS CO., INC.
2010**

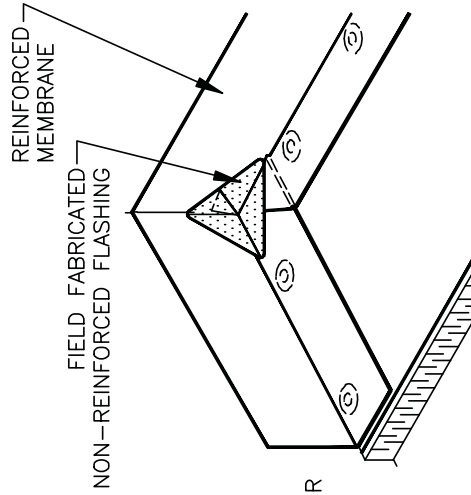
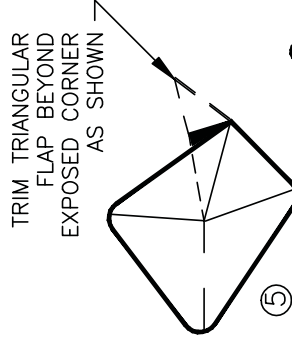
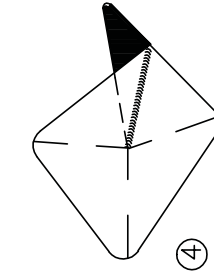
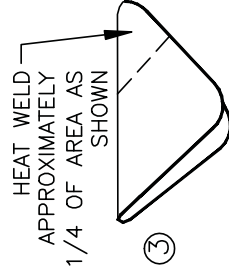
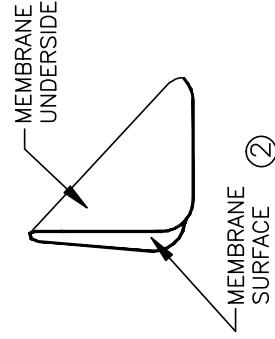
**PRE-MOLDED
INSIDE CORNER FLASHING**

**SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-182**

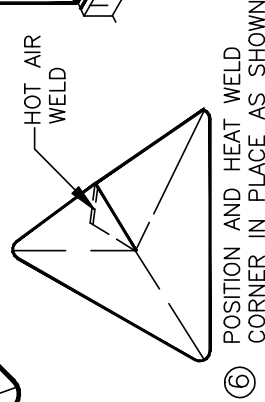


- CUT A SECTION OF NON-REINFORCED MEMBRANE WITH ROUNDED CORNERS OR USE INSIDE/OUTSIDE CORNER;
 ① FOLD ALONG LINE AS INDICATED



NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.

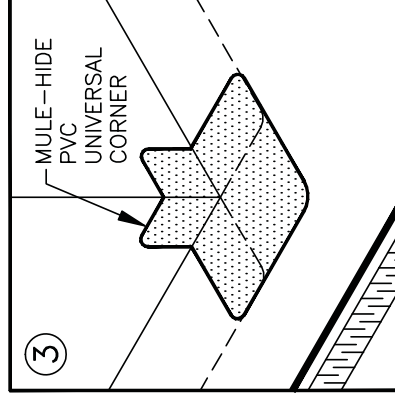
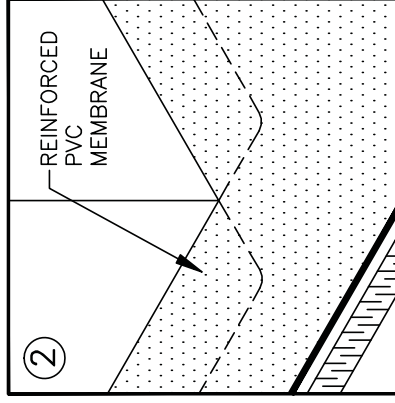
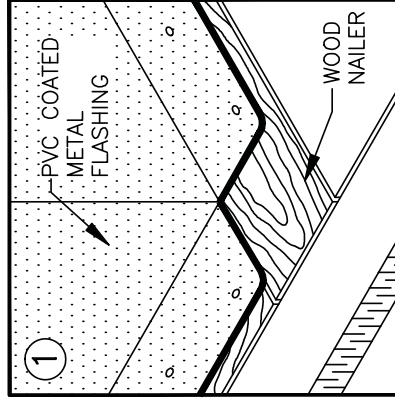


- ⑥ POSITION AND HEAT WELD CORNER IN PLACE AS SHOWN

**MULE-HIDE
 PRODUCTS CO., INC.
 04/01/2007**

**FIELD FABRICATED INSIDE CORNER
 SYSTEMS:
 ALL PVC**

**DETAIL NO:
 MHP-183**



NOTES:

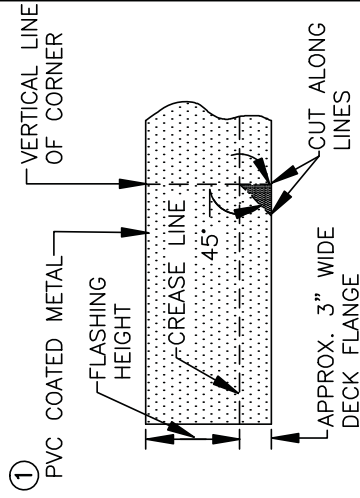
1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
 2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
 3. FASTEN COATED METAL FLASHING TO WOOD NAILERS USING RINK SHANK NAILS SPACED 6 INCHES O.C., STAGGERED 1/2".
- REFER TO MULE-HIDE DETAIL MHP-185 FOR FLASHING VERTICAL JOINTS IN COATED METAL.

**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

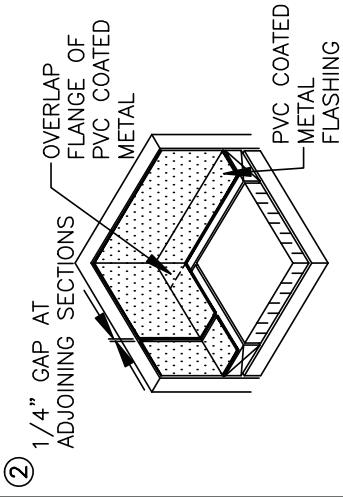
**PRE-MOLDED OUTSIDE CORNER ON
COATED METAL WALL FLASHING**

**SYSTEMS:
ALL PVC**

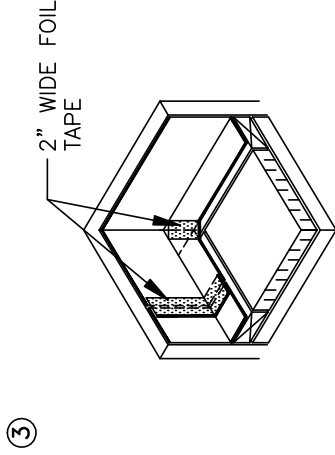
**DETAIL NO:
MHP-184**



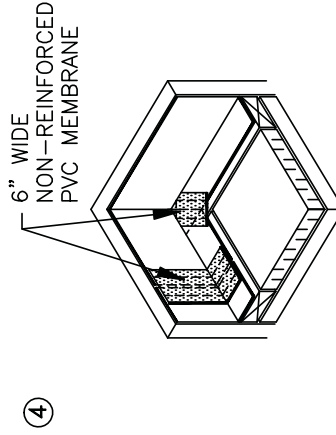
CREASE PVC COATED METAL FLASHING ALONG DASHED LINES AFTER CUTTING AND REMOVING SHADED TRIANGLE.



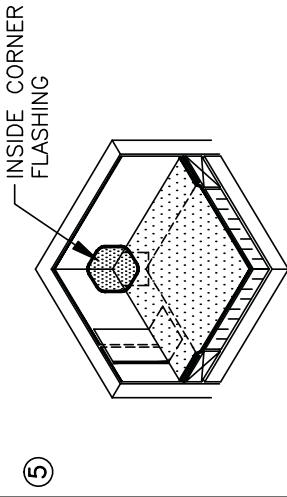
OVERLAP FLANGE AT CORNER AND FASTEN TO WOOD NAILERS USING 1-1/4" RING SHANK NAILS SPACED 6" O.C., STAGGERED 1/2".



INSTALL 2" WIDE FOIL TAPE OVER VERTICAL JOINT IN PVC COATED METAL AND OVER CUT EDGE AT CORNER AS SHOWN.



HEAT WELD 6" WIDE PIECE OF REINFORCED PVC MEMBRANE OVER FOIL TAPE.



INSTALL PVC FIELD MEMBRANE AND HEAT WELD TO FLANGE OF PVC COATED METAL. ALSO INSTALL INSIDE CORNER FLASHING PER MULE-HIDE DETAILS MHP-182 OR MHP-183.

NOTE:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. DUCT TAPE MAY BE SUBSTITUTED FOR FOIL TAPE.

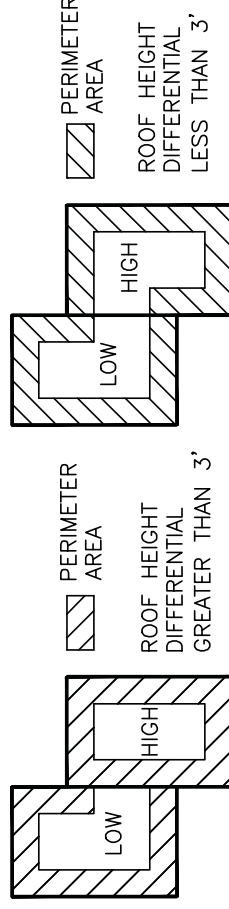
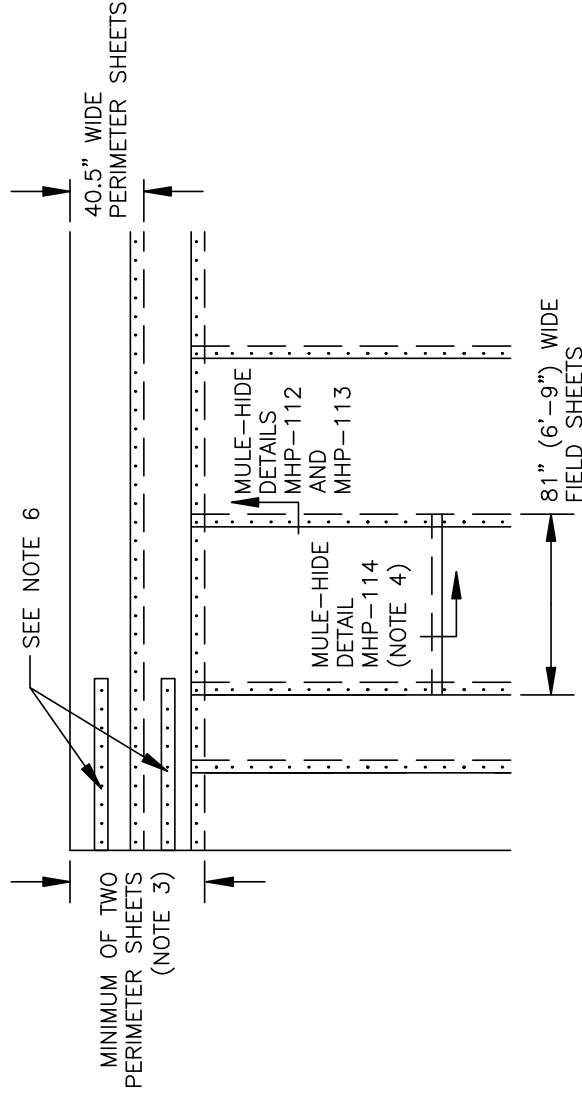
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**INSIDE CORNER WITH
COATED METAL WALL FLASHING
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-185**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. REFER TO SPECIFICATIONS FOR REQUIRED NUMBER OF PERIMETER SHEETS AND MEMBRANE FASTENING.
4. SECUREMENT NOT REQUIRED AT END ROLL SECTIONS; OVERLAP MEMBRANE 2" TO 3". REFER TO MULE-HIDE DETAIL MHP-110.
5. FOR INSULATION SECUREMENT, REFER TO MULE-HIDE DETAIL MHP-206.
6. MEMBRANE ATTACHMENT IN CORNERS MUST BE INCREASED ABOVE PERIMETER ATTACHMENT REQUIREMENTS TO COMPENSATE FOR THE HIGHER UPLIFT PRESSURES PRESENT AT BUILDING CORNERS.



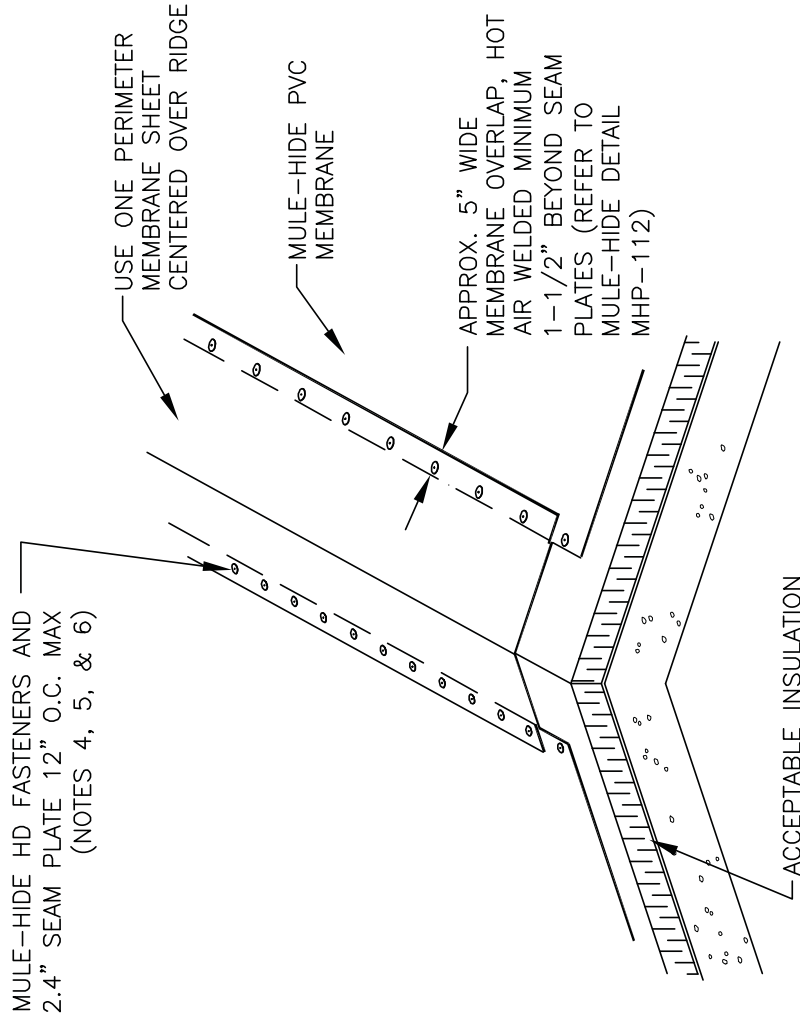
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**MEMBRANE SECUREMENT
SYSTEMS:
MECHANICALLY FASTENED PVC**

**DETAIL NO:
MHP-186**

NOTES

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. RIDGE MEMBRANE ATTACHMENT IS ONLY REQUIRED WHEN ROOF SLOPE EXCEEDS 3" TO ONE HORIZONTAL FOOT.
4. POSITION 2.4" SEAM PLATES 1/2" MINIMUM TO 1" MAXIMUM FROM THE EDGE OF THE DECK MEMBRANE.
5. REFER TO SPECIFICATION FOR ACCEPTABLE MULE-HIDE FASTENERS AND PLATES AND OTHER FASTENING DENSITIES.
6. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



**MULE-HIDE
PRODUCTS CO., INC.
2010**

RIDGE MEMBRANE ATTACHMENT

SYSTEMS:

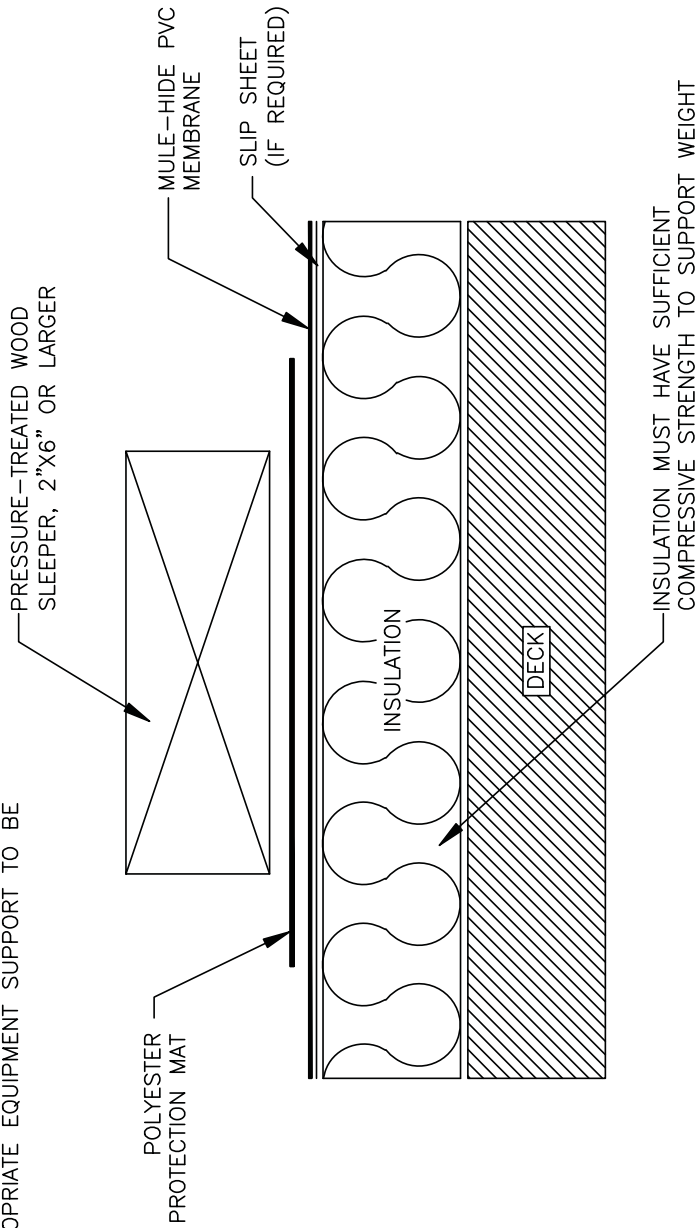
MECHANICALLY FASTENED PVC

**DETAIL NO:
MHP-190**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.

2. SPECIFIER/APPLICATOR MUST DETERMINE APPROPRIATE EQUIPMENT SUPPORT TO BE USED.



**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

SLEEPER SUPPORT (LIGHT WEIGHT)

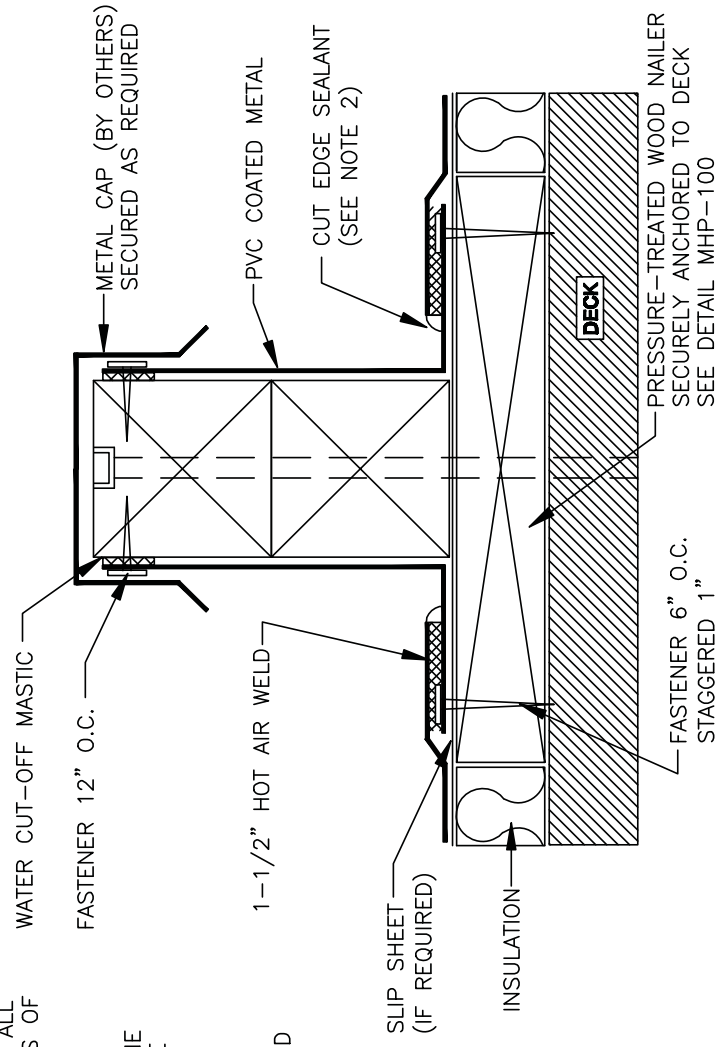
SYSTEMS:

ALL PVC

**DETAIL NO:
MHP-191**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT EDGES OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. SPECIFIER/APPLICATOR MUST DETERMINE APPROPRIATE EQUIPMENT SUPPORT TO BE USED.
4. WHEN UTILIZING MULE-HIDE PVC MEMBRANE, THE ROOFING SHEET MAY BE ATTACHED WITH APPROVED FASTENERS AND PLATES AS A BASE TIE-IN. SEE DETAIL MHP-120



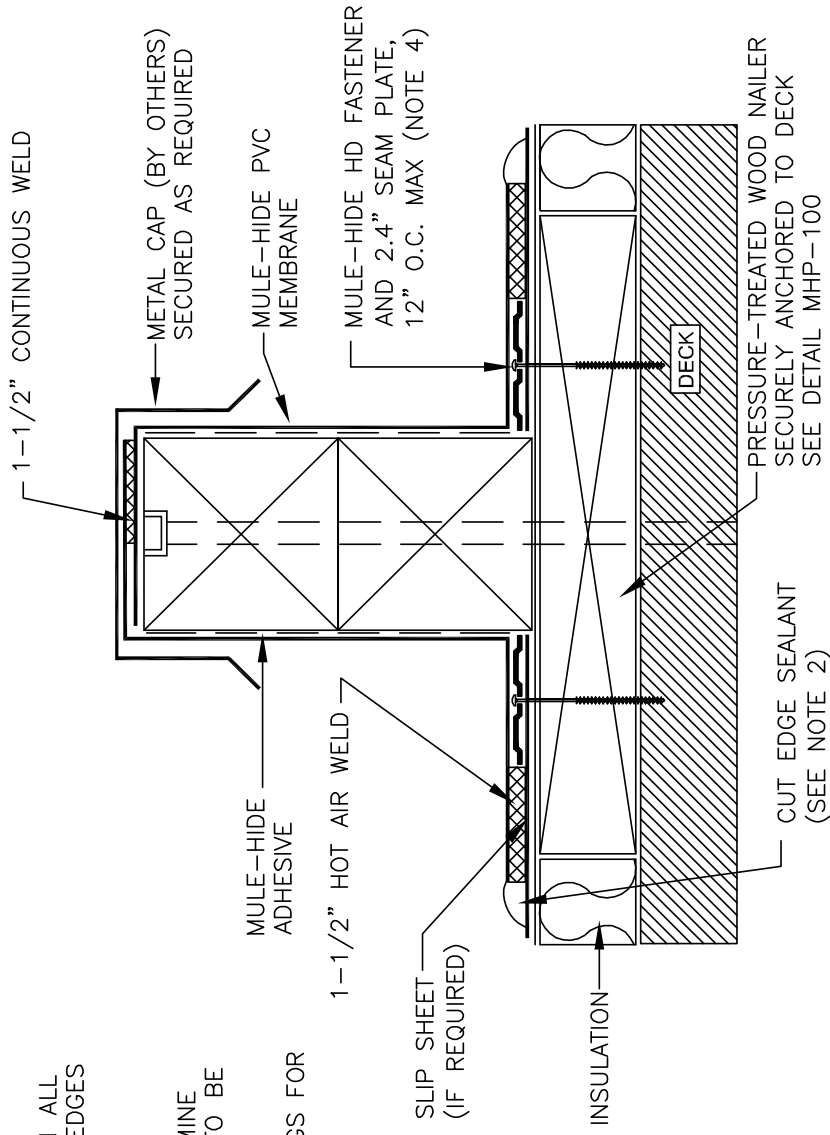
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**SLEEPER SUPPORT (HEAVY WEIGHT)
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-192**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT EDGES OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. SPECIFIER/APPLICATOR MUST DETERMINE APPROPRIATE EQUIPMENT SUPPORT TO BE USED.
4. REFER TO MULE-HIDE UPLIFT RATINGS FOR APPROPRIATE FASTENER SIZE, AND SPACING.



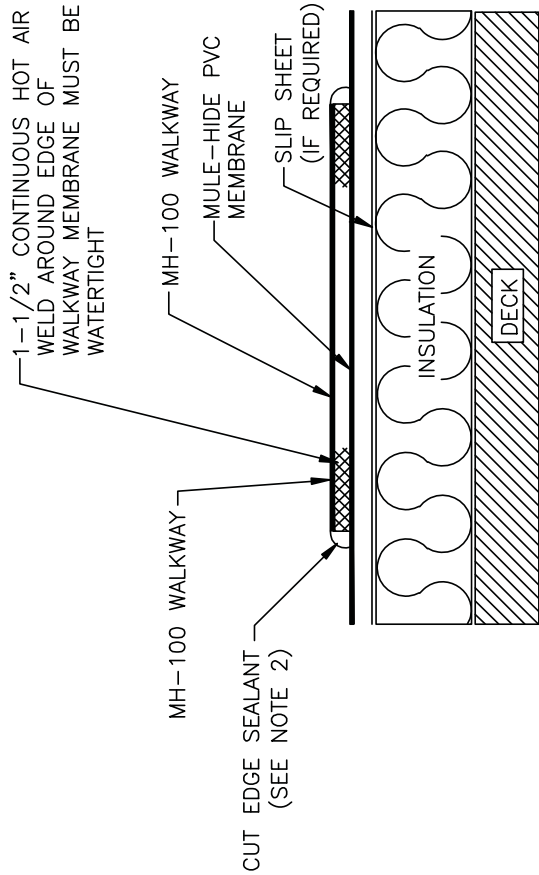
**MULE-HIDE
PRODUCTS CO., INC.
2010**

**SLEEPER SUPPORT (HEAVY WEIGHT)
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-193**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. PVC EDGE SEALANT IS REQUIRED ON ALL CUT OR NON-ENCAPSULATED EDGES OF REINFORCED MEMBRANE. THIS INCLUDES FACTORY CUT MEMBRANE.
3. MH-100 WALKWAY IS NOT INTENDED FOR USE IN HEAVY TRAFFIC AREAS.
4. THE MH-100 WALKWAY MUST NOT BE INSTALLED OVER FIELD SEAMS AND FASTENER ROWS AND MUST BE GAPPED FROM THESE AREAS A MINIMUM OF 6".
5. ALL ADJACENT AND ABUTTING WALKWAY RUNS MUST BE GAPPED A MINIMUM OF 6" AND MUST NOT BE OVERLAPPED.



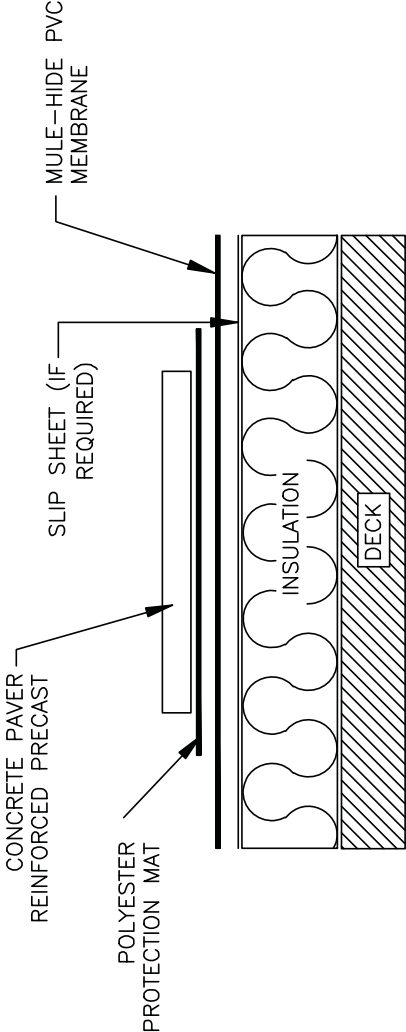
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**MH-100 WALKWAY
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-194**

NOTES:

- 1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.



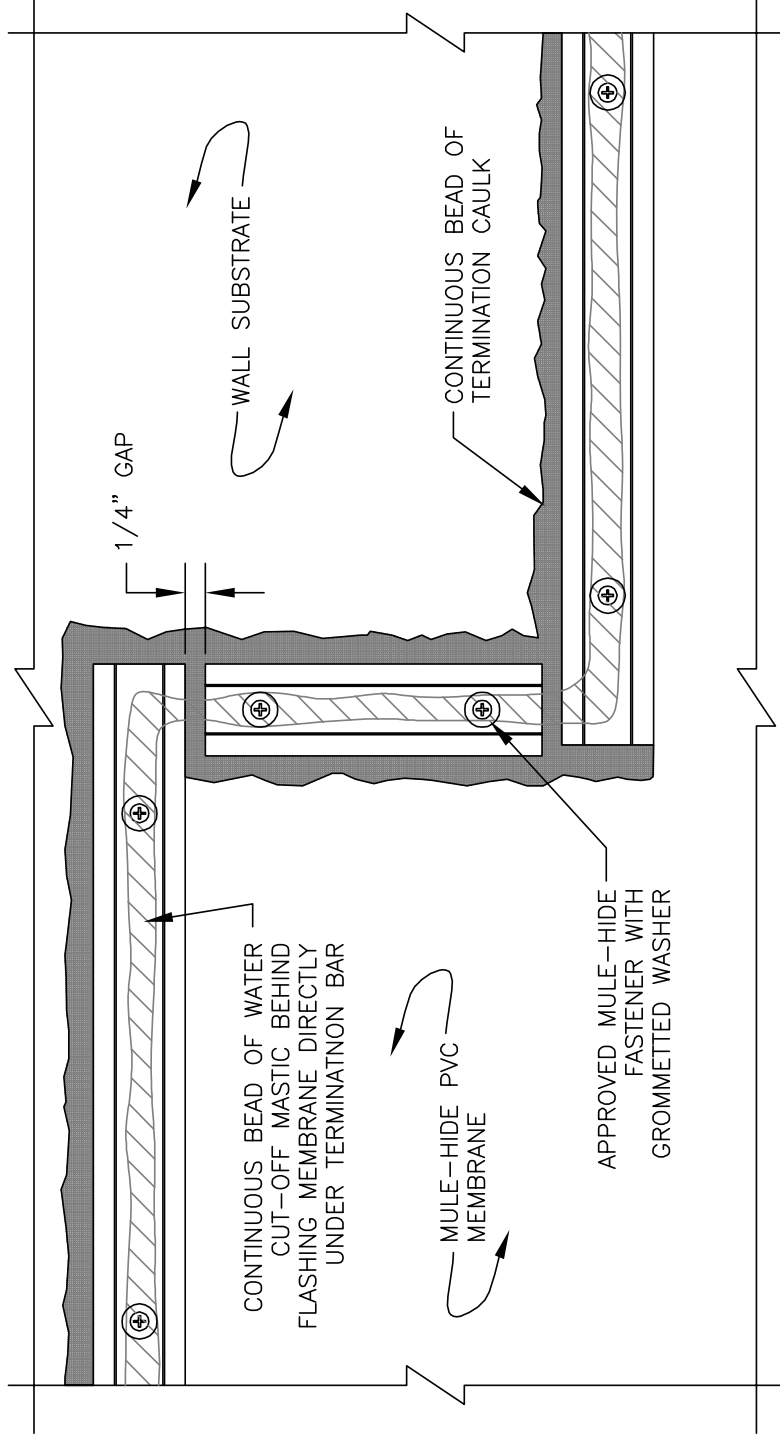
**MULE-HIDE
PRODUCTS CO., INC.
04/01/2007**

**CONCRETE PAVER WALKWAY
SYSTEMS:
ALL PVC**

**DETAIL NO:
MHP-195**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. TERMINATION BAR MUST BE INSTALLED TO HARD, SMOOTH NON-POROUS SUBSTRATE.
3. DO NOT APPLY TERMINATION CAULK OVER ASPHALT OR OTHER MATERIALS THAT WILL PREVENT PROPER ADHESION.



**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

**TERMINATION
ELEVATION CHANGE**

SYSTEMS:

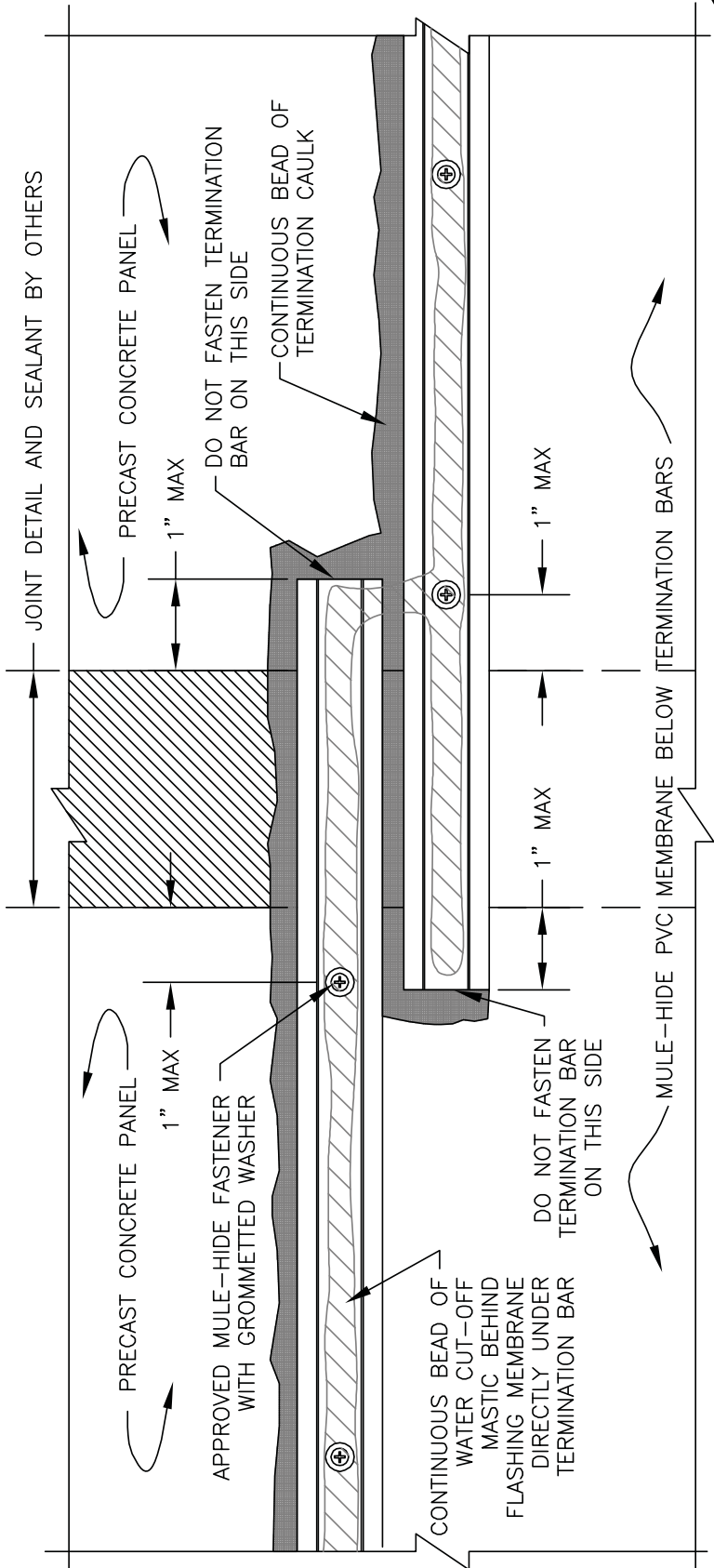
ALL PVC

DETAIL NO:

MHP-196

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIP SHEETS, ETC.
2. TERMINATION BAR MUST BE INSTALLED TO HARD, SMOOTH NON-POROUS SUBSTRATE.
3. DO NOT APPLY TERMINATION CAULK OVER ASPHALT OR OTHER MATERIALS THAT WILL PREVENT PROPER ADHESION.
4. TERMINATION BAR MUST BE CUT AT EACH WALL JOINT



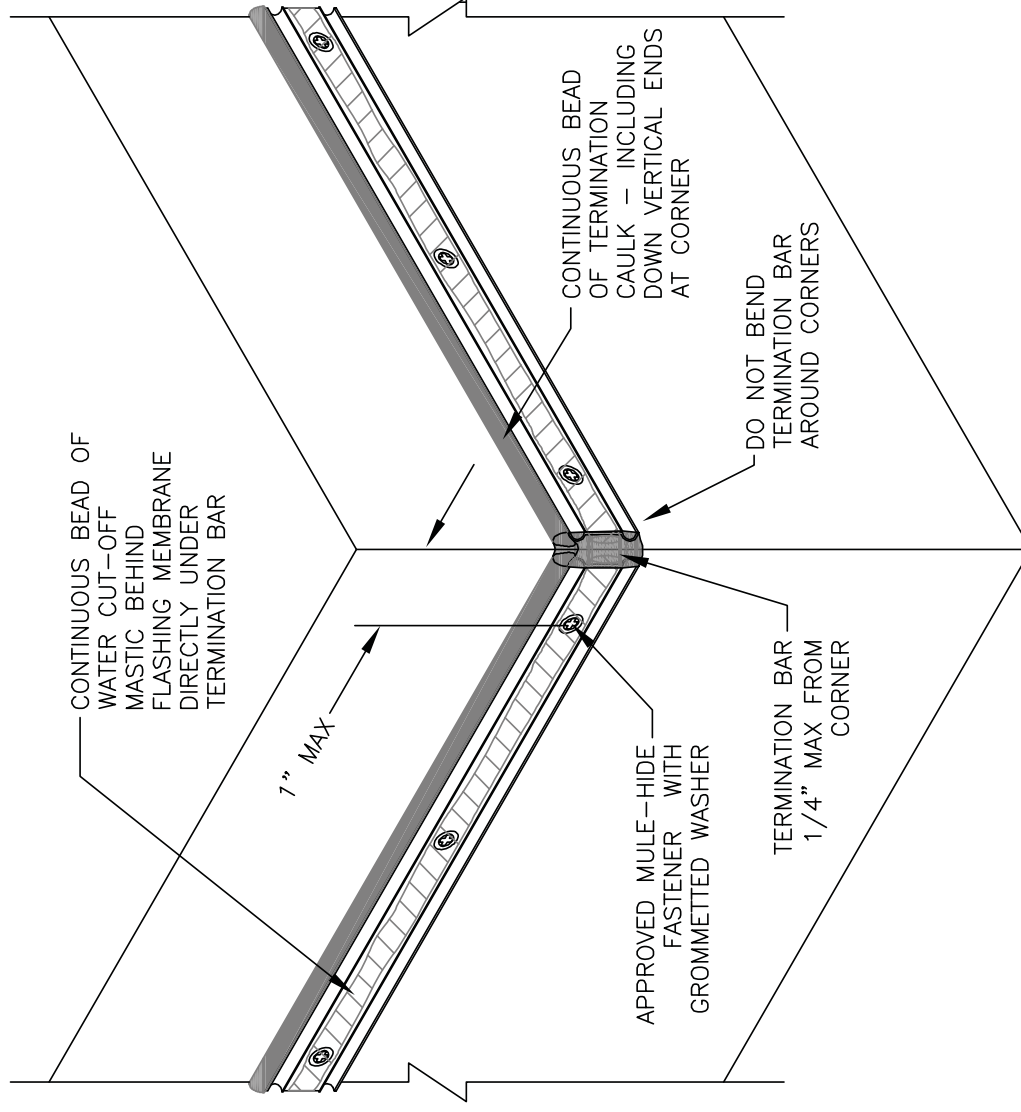
**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

**TERMINATION BAR
AT TILT-UP WALL JOINT**
SYSTEMS:
ALL PVC

**DETAIL NO:
MHP-197**

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. TERMINATION BAR MUST BE INSTALLED TO HARD, SMOOTH NON-POROUS SUBSTRATE.
3. DO NOT APPLY TERMINATION CAULK OVER ASPHALT OR OTHER MATERIALS THAT WILL PREVENT PROPER ADHESION.
4. A MINIMUM OF 2 FASTENERS IS REQUIRED FOR EACH PIECE OF TERMINATION BAR OR 12" O.C. MAX.
5. IF MASONRY FASTENERS ARE USED, FASTENER MAY BE MOVED TO 2" MAXIMUM FROM CORNER.



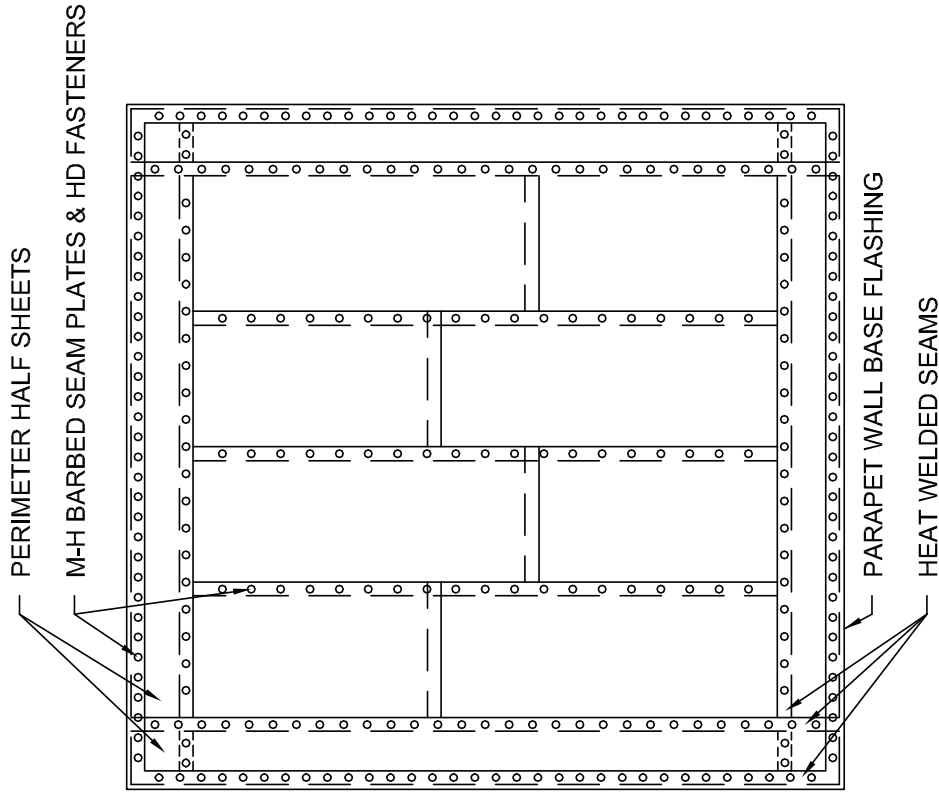
**MULE-HIDE
PRODUCTS CO., INC.**
04/01/2007

**DETAIL NO:
MHP-198**

TERMINATION BAR AT CORNER

SYSTEMS:

ALL PVC



NOTE: SEE PVC 10 OR 15 YR WARRANTY
DESIGN SUMMARY FOR APPROPRIATE
FASTENER SPACING FOR VARIOUS DECK
TYPES AND WIND UPLIFT REQUIREMENTS

**MULE-HIDE
PRODUCTS CO., INC.
2010**

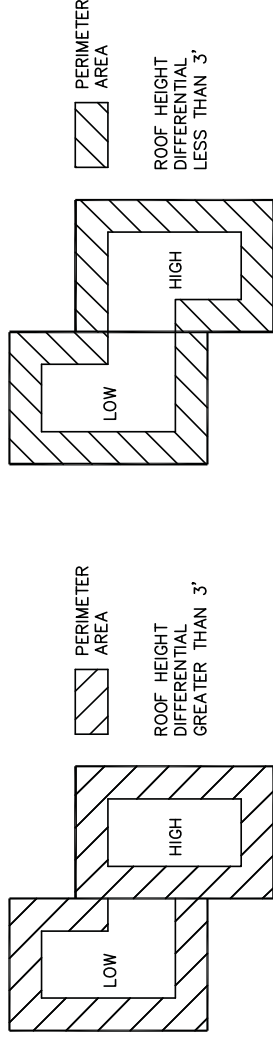
FIELD MEMBRANE LAYOUT

SYSTEMS:

MECHANICALLY ATTACHED PVC

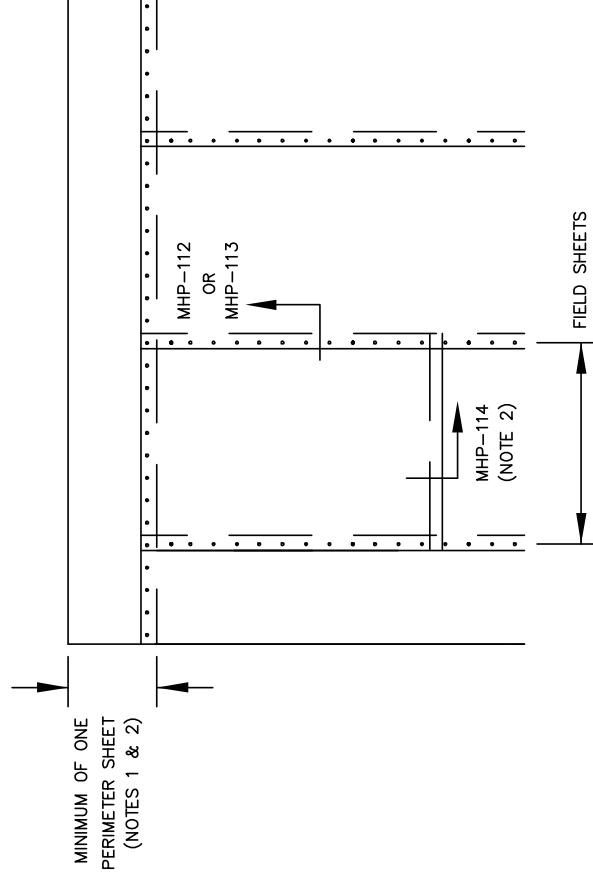
DETAIL NO:

MHP-300



NOTES:

1. CONTACT MULE-HIDE FOR FM OR CODE COMPLIANCE FOR REQUIRED NUMBER OF PERIMETER SHEETS AND MEMBRANE FASTENING.
2. SECUREMENT NOT REQUIRED AT END ROLL SECTIONS; OVERLAP MEMBRANE 2" TO 3" (50 TO 75 mm). REFER TO DETAIL MHP-114.
3. FOR INSULATION SECUREMENT, REFER TO DETAIL MHP-200.
4. IF A FACTORY MUTUAL RATING IS REQUIRED, MEMBRANE FASTENING AT CORNERS MUST EXTEND TO ROOF EDGES IN BOTH DIRECTIONS.

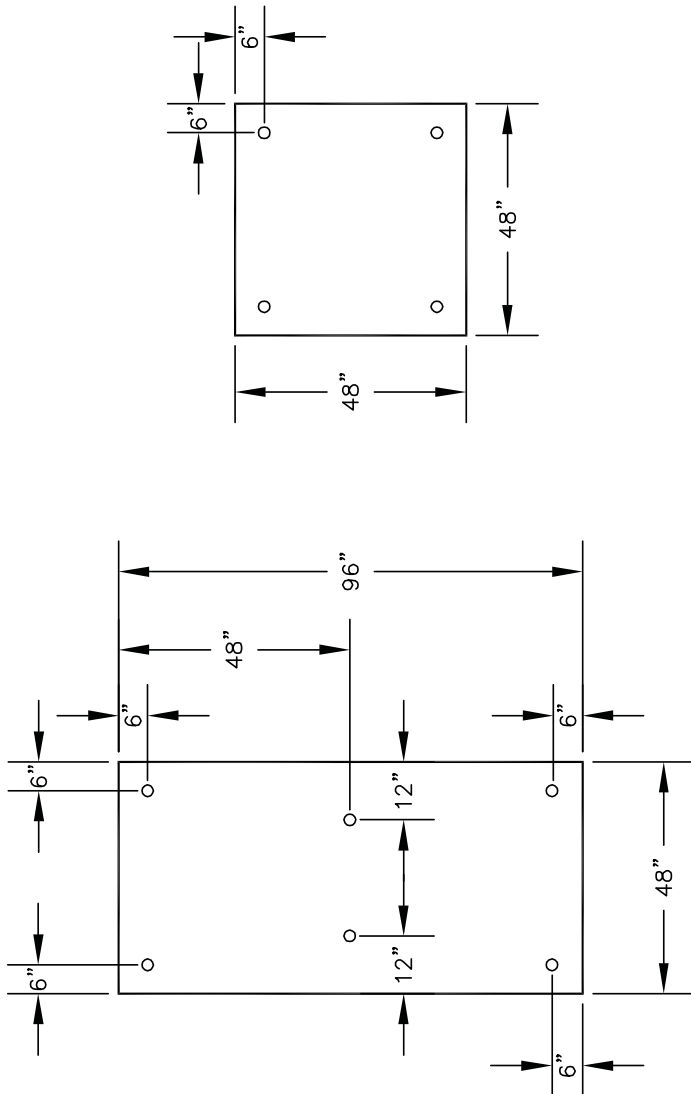


**MULE-HIDE
PRODUCTS CO., INC.
2010**

**PERIMETER ATTACHMENT
SYSTEMS:
MECHANICALLY ATTACHED PVC**

**DETAIL NO:
MHP-301**

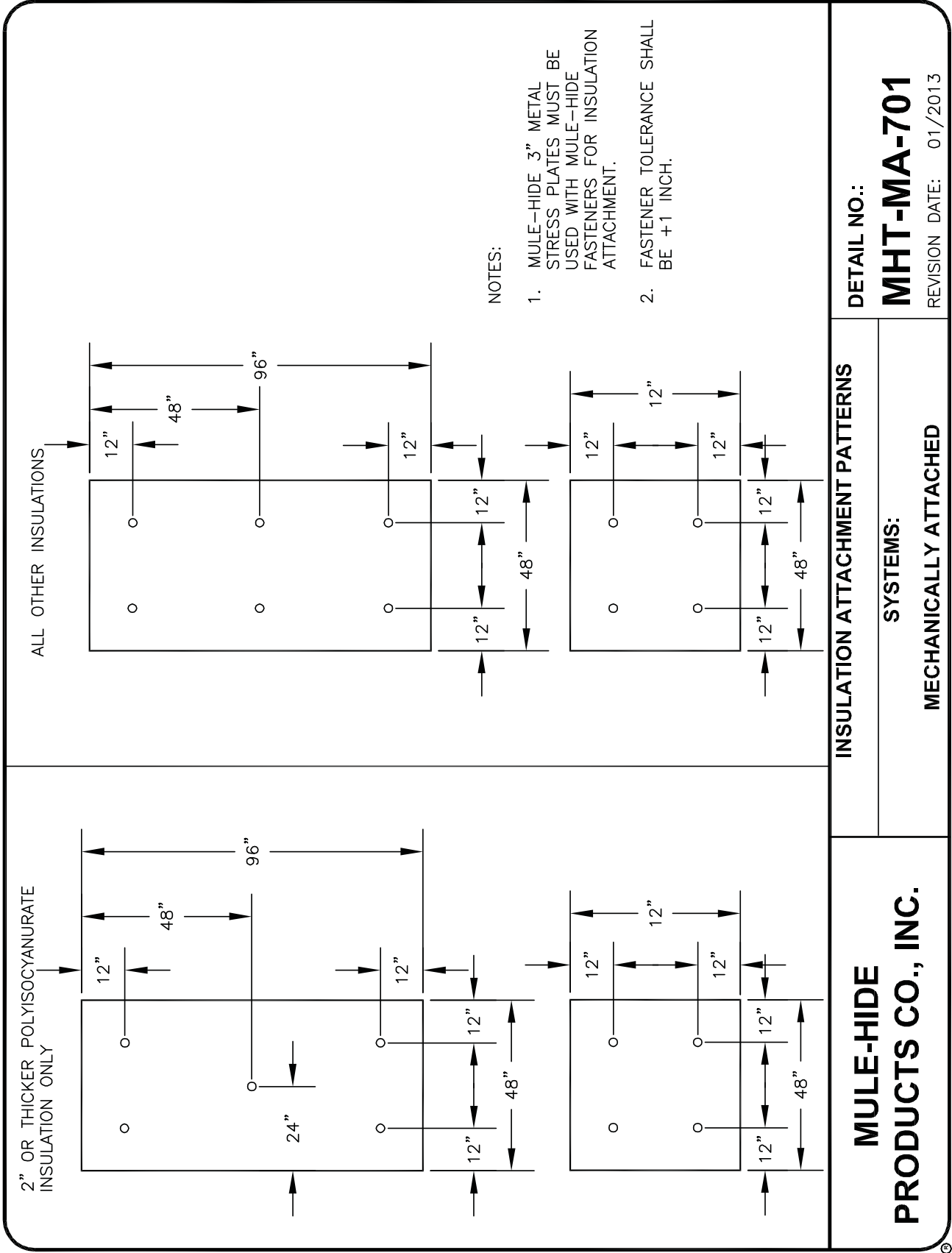
FASTENING PATTERNS FOR EXTRUDED POLYSTYRENE INSULATION
FOR USE DIRECTLY UNDER MECHANICALLY ATTACHED WHITE TPO
REINFORCED MEMBRANE ONLY



NOTES:

1. MULE-HIDE 3" METAL STRESS PLATES MUST BE USED WITH MULE-HIDE FASTENERS FOR INSULATION ATTACHMENT.
2. FASTENER TOLERANCE SHALL BE ± 1 INCH.

MULE-HIDE PRODUCTS CO., INC.	EXTRUDED POLYSTYRENE INSULATION ATTACHMENT FASTENING PATTERNS		DETAIL NO.:
	SYSTEMS: MECHANICALLY ATTACHED		MHT-MA-700 REVISION DATE: 01/2013



NOTES:

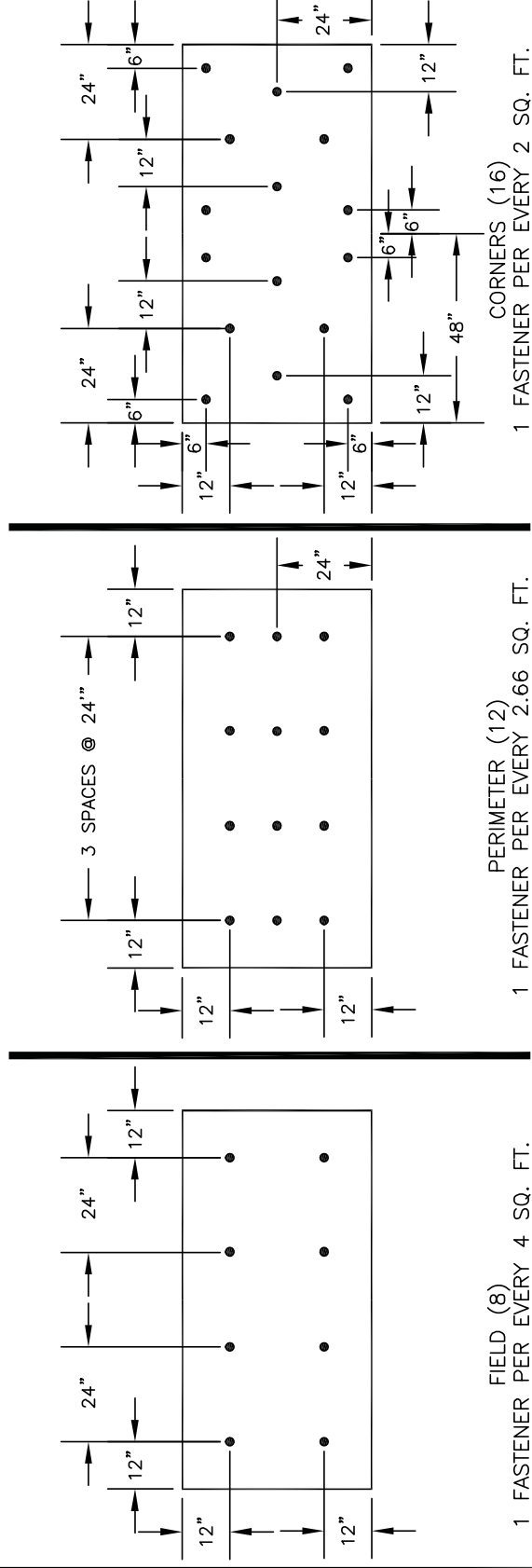
1. MULE-HIDE 3" METAL STRESS PLATES MUST BE USED WITH MULE-HIDE FASTENERS FOR INSULATION ATTACHMENT.
2. FASTENER TOLERANCE SHALL BE +1 INCH.

**MULE-HIDE
PRODUCTS CO., INC.**

**SYSTEMS:
MECHANICALLY ATTACHED**

NOTES:

1. 8 FASTENERS PER 4' X 8' BOARDS (1 FASTENER EVERY 4 SQUARE FEET) IN THE FIELD IS APPROVED FOR INSULATIONS 2" OR MORE THICK WHEN USED AS THE TOP LAYER.
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



**MULE-HIDE
PRODUCTS CO., INC.**

**2" OR THICKER INSULATION ATTACHMENT
8 FASTENERS PER 4' X 8' IN FIELD**

**SYSTEMS:
FULLY ADHERED**

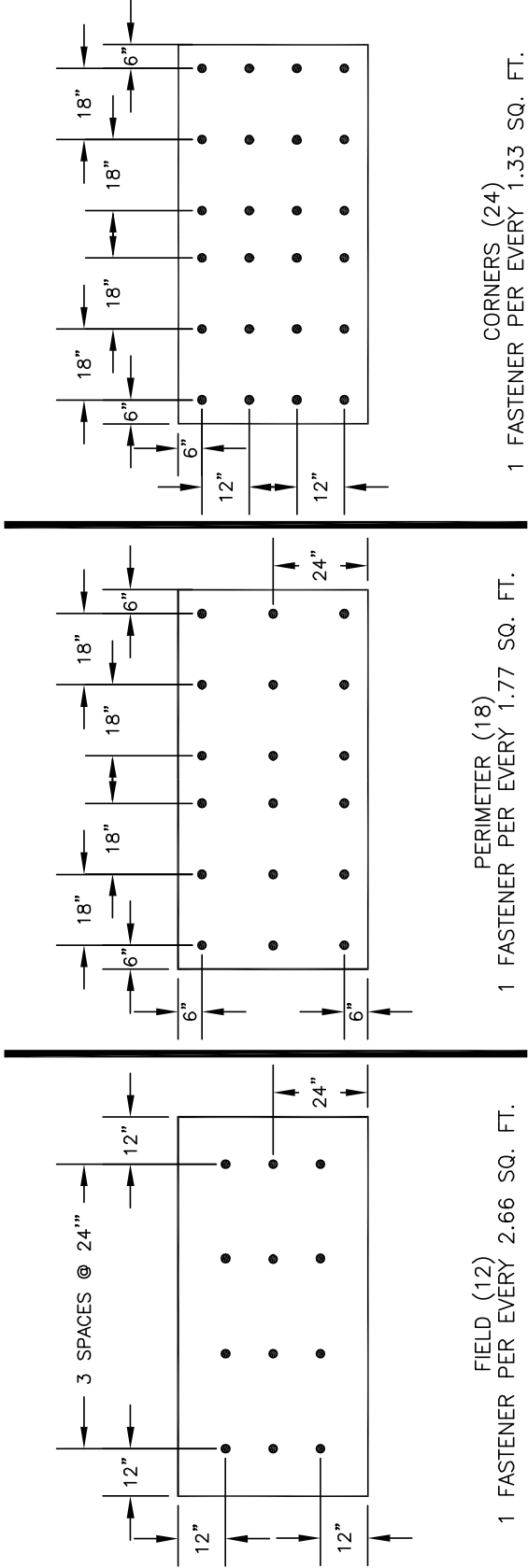
DETAIL NO.:

MHT-FA-720

REVISION DATE: 01/2013

NOTES:

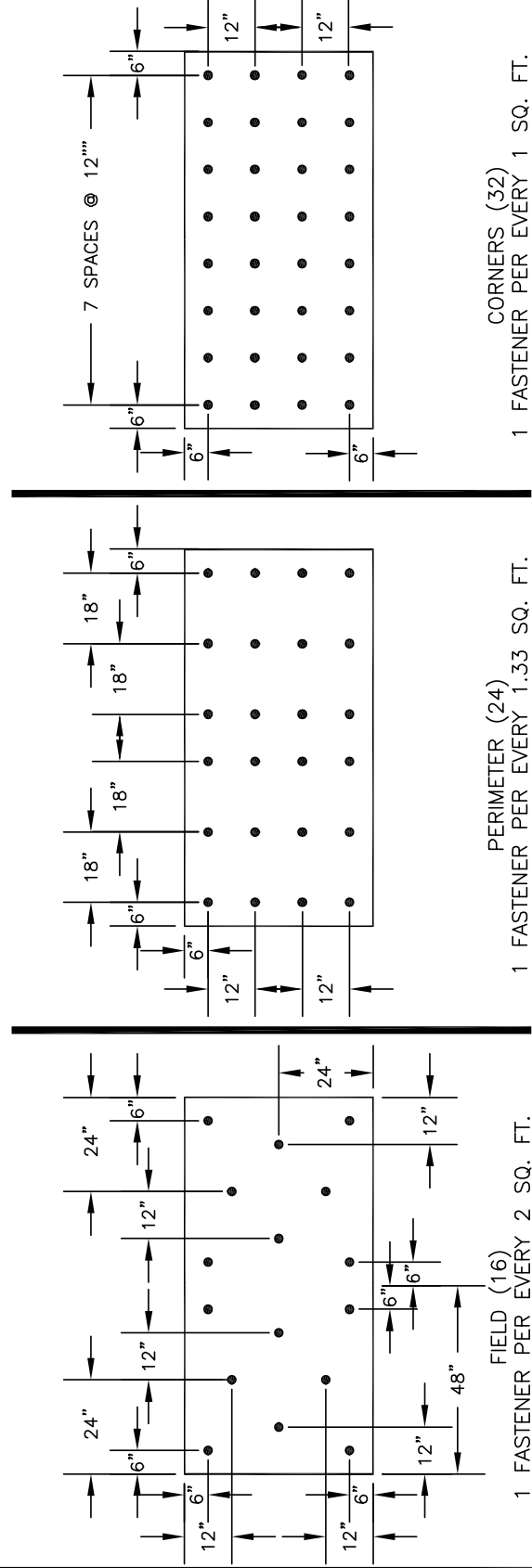
1. 12 FASTENERS PER 4' X 8' BOARD IN THE FIELD IS APPROVED FOR 1-1/2" TO 2" THICK POLYISOCYANURATE INSULATIONS WHEN USED AS THE TOP LAYER OR 1/4" DENS DECK INSTALLED AS A COVER BOARD.
2. PERIMETER AND CORNER DIMENSIONS ARE TO BE A MINIMUM OF 8' WIDE UNLESS THE PROJECT REQUIRES FACTORY MUTUAL COMPLIANCE. 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



MULE-HIDE PRODUCTS CO., INC.	INSULATION ATTACHMENT 12 FASTENERS PER 4' X 8' IN FIELD		DETAIL NO.:
	SYSTEMS: FULLY ADHERED		MHT-FA-721 REVISION DATE: 01/2013

NOTES:

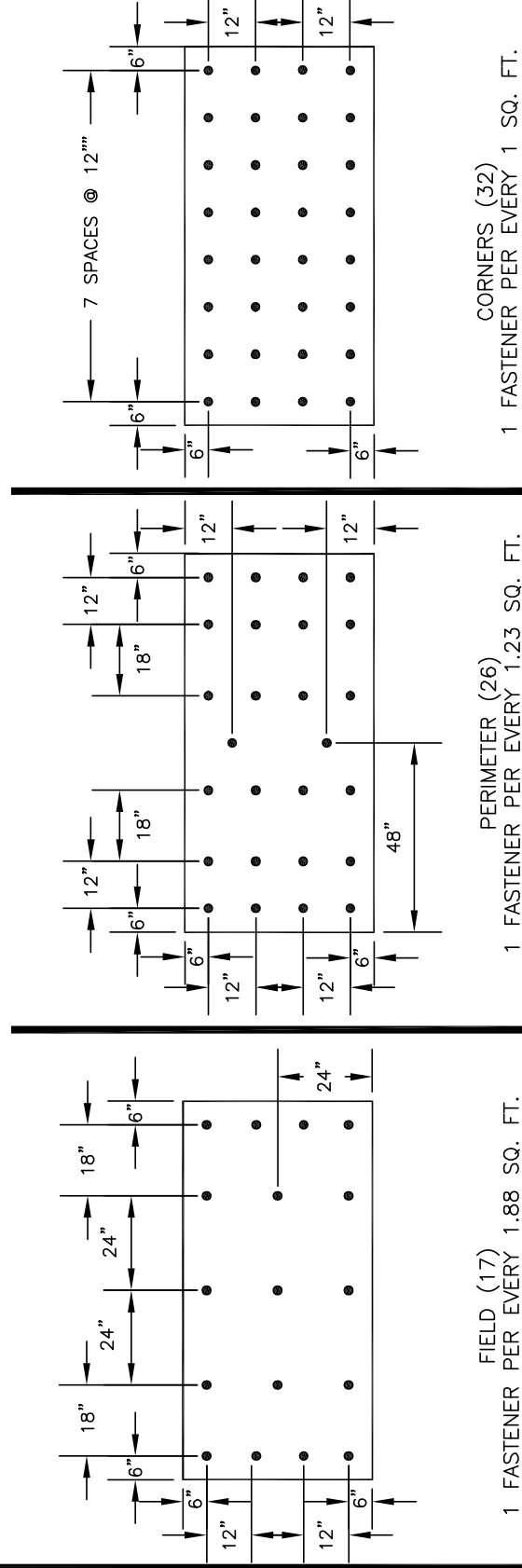
1. 16 FASTENERS PER 4' X 8' BOARD IN THE FIELD IS MULE-HIDE'S STANDARD FOR FULLY ADHERED TPO ROOFING SYSTEMS.
2. PERIMETER AND CORNER DIMENSIONS ARE TO BE A MINIMUM OF 8' WIDE UNLESS THE PROJECT REQUIRES FACTORY MUTUAL COMPLIANCE. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR FACTORY MUTUAL REQUIREMENTS.
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



MULE-HIDE PRODUCTS CO., INC.	INSULATION ATTACHMENT 16 FASTENERS PER 4' X 8' IN FIELD		DETAIL NO.:
	SYSTEMS: FULLY ADHERED		MHT-FA-722 REVISION DATE: 01/2013

NOTES:

1. 17 FASTENERS PER 4' X 8' BOARD IN THE FIELD IS APPROVED FOR OSB COVER BOARDS OR OSB/POLYISOCYANURATE COMPOSITE INSULATION.
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



**MULE-HIDE
PRODUCTS CO., INC.**

**INSULATION ATTACHMENT
17 FASTENERS PER 4' X 8' IN FIELD**

SYSTEMS:

FULLY ADHERED

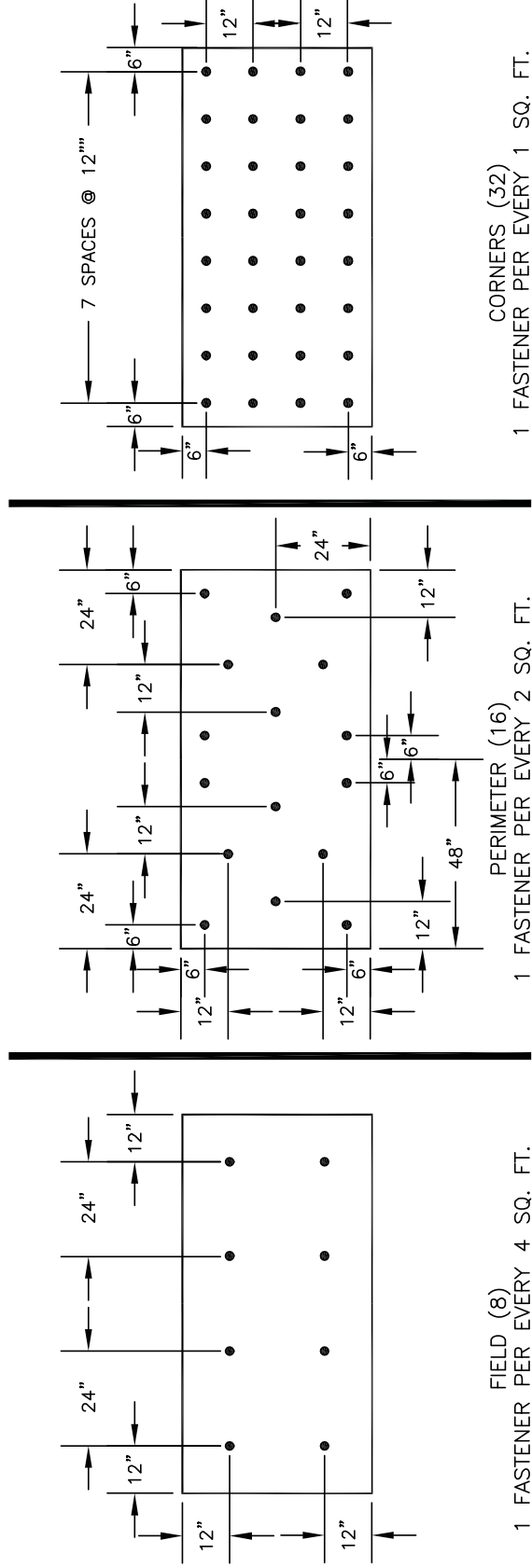
DETAIL NO.:

MHT-FA-723

REVISION DATE: 01/2013

NOTES:

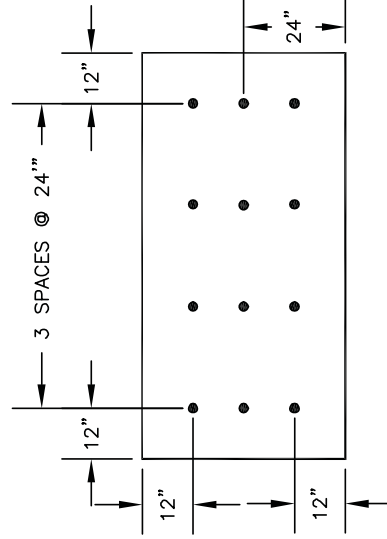
1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFER TO MULE-HIDE WIND 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.



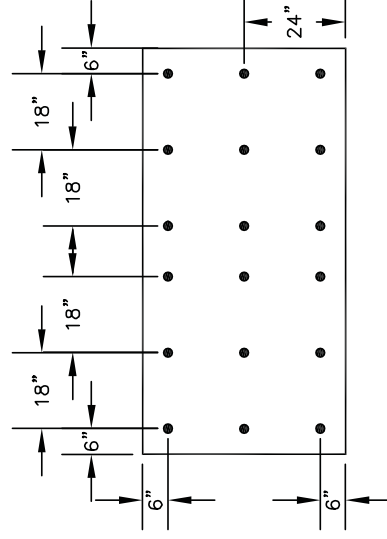
MULE-HIDE PRODUCTS CO., INC.	FM - 8 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT		DETAIL NO.: MHT-FM-724
	SYSTEMS: FULLY ADHERED		REVISION DATE: 01/2013

NOTES:

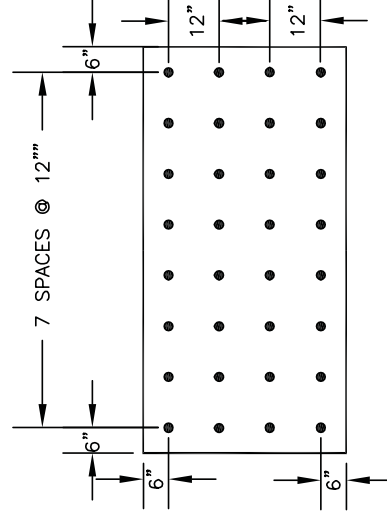
1. THESE FASTENING PATTERNS ARE TO BE USED WHEN THE PROJECT REQUIRES A FACTORY MUTUAL RATED SYSTEM. CONTACT MULE-HIDE TECHNICAL DEPARTMENT FOR APPROPRIATE USE OF THESE PATTERNS.
2. MULE-HIDE INSULATION FASTENERS AND 3" DIAMETER PLATES MUST BE USED FOR INSULATION ATTACHMENT.
3. REFER TO MULE-HIDE WIND 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 FOOT
 - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FOOT 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

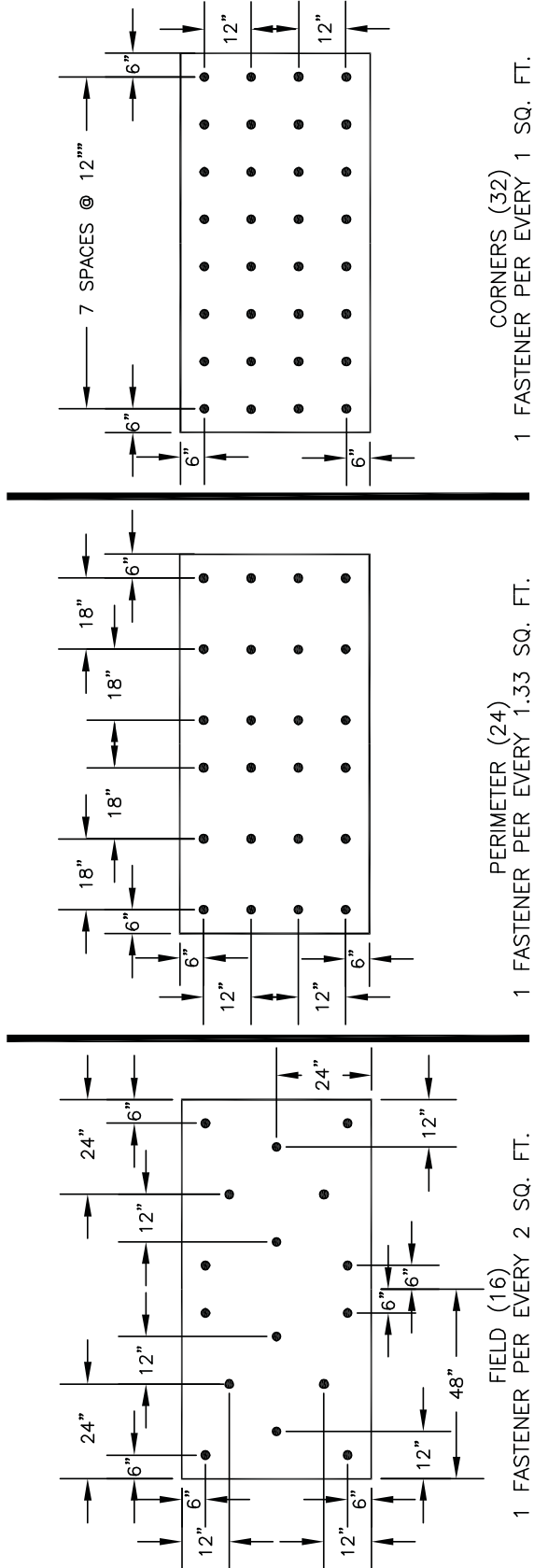
DETAIL NO.:

MHT-FM-725

REVISION DATE: 01/2013

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 FOOT
 - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FOOT FOR CORNERS.



**MULE-HIDE
PRODUCTS CO., INC.**

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

SYSTEMS:

FULLY ADHERED

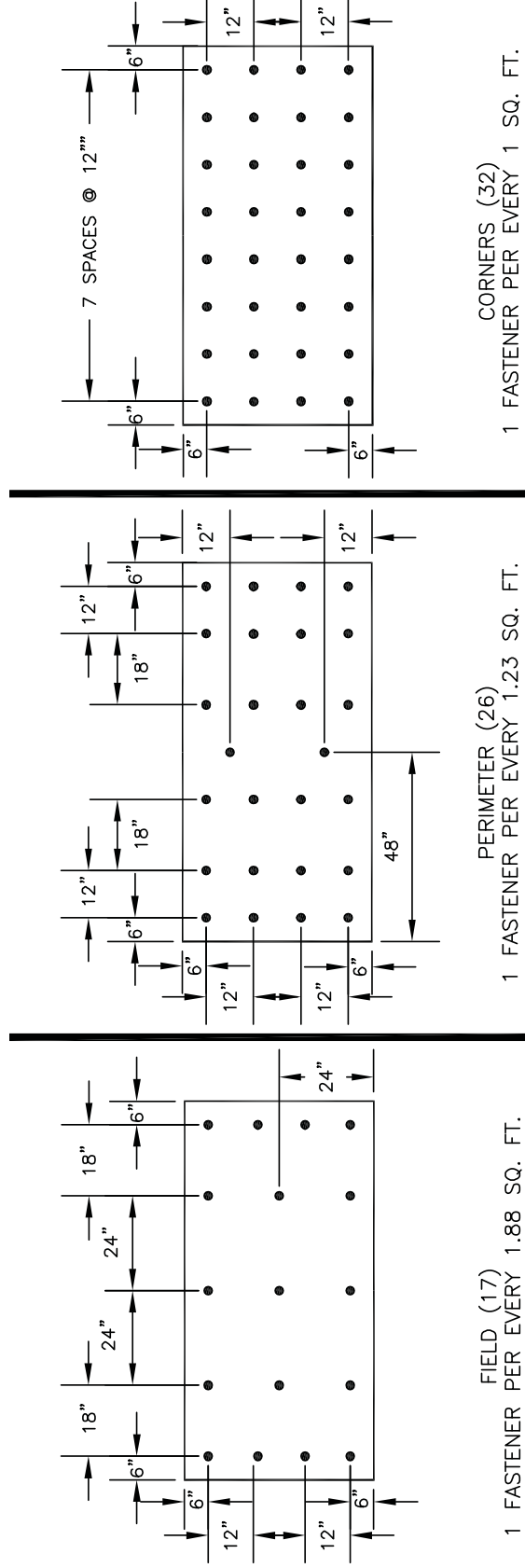
DETAIL NO.:

MHT-FM-726

REVISION DATE: 01/2013

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:
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 - CONSTANT DENSITY OF 1 FASTENER EVERY 1 SQUARE FOOT FOR CORNERS.



MULE-HIDE PRODUCTS CO., INC.	FM - 17 FIELD FASTENERS PER 4' X 8' BOARD PATTERN LAYOUT		DETAIL NO.: MHT-FM-727
	SYSTEMS: FULLY ADHERED		REVISION DATE: 01/2013

SECTION 8

MULE-HIDE PRODUCTS CO., INC.

PVC PRODUCT DATA SHEETS (PDS)

Please consult the Mule-Hide website for the most current information at
www.mulehide.com

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Product Data Sheet

MULE-HIDE PVC

PRODUCT DATA SHEET INDEX

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Mule-Hide PVC KEE HP Membrane (0.050", 0.060", 0.080"	09-1220
Adhesives and Sealants	
Universal Single-Ply Sealant	09-2105
Mule-Hide EPDM Water Cut-Off	09-2110
Mule-Hide Thermoplastic One-Part Pourable Sealer	09-2205
Mule-Hide Low VOC PVC Bonding Adhesive	09-2410
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Mule-Hide All Purpose Bar	09-6105
Mule-Hide Poly ISO 1 Roof Insulation	09-6210
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Please consult the Mule-Hide website for the most current information at
www.mulehide.com

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Product Data Sheet

MULE-HIDE PVC MEMBRANE

PRODUCT DESCRIPTION

Mule-Hide PVC Membrane is an advanced formula, heat-weldable PVC thermoplastic membrane designed for long term weatherability and performance. The physical properties of the membrane are enhanced by a tenacious, weft-inserted polyester fabric. Meets or exceeds all requirements of ASTM D4434, Type III.

BASIC USES

Mule-Hide PVC membrane is used in mechanically attached and fully adhered roofing systems in new construction, reroofing and recover (retrofit) applications. It may also be used as flexible membrane flashings for walls, curbs, etc, when installing PVC membrane roofing systems. The system must be installed over acceptable roof insulation or other suitable substrate. See the Mule-Hide PVC Specifications Manual for complete specifications and details.

TYPICAL PHYSICAL PROPERTIES

Physical Property*	ASTM D4434 Requirement	50-mil	60-mil	80-mil
Tolerance on nominal thickness, % ASTM D751	±10 %	±10 %	±10 %	±10 %
Weight, lbs/ft ² (kg/m ²)	----	0.33 (1.61)	0.40 (1.95)	0.55 (2.68)
Breaking Strength (MD x CD), lbf/in (kN/m) ASTM D751 grab method	200 min (35)	320 x 300 (56 x 53)	330 X 300 (58 x 55)	360 x 330 (63 x 58)
Elongation break of reinforcement (MD x CD) % ASTM D751 grab method	15 min	30 x 30	30 x 30	30 x 30
Thickness over scrim, in. (mm) ASTM D4434 optical method, ave of 3	0.016 min (0.40)	0.017 typ (0.432)	0.025 typ (0.635)	0.030 typ (0.762)
Seam Strength, min. ASTM D751 grab method (% of breaking strength)	>75	PASS	PASS	PASS
Tearing Strength (MD x CD), lbf (N) ASTM D751 proc. B, 8" x 8"	45 (200)	50 x 70 (222 x 311)	50 x 70 (222 x 311)	50 x 70 (222 x 311)
Low Temperature Bend, no cracks @5x ASTM D2136	PASS	Pass -40°F (-40°C)	- Pass -40°F (-40°C)	Pass -40°F (-40°C)
Linear Dimensional Change % ASTM D1204, 6 hours @ 176° F (80° C)	±0.5 max	0.4 typ	0.4 typ	0.4 typ
Water absorption resistance, mass % ASTM D570 166 hrs @ 158° F (70° C)	±3.0 max	2.0 typ	2.0 typ	2.0 typ
Water Vapor Permeance, Perms ASTM E96 proc. B	No Requirement	0.10 max 0.05 typ	0.10 max 0.05 typ	0.10 max 0.05 typ
Puncture resistance Federal lbf (kN) FTM 101C, method 2031 Dynamic, J (ft-lb) ASTM D5635 Static, lbf (N) ASTM D5602	No Requirement 20 (14.7) 33 (145)	280 typ PASS PASS	320 typ PASS PASS	380 typ PASS PASS
Properties after heat aging ASTM D3045, 56 days @ 176°F Breaking strength % retained Elongation rein., % retained	90 min 90 min	90 min 90 min	90 min 90 min	90 min 90 min
Ozone Resistance, no cracks @ 7x ASTM D1149, 100 pphm, 168 hrs	PASS	PASS	PASS	PASS
Xenon-Arc Resistance, no cracks or crazing @ 10x, ASTM G155, 0.35 W/m ² at 340 nm, 63°C B.P.T, 12,600 kJ/m ² total radiant exposure 10,000 hrs	PASS	PASS	PASS	PASS



Product Data Sheet

MULE-HIDE PVC MEMBRANE

TYPICAL PHYSICAL PROPERTIES (Continued)

*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

BENEFITS & SUPPLEMENTAL STATEMENTS

- Heat weldable – Seams are stronger than the membrane
- Durable – scrim reinforcement offer superior resistance to impact, wind uplift
- UV, ozone and oxidation resistance
- Energy efficiency – white color reflects sunlight
- Enhanced chemical resistance
- Low temperature flexibility

CODE APPROVALS/COMPLIANCE

A variety of Factory Mutual Ratings and Underwriters Laboratories Classifications are available. Contact Mule-Hide Technical Department for additional information.

INSTALLATION INSTRUCTIONS

- 1) Approved insulation shall be attached to the roof deck with an approved insulation adhesive or approved fasteners and plates. Install insulation with its largest dimension perpendicular to the direction of the membrane seams where possible.
- 2) Mechanically Attached Roofing System
 - a) Perimeter sheets to be installed in an approved pattern along all exterior roof edges.
 - b) Mechanical fasteners and plates are installed in the seams of both the perimeter sheets and field sheets and into the roof deck. Use approved fasteners and maintain proper penetration for specific roof deck.
- 3) Fully Adhered Roofing System
 - a) Perimeter sheets are not required.
 - b) The membrane is required to be mechanically attached at the base of all vertical surfaces, roof edges, and angle changes.
 - c) The field of the roof is fully adhered to the substrate with Mule-Hide Low-VOC Bonding Adhesive, HydroBond Water-Based PVC Bonding Adhesive or WBBA-2000 bonding adhesive.
- 4) All seams are hot air welded and checked by probing.
- 5) All details will be done in accordance with Mule-Hide details.
- 6) On projects where a Mule-Hide Standard or Premium Warranty is requested, an authorized Mule-Hide representative shall inspect all completed work. This is only a brief summary and not the complete specification. The Mule-Hide Specifications, Details, Technical Bulletins, and associated documents should be thoroughly reviewed prior to starting any project. Contact Mule-Hide Products for additional information.

PRECAUTIONS

- Surfaces may be slippery when wet, or due to frost and ice build-up. Exercise caution to prevent falls.
- Mule-Hide PVC membranes are highly reflective to sunlight. Workers should dress appropriately, wear sunscreen, and wear sunglasses that filter out UV light.
- Exercise care when working near roof edge. Roof edges may not be visible when surrounding area is covered with snow.
- Store Mule-Hide membrane in original wrappings in a cool, shaded area. Cover with light-colored, breathable, waterproof tarpaulins. Mule-Hide membrane that has been exposed to the elements for approximately 7 days or longer must be prepared with Weathered Membrane Cleaner prior to hot air welding.



Product Data Sheet

MULE-HIDE PVC MEMBRANE

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.

SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS

1. Mule-Hide PVC membranes meet or exceeds ASTM D 4434 requirements Poly Vinyl Chloride Sheet Roofing. Mule-Hide PVC membrane is classified as Type III as defined by ASTM D 4434.
2. Mule-Hide reinforced PVC membrane was tested for static puncture resistance as per ASTM D5602 and exceeded 33 lbf (145 N) which passes the ASTM D4434 requirement.
3. Mule-Hide reinforced PVC was tested for dynamic puncture resistance per ASTM D5635 using the most recently modified impact head. Our 50-mil membrane was watertight after an impact energy of 22.5 J (16.6 ft-lbf) which passes the ASTM D4434 requirement.
4. Radiative Properties for Energy Star®, Cool Roof Rating Council (CRRC) and LEED™

DESCRIPTION	TEST METHOD	WHITE PVC	TAN PVC	GRAY PVC
ENERGY STAR® initial solar reflectance	Solar Spectrum Reflectometer	0.87	pending	pending
ENERGY STAR® solar reflectance - 3 yrs	Solar Spectrum Reflectometer (uncleaned)	0.61	pending	pending
CRRC initial solar reflectance	ASTM C1549	0.87	pending	pending
CRRC solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.61	pending	pending
CRRC initial thermal emittance	ASTMC1371	0.95	pending	pending
CRRC thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86	pending	pending
CRRC SRI (Solar Reflectance Index)	ASTM E1980	111	pending	pending
CRRC SRI (Solar Reflectance Index - 3 yrs)	ASTM E1980	72	pending	pending
CRRC Product ID	N/A	0670-0015		
LEED™ thermal emittance	ASTM E408	0.94	pending	pending

Mule-Hide White PVC membranes are LEED compliant. Mule Hide White PVC is also an ENERGY STAR® and California Title 24 rated roof product.

An ENERGY STAR qualified low slop roof product must have an initial solar reflectance of at least 0.65 and a 3-year aged solar reflectance of at least 0.50. Cleaning the aged roof surface is not permitted by the ENERGY STAR test protocol. Energy Star is only valid in the United States for Roofing Products.

The Cool Roof Rating Council (CRRC) does not specify minimums for reflectance or emittance but they do require specific protocols for testing and reporting. Cleaning of the aged roof surface is not permitted for determination of radiative properties after 3 years.

A LEED “point” may be earned if a roof material is ENERGY STAR qualified and has a thermal emittance of at least 0.90 as determined by ASTM E408.



Product Data Sheet

MULE-HIDE PVC MEMBRANE

SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS (continued)

Solar Reflectance Index (SRI) is calculated per ASTM E 1980. The SRI is a measure of the roof's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Materials with the highest SRI values are the coolest choices for roofing. Due to the way SRI is defined, particularly hot materials can even take slightly negative values, and particularly cool materials can even exceed 100.

California Title 24 requires an initial minimum reflectance of 0.70 and emittance of 0.75 as determined by CRRS.

ADDITIONAL INFORMATION

The information given on this PDS is subject to change without notice. Always check the Mule-Hide website at www.mulehide.com for the latest information, changes and updates or contact Mule-Hide Products Company at 800-786-1492.

DISCLAIMER

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Product Data Sheet

MULE-HIDE PVC KEE HP MEMBRANE

PRODUCT DESCRIPTION

Mule-Hide PVC KEE HP (High Performance) Membrane is manufactured using DuPont® Elvaloy® resin modifier and provides outstanding thermal stability and flexibility, extended upper and lower temperature performance limits and enhanced chemical resistance. The physical properties of the membrane are enhanced by a tenacious, weft-inserted polyester fabric. Meets or exceeds all requirements of ASTM 4434, Type III.

BASIC USES

Mule-Hide PVC KEE HP Membrane is used in mechanically attached and fully adhered roofing systems in new construction, reroofing and recover (retrofit) applications. It may also be used as flexible membrane flashings for walls, curbs, etc, when installing PVC KEE HP Membrane roofing systems. The system must be installed over acceptable roof insulation or other suitable substrate. See the Mule-Hide PVC Specifications Manual for complete specifications and details.

TYPICAL PHYSICAL PROPERTIES

Physical Property*	ASTM D4434 Requirement	50-mil	60-mil	80-mil
Weight, lbs/ft ² (kg/m ²)	----	0.33 (1.61)	0.38 (1.86)	0.51 (2.49)
Breaking Strength (MD x CD), lbf/in (kN/m) ASTM D751 grab method	200 min (35)	275 x 235 (48 x 41)	280 X 250 (49 x 44)	300 x 275 (53 x 48)
Elongation break of reinforcement (MD x CD) % ASTM D751 grab method	15 min	32 x 31	30 x 29	28 x 31
Thickness over scrim, in. (mm) ASTM D4434 optical method, ave of 3	0.016 min (0.4064)	0.024 typ (0.6096)	0.029 typ (0.7366)	0.036 typ (0.9144)
Tearing Strength (MD x CD), lbf (N) ASTM D751 proc. B, 8" x 8"	45 (200)	50 x 95 (222 x 422)	50 x 105 (222 x 467)	50 x 100 (222 x 445)
Low Temperature Bend, no cracks @5x ASTM D2135	PASS @ -40°F Typical value	Pass -40°F (-46°C)	- Pass -40°F (-46°C)	Pass -40°F (-46°C)
Linear Dimensional Change % ASTM D1204, 6 hours @ 176° F (80° C)	±0.5 max	0.4 typ	0.4 typ	0.4 typ
Water absorption resistance, mass % ASTM D570 166 hrs @ 158° F (70° C)	±3.0 max	1.25	0.87	0.89
Puncture resistance Dynamic, J (ft-lb) ASTM D5635 Static, lbf (N) ASTM D5602	20 (14.7) 33 (145)	PASS PASS	PASS PASS	PASS PASS
Properties after heat aging ASTM D3045, 56 days @ 176°F Breaking strength % retained Elongation rein., % retained	90 min 90 min	90 min 90 min	90 min 90 min	90 min 90 min
Ozone Resistance, no cracks @ 7x ASTM D1149, 100 pphm, 168 hrs	PASS	PASS	PASS	PASS
Xenon-Arc Resistance, no cracks or crazing @ 10x, ASTM G155, 0.35 W/m ² at 340 nm, 63°C B.P.T, 12,600 kJ/m ² total radiant exposure 10,000 hrs	PASS	PASS	PASS	PASS

*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.



Product Data Sheet

MULE-HIDE PVC KEE HP MEMBRANE

BENEFITS & SUPPLEMENTAL STATEMENTS

- Heat weldable – Wide window of weldability, welds quickly, cleanly and consistently
- Durable – scrim reinforcement offer superior resistance to impact, wind uplift
- UV, ozone and oxidation resistance
- Energy efficiency – white color reflects sunlight
- Enhanced chemical resistance
- Low temperature flexibility

CODE APPROVALS/COMPLIANCE

A variety of Factory Mutual Ratings and Underwriters Laboratories Classifications are available. Contact Mule-Hide Technical Department for additional information.

INSTALLATION INSTRUCTIONS

- 1) Approved insulation shall be attached to the roof deck with an approved insulation adhesive or approved fasteners and plates. Install insulation with its largest dimension perpendicular to the direction of the membrane seams where possible.
- 2) Mechanically Attached Roofing System
 - a) Perimeter sheets to be installed in an approved pattern along all exterior roof edges.
 - b) Mechanical fasteners and plates are installed in the seams of both the perimeter sheets and field sheets and into the roof deck. Use approved fasteners and maintain proper penetration for specific roof deck.
- 3) Fully Adhered Roofing System
 - a) Perimeter sheets are not required.
 - b) The membrane is required to be mechanically attached at the base of all vertical surfaces, roof edges, and angle changes.
 - c) The field of the roof is fully adhered to the substrate with Mule-Hide Low-VOC Bonding Adhesive, HydroBond Water-Based PVC Bonding Adhesive or WBBA-2000 bonding adhesive.
- 4) All seams are hot air welded and checked by probing.
- 5) All details will be done in accordance with Mule-Hide details.
- 6) On projects where a Mule-Hide Standard or Premium Warranty is requested, an authorized Mule-Hide representative shall inspect all completed work. This is only a brief summary and not the complete specification. The Mule-Hide Specifications, Details, Technical Bulletins, and associated documents should be thoroughly reviewed prior to starting any project. Contact Mule-Hide Products for additional information.

PRECAUTIONS

- Surfaces may be slippery when wet, or due to frost and ice build-up. Exercise caution to prevent falls.
- Mule-Hide PVC KEE HP Membranes are highly reflective to sunlight. Workers should dress appropriately, wear sunscreen, and wear sunglasses that filter out UV light.
- Exercise care when working near roof edge. Roof edges may not be visible when surrounding area is covered with snow.
- Use proper stacking procedures to ensure sufficient stability of the materials.
- Store Mule-Hide membrane in original wrappings in a cool, shaded area. Cover with light-colored, breathable, waterproof tarpaulins. Mule-Hide membrane that has been exposed to the elements for approximately 7 days or longer must be prepared with Weathered Membrane Cleaner prior to hot air welding.



Product Data Sheet

MULE-HIDE PVC KEE HP MEMBRANE

PROTECTION & SAFETY

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SUPPLEMENTAL APPROVALS, STATEMENTS AND CHARACTERISTICS

1. Mule-Hide PVC KEE HP Membranes meet or exceeds ASTM D 4434 Standard Specification for Poly Vinyl Chloride Sheet Roofing. Mule-Hide PVC KEE HP Membrane is classified as Type III as defined by ASTM D 4434.
2. Mule-Hide reinforced PVC KEE HP Membrane was tested for static puncture resistance as per ASTM D5602 and exceeded 33 lbf (145 N) which passes the ASTM D4434 requirement.
3. Radiative Properties for Energy Star®, Cool Roof Rating Council (CRRC) and LEED™

DESCRIPTION	TEST METHOD	WHITE PVC	TAN PVC	GRAY PVC
ENERGY STAR® initial solar reflectance	Solar Spectrum Reflectometer	0.86	pending	pending
ENERGY STAR® solar reflectance - 3 yrs	Solar Spectrum Reflectometer (uncleaned)	0.70	pending	pending
ENERGY STAR® initial emissivity	ASTM E408	0.95	pending	pending
CRRC initial solar reflectance	ASTM C1549	0.86	pending	pending
CRRC solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70	pending	pending
CRRC initial thermal emittance	ASTMC1371	0.86	pending	pending
CRRC thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.82	pending	pending
CRRC SRI (Solar Reflectance Index)	ASTM E1980	108	pending	pending
CRRC SRI (Solar Reflectance Index - 3 yrs)	ASTM E1980	84	pending	pending
CRRC Product ID	N/A	0670-0015		
LEED™ thermal emittance	ASTM E408	0.94	pending	pending

Mule-Hide White PVC KEE HP Membranes are LEED compliant. Mule Hide White PVC is also an ENERGY STAR® and California Title 24 rated roof product.

An ENERGY STAR qualified low slop roof product must have an initial solar reflectance of at least 0.65 and a 3-year aged solar reflectance of at least 0.50. Cleaning the aged roof surface is not permitted by the ENERGY STAR test protocol. Energy Star is only valid in the United States for Roofing Products.

The Cool Roof Rating Council (CRRC) does not specify minimums for reflectance or emittance but they do require specific protocols for testing and reporting. Cleaning of the aged roof surface is not permitted for determination of radiative properties after 3 years.

A LEED “point” may be earned if a roof material is ENERGY STAR qualified and has a thermal emittance of at least 0.90 as determined by ASTM E408.



Product Data Sheet

MULE-HIDE PVC KEE HP MEMBRANE

Solar Reflectance Index (SRI) is calculated per ASTM E 1980. The SRI is a measure of the roof's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Materials with the highest SRI values are the coolest choices for roofing. Due to the way SRI is defined, particularly hot materials can even take slightly negative values, and particularly cool materials can even exceed 100.

California Title 24 requires an initial minimum reflectance of 0.70 and emittance of 0.75 as determined by CRRC.

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Product Data Sheet

UNIVERSAL SINGLE-PLY SEALANT

PRODUCT DESCRIPTION

A 100% solids, solvent free, one-part, polyether sealant that provides a weather tight seal to a variety of building substrates. Provides excellent adhesive to substrates such as stone, masonry, ceramic, marble, wood, steel, aluminum, most plastics and composites. Not recommended as a glass-glazing sealant.

BASIC USES

Universal Single-Ply Sealant can be used as a:

- Lap-sealant for White-on-Black EPDM roofing systems
- Sealant for All-Purpose Bar on EPDM, TPO, and PVC systems
- Sealant for counter flashings, copings, and scupper details



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics	
Viscosity	850,000 Cps
Tack Free Time	35 minutes depending upon temperature
Cure Time	3-7 days depending upon temperature
Flow, Sag or Sump	None (1/4" bead)
Staining	None
Ozone Resistance	Good
UV Resistance	Excellent
Cured Hardness (Shore A)	17 - 23
Shear Strength	150 PSI
Color	White
Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.	

PACKAGING

Packaging	
Weight per Carton	26 lbs
Packaging	24 tubes, 10.1 fluid oz. each (per carton)
Shelf Life	12 months (unopened tube @ 90° F

BENEFITS & SUPPLEMENTAL STATEMENTS

- Excellent adhesion to various substrates
- VOC free
- Versatile applications

COVERAGE RATES

25 feet (7.6 m) per tube or 600 feet (183 m) using a 0.250 " (6 mm) bead

INSTALLATION TEMPERATURE

Do not install in temperatures below 40° F



Product Data Sheet

UNIVERSAL SINGLE-PLY SEALANT

INSTALLATION INSTRUCTIONS

1. Universal Single-Ply Sealant is a one-component, ready-to-use material that requires no mixing or preparation.
2. Surface Preparation - Surfaces shall be dry, clean and free of all dust, or contamination, which may harmfully affect the adhesion of the sealant. Cleaning with Weathered Membrane Cleaner may be required.
3. A quality caulking gun should be used to ensure ease of application.
4. Universal Single-Ply Sealant typically is tack free in 25 minutes and skins over within 45 minutes. Full cure occurs in 3 to 7 days depending on temperature and humidity.
5. Clean Up - Remove excess sealant adjacent to joint prior to curing with our Weathered Membrane Cleaner. Uncured sealant can also be removed from tools or equipment with our Weathered Membrane Cleaner.

PRECAUTIONS

1. Avoid prolonged contact with skin. Uncured adhesive irritates eyes. In case of contact with eyes, immediately flush with water. Consult a physician if ill effects occur.
2. Store in original unopened containers in a cool, dry area. Protect unopened containers from heat and direct sunlight. Elevated temperatures will reduce shelf life.
3. KEEP OUT OF THE REACH OF CHILDREN.
4. For industrial professional use only. May not be repackaged or resold for other than industrial or professional use.
5. See Material Safety Data Sheet for complete safety information before using product.
6. Do not use Universal Single-Ply Sealant in temperatures below 40 degrees F.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE WATER CUT-OFF

PRODUCT DESCRIPTION

Mule-Hide Water Cut-Off is a one-part, low viscosity, self-wetting, butyl-blend mastic designed for sealing Mule-Hide membranes to wood, concrete, metal, plastic and other substrates. This product is an extremely tacky material and will remain so when used with a compression –type seal.

BASIC USES

Mule-Hide Water Cut-Off can be used to seal roofing membranes to stop water penetration into the roofing system. Common uses are at drain terminations and behind Mule-Hide's All Purpose Bars at wall terminations



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics	
Color	Gray
Solids	80%
Flash Point	40°F (4°C) Closed Cup
Service Temperature	-40°F to 200°F (-40°C to 93°C)
Specific Gravity	1.29
Cold Weather Flexibility	Good
Average Brookfield Viscosity	1,320,000 cps
Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.	

LEED Information	
Pre-consumer Recycled Content	0%
Post-consumer Recycled Content	0%
Manufacturing Location	Carlisle, PA
VOC Content	250 g/L

Packaging

Weight Per Carton – 28 lbs
Packaging – 25 tubes / carton
Shelf Life (un-opened tube) – 1 year

BENEFITS & SUPPLEMENTAL STATEMENTS

Excellent adhesion to various substrates
Provides a durable compression type seal
Versatile applications

COVERAGE RATES

Approximately 10 lineal feet per using a ½" diameter bead

INSTALLATION INSTRUCTIONS

1. Mule-Hide Water Cut-Off is a one-component, ready-to-use material that requires no mixing or preparation.
2. Surface Preparation - Surfaces shall be dry, clean and free of all dust, or contamination, which may harmfully affect the adhesion of the sealant. Cleaning with Weathered Membrane Cleaner may be required.
3. A quality caulking gun should be used to ensure ease of application.
4. Apply a ½" diameter bead of Mule-Hide Water Cut-Off between the substrate and the edge of the membrane. The membrane must cover the mastic.



Product Data Sheet

MULE-HIDE WATER CUT-OFF

4. Install appropriate termination detail and secure to provide constant compression for the Mule-Hide Water Cut-Off. Follow Mule-Hide's Specification Manual and Details for appropriate methods of termination.

CLEAN UP

1. Clean Up - Remove excess Water Cut-Off with our Weathered Membrane Cleaner. Water Cut-Off can also be removed from tools or equipment with our Weathered Membrane Cleaner.

PRECAUTIONS

1. See Material Safety Data Sheet for complete safety information before using product.
2. Water Cut-Off is FLAMMABLE – contains solvents that are dangerous fire and explosion hazards when exposed to heat, flame or sparks. Store and use away from all sources of heat, flame or sparks. Do not smoke while applying. Do not use in a confined or unventilated area. Vapors are heavier than air and may travel along ground to a distant ignition source and flash back.
3. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
4. If swallowed, DO NOT INDUCE VOMITING. Call a physician immediately.
5. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of clean water for at least 15 minutes. Contact a physician immediately.
6. Avoid contact with skin. Wash hands thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water.

Note: Permeation-resistant gloves (that meet ANSI/ISEA 105-2005) are recommended to be worn when using this product to protect hands from irritating ingredients.

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Product Data Sheet

THERMOPLASTIC ONE-PART POURABLE SEALER

PRODUCT DESCRIPTION

Thermoplastic One-Part Pourable Sealer is a one-part, moisture curing, elastomeric polyether sealant providing rapid skin time when exposed to atmospheric moisture forming a waterproof rubber surface in less than an hour. Moisture curing continues for fourteen to twenty-eight days, until a two-inch deep solid rubber seal encases the penetration. Complete cure time will vary depending on relative humidity and temperature. Mule-Hide's Tape Primer must be applied to all surfaces that will be in contact with the Thermoplastic One-Part Pourable Sealer. Primer is not used with the PVC Molded Sealant Pocket. Unused sealant remaining in the pouch will remain useable up to 30 days if pouch is resealed with original cap.



BASIC USES

This product is designed for use with our TPO, PVC & EPDM Sealant Pockets. The sealant's one-part, pourable consistency allows for quick pocket filling without mixing

SPECIFICATIONS

Typical Values*	
Color	White
Odor	Mild ester smell (mint) when wet. Odorless when dry
Specific Gravity	1.40 (11.6 lbs/gallon) – 1.44 (12.0 lbs/gallon)
Viscosity (Brookfield RTV), cps	Self leveling 20,000 – 50,000
Hardness (Shore A) ASTM C 0661	25 to 35
Tack Free Time ASTM C 0679	Less than 1 hour @ 70° F (21°C)
Long term weatherability ASTM G 53	No crazing or cracking
Service Temperature ASTM 2453	Minus 40°F to 200°F. (Minus 40°C to 93°C)
Elongation @ Break, % ASTM D 412	450
Long Term Weatherability ASTM G 53 - 98 cycles @ 12 hours/cycle - Condensate exposure: 4 hrs @ 122°F (50°C) - U.V. exposure – 8 hrs @ 158°F (70°C)	No Cracking or crazing
*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.	

PACKAGING

Each carton contains: 4 – 0.5 Gallon pouches per bucket (4-2 liter)
Weight Per Carton: 26 lbs/bucket (11.8 kg)

BENEFITS & SUPPLEMENTAL STATEMENTS

- No mixing required – ready to use
- Resealable pouch using original cap
- Provides a flexible and long-lasting seal around hard to flash projections
- Provides a watertight seal in less than an hour after application



Product Data Sheet

THERMOLPLASTIC ONE-POUR POURABLE SEALER

COVERAGE RATES

One 0.5-gallon pouch (2-liter) will fill 122 cubic inches of volume within a sealant pocket. As an example, one 6" TPO, PVC or EPDM Sealant Pocket will require 0.23 gallons (0.87 liters) to fill completely (with no penetrations). Coverage rates are average and may vary due to jobsite conditions.

INSTALLATION INSTRUCTIONS

Preparation

1. Surfaces must be free of moisture, dirt and any contaminants. Any previously applied asphalt, caulking or sealants must be removed from the penetration.
2. Fill any voids in the roof deck around the penetration(s) to prevent sealant from seeping through the roof. Pourable sealer must be a minimum of 2" (50 mm) deep. All penetrations must be a minimum of 1" (25 mm) from sides of the pitch pan or sealer pocket.

TPO Application

1. Clean all surfaces with TPO Weathered Membrane Cleaner.
2. Mule-Hide Tape Primer is required for prepping the interior surfaces of the pocket. After welding the pocket in place, apply Mule-Hide Tape Primer to all bonding surfaces, including penetration(s), TPO-c membrane, inside wall and rim of TPO Molded Sealant Pocket. Allow primer to dry.

PVC Application

1. Clean all surfaces with PVC Weathered Membrane Cleaner
2. DO NOT PRIME PVC membrane or pocket with Mule-Hide Tape Primer

EPDM Application

1. Clean all surfaces with PVC Weathered Membrane Cleaner
2. Mule-Hide Tape Primer is required for prepping the interior surfaces of the pocket. After welding the pocket in place, apply Mule-Hide Tape Primer to all bonding surfaces, including penetration(s), TPO-c membrane, inside wall and rim of TPO Molded Sealant Pocket. DO NOT apply primer to blue plastic strip that forms inside wall of pourable sealer pocket. Allow primer to dry.

All Applications

1. Remove cap from 0.5-gallon (2-liter) pouch and pour Thermoplastic One-Part Pourable Sealer directly into pocket. Fill pocket completely until rim is covered with Thermoplastic One-Part Pourable Sealer making sure all voids are filled.
2. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
3. If swallowed, DO NOT INDUCE VOMITING! Call a physician immediately
4. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with water for at least 15 minutes. Contact a physician immediately.
5. Avoid contact with skin. Wash hand thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water.
6. Do not thin. Thinning will affect performance.
7. KEEP OUT OF REACH OF CHILDREN.



Product Data Sheet

THERMOPLASTIC ONE-PART POURABLE SEALER

STORAGE & HANDLING

Shelf life is established at 12 months. Shelf life is based on storage in original, unopened or undamaged containers at temperatures ranging from 60oF to 80oF. Should the Pourable Sealer be exposed to lower temperatures, restore to room temperature prior to use.

PROTECTION & SAFETY

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Product Data Sheet

Low-VOC PVC BONDING ADHESIVE

PRODUCT DESCRIPTION

A high strength solvent-based contact adhesive that allows bonding of PVC membranes to various porous and non-porous substrates. It is specially formulated using a blend of VOC-exempt and non-exempt solvents to be in compliance with the state of California Clean Air Act of 1988 (updated in 1997) and as further regulated by California's Air Quality Control Districts listing VOC limitations. This product also meets the 50 gpl VOC content requirements of the OTC Model Rule for Single Ply Roofing Adhesive.

BASIC USES

Mule-Hide Low VOC PVC Bonding Adhesive is used for bonding PVC flashings and membranes to a variety of substrates.

TYPICAL PHYSICAL PROPERTIES



Typical Properties and Characteristics*	
Base	Synthetic Rubber
Color	Pale Yellow to Orange to Amber
Solids	23.6% to 29.6%
Flash Point	-4° F (-20° C) SETA
Brookfield Viscosity	1500 to 4500 Centipoises
Avg. Net Weight	6.9 to 7.7 lbs/gal (0.8 to 9 kg/l)
Packaging	5 Gallon Pail
Shelf Life	1 year

LEED Information	
Pre-consumer Recycled Content	0%
Post-consumer Recycled Content	0%
VOC Content	<250 g/l
Manufacturing Location	Carlisle, PA

*General properties. Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

BENEFITS & SUPPLEMENTAL STATEMENTS

- High strength adhesive with quick bonding characteristics
- Ease of application with a medium nap roller
- Provides excellent adhesion between PVC membranes and a variety of substrates

CODE APPROVALS/COMPLIANCE

A variety of Factory Mutual Ratings and Underwriter Laboratory Classifications are available. Contact Mule-Hide Technical Department for additional information.

COVERAGE RATES

Low VOC PVC Bonding Adhesive – 60 ft² (5.6 square m) per gallon finished surface. Coverage rates are average and may vary due to conditions on the job site. Porous surfaces and substrates may require more bonding adhesive than the typical coverage rate.

INSTALLATION TEMPERATURE

If adhesive is stored at temperatures lower than 60° F, restore to room temperature (~70° F) before use.



Product Data Sheet

Low-VOC PVC BONDING ADHESIVE

INSTALLATION INSTRUCTIONS

Surface Preparation

1. The surface, on or against which adhesive is to be applied, shall be clean, smooth, dry, free of fins, sharp edges, loose and foreign materials, oil and grease. Depressions greater than 1/4" (6 mm) should be feathered; using epoxy, mortar or other approved patching material. All sharp projections shall be removed by sweeping, blowing or vacuum cleaning.

Mixing

1. **Stir thoroughly until all settled pigments are dispersed and the adhesive is uniform in color. Stir adhesive for a minimum of 5 minutes.**

Application

1. After thorough stirring (minimum 5 minutes), apply Low VOC PVC Bonding Adhesive to substrate and membrane using a 9" (228 mm) wide, 1/2" (13mm) medium nap roller. Application shall be continuous and uniform avoiding globs or puddles. An open time of 5 to 90 minutes, based on drying conditions is recommended before assembly. Low VOC PVC Bonding Adhesive must be allowed to dry until tacky but does not string or stick to a dry finger touch. Any coated area, which has been exposed to rain, should be allowed to dry and then recoated. **Do not apply adhesive to seam areas.**
2. Roll the membrane onto the adhesive coated substrate while avoiding wrinkles. Immediately brush down the bonded portion of the sheet with a soft bristle push broom or a clean dry roller applicator to achieve maximum contact.

REVIEW CURRENT MULE-HIDE SPECIFICATIONS AND DETAILS FOR SPECIFIC APPLICATION REQUIREMENTS.

PRECAUTIONS

1. Review the applicable Material Safety Data Sheet for complete safety information prior to use.
2. Low VOC PVC Bonding Adhesive is **EXTREMELY FLAMMABLE** – It contains solvents that are dangerous fire and explosion hazards when exposed to heat, flame or sparks. Do not smoke while applying. Do not use in a confined or unventilated area. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point and flashback. All containers should be grounded when material is transferred from one container to another. A red caution label is required when shipping. A fire extinguisher should be available. In case of fire, use water spray, foam, dry chemical or carbon dioxide. Do not use a solid stream of water because it can scatter and spread the fire.
3. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately. During application, efforts must be made to prevent fumes from entering the building via air ventilation ducts. Do not place open containers or mix adhesive near fresh air intake units. When possible, shut down or seal off the closest units.
4. If swallowed, **DO NOT INDUCE VOMITING**. Call a physician immediately.



Product Data Sheet

Low-VOC PVC BONDING ADHESIVE

PRECAUTIONS (Continued)

5. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of clean water for at least 15 minutes. Contact a physician immediately.
6. Avoid contact with skin. Wash hands thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water. Contact physician if irritation persists. Note: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) are recommended to be worn when using this product to protect hands from irritating ingredients.
7. Do not thin Low VOC PVC Bonding Adhesive. Thinning will affect performance. Excessively thick or gelled material should be discarded.
8. Job site storage in excess of 90°F (32°C) may affect product shelf life. Should the Low VOC PVC Bonding Adhesive be stored at temperatures lower than 60°F (15°C), restore to room temperature prior to use.
9. Opened containers of Low VOC PVC Bonding Adhesive should be used within 48 hours. Adhesives will begin to thicken after this point, making it difficult and eventually impossible, 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. Stir adhesive occasionally while using.
10. **Adhesive must be allowed to dry thoroughly.** If membrane is mated with the substrate prior to the adhesive being dry, blistering will occur and not subside over time.
11. **KEEP OUT OF THE REACH OF CHILDREN.**

PROTECTION & SAFETY

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ADDITIONAL INFORMATION

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Product Data Sheet

MULE-HIDE WBBA 2000

PRODUCT DESCRIPTION

WBBA 2000 is a semi pressure-sensitive water base bonding adhesive that can be used with Mule-Hide fleece back membranes as well as standard (non fleece back) EPDM, TPO, and PVC membranes. WBBA 2000 offers high peel strength with low-VOCs and no strong odors.

BASIC USES

WBBA 2000 bonding adhesive can be used as a single side, wet lay-in adhesive on horizontal surfaces with our Mule-Hide fleece back membranes. It can also be used as a two-sided, contact adhesive with our standard (non-fleece back) EPDM, TPO and PVC roofing membranes on both vertical and horizontal surfaces.

TYPICAL PHYSICAL PROPERTIES

Typical values*	
Base Material	Acrylic
Color	White (translucent when dry)
Solids	62.5%
VOC:	8 g/l max
Flash Point	None
Brookfield Viscosity	16,000 Centipoises
Avg Net Weight	8.8 lbs. / gallon (3.99 Kg)
Packaging	5 Gallon Pails
Shelf Life	1 Year



*General properties. Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

PACKAGING

5 Gallon Pails

COVERAGE RATES

Fleece Back Membranes - Single-side, wet lay-in: Coverage rate for WBBA 2000 applied as single side, wet lay-in is approximately 100 to 120 ft² (10.2 square m) of finished surface per gallon

Standard (non-fleece back) Membranes - Double-sided, contact lay-in: Coverage rate for WBBA 2000 applied as double sided, contact lay-in is approximately 50 to 60 ft² (5.1 square m) of finished surface per gallon (membrane and substrate).

These coverage rates are an average and may vary due to conditions on the job site. Porous surfaces and substrates may require more bonding adhesive than the typical coverage rate information shown above.

INSTALLATION TEMPERATURE

Adhesive is designed to be applied when ambient temperature is 40°F (4°C) and rising. Do not apply if ambient temperature will drop below 32°F (0°C) before adhesive completely dries.

DO NOT ALLOW PRODUCT TO FREEZE. Frozen product is un-usable and must be discarded.



Product Data Sheet

MULE-HIDE WBBA 2000

INSTALLATION INSTRUCTIONS

1. The surface to which adhesive is to be applied must be clean, smooth, dry, free of fins, sharp edges, loose and foreign materials. Depressions or offsets greater than 1/4" should be feathered using epoxy, mortar or other approved material. All sharp projections shall be removed by sweeping, blowing or vacuum cleaning.
2. WBBA 2000 bonding adhesive is approved for use on (max) 15-year warranties over Polyiso, Dens Deck Prime, High Density Fiberboard, OSB, Plywood, cellular lightweight concrete and structural concrete.
3. Mix adhesive thoroughly scraping the sides and bottom of the can (minimum of 5 minutes is required) until adhesive is uniform in color.
4. Using a 1/4" or 3/8" nap roller apply adhesive in a uniform manner avoiding globs, puddles and holidays (uncoated areas). Avoid accumulation of adhesive between insulation joints. Do not exceed published application rates.

Single Side (wet lay-in) Application with Fleece Back Membranes

1. Apply a smooth even coating of WBBA 2000 bonding adhesive to the substrate at the rate of 100 to 120 square feet per gallon and immediately roll the fleece back membrane into the wet adhesive.
2. Once the membrane has been mated to the substrate, broom the membrane with a stiff bristled push broom to ensure proper contact and 100% adhesion.
4. WBBA 2000 bonding adhesive can be applied with a 1/8" notched squeegee or a medium nap roller.
Note: Adhesive must be wet at time of membrane placement.
5. Do not apply adhesive in seam lap areas that are to be heat welded.

Two-Sided Contact Application with Standard (non- fleece back) Membranes - Horizontal Surfaces

1. Apply a smooth, even coat of WBBA 2000 bonding adhesive to the back side of the membrane and substrate. Do not apply adhesive in area of seam laps.
2. Coverage rate to be approximately:
120 square feet per gallon for one surface (membrane or substrate only) or
60 square feet per gallon per finished surface (membrane and substrate)
3. Allow adhesive to dry until it turns translucent and does not transfer to a dry finger or pull away from the substrate. WBBA 2000 bonding adhesive will take a longer time to dry. Adhesive must be dry but still tacky (but not string) when the sheet is mated to the substrate. Do not allow to over dry.
4. Mate surfaces together avoiding wrinkles. Immediately roll the bonded area of the sheet with a 100 to 150 lbs roller to ensure full contact. It is important to thoroughly roll the membrane over all insulation joints. Repeat this procedure for remaining sheets.
5. Extended drying times can be expected during cool, overcast, humid, shaded, or late day applications. The adhesive must be dry (but still tacky) before mating surfaces to avoid permanent blisters due to trapped moisture or a lack of sufficient adhesion.



Product Data Sheet

MULE-HIDE WBBA 2000

Standard Membrane (vertical walls two-sided contact application)

1. Apply a smooth, even coat of WBBA 2000 bonding adhesive to the back side of the membrane and substrate. Do not apply adhesive in area of seam laps.
2. Coverage rate to be approximately:
120 square feet per gallon for one surface (membrane or substrate only) or
60 square feet per gallon per finished surface (membrane and substrate)
3. Allow adhesive to dry until it turns translucent and does not transfer to a dry finger or pull away from the substrate. WBBA 2000 bonding adhesive will take a longer time to dry. Adhesive must be dry but still tacky (but not string) when the sheet is mated to the vertical surface. Do not allow to over dry.
4. Mate surfaces together avoiding wrinkles. Immediately roll the bonded area of the sheet with a 2-inch wide rubber hand roller to promote maximum positive contact between the membrane and the substrate. Overlap all adjacent flashing sheets a minimum of 2 inches. The Heat-Weld Membrane Flashings shall extend a minimum of 6 inches onto the field sheet and be securely adhered. There shall be a minimum 2 inches hot-air weld in front of the fastener plates. All side laps are to overlap a minimum of 2 inches.
5. Extended drying times can be expected during cool, overcast, humid, shaded, or late day applications. The adhesive must be dry (but still tacky) before mating surfaces to avoid permanent blisters due to trapped moisture or lack of sufficient adhesion...

Precautions

1. Review the applicable Material Safety Data Sheet for complete safety information prior to use.
2. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air.
3. If swallowed, **DO NOT INDUCE VOMITING**. Call a physician immediately.
4. Avoid contact with skin. Wash hands thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water.
5. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of clean water for at least 15 minutes. Contact a physician immediately.
6. Do not thin WBBA 2000. Thinning will affect performance and may coagulate the adhesive.
7. Job site storage in excess of 90°F (32°C) may affect product shelf life. **DO NOT ALLOW WBBA 2000 TO FREEZE**. Do not store below 40°F.
8. WBBA 2000 will turn translucent or clear when completely dry. Dry time is dependent upon ambient conditions.
9. WBBA 2000 is to be used when ambient temperatures are 40°F (4°F and rising. Do not apply if ambient temperature will drop below 32°F (0°F) before adhesive completely dries.
10. Open containers of WBBA 2000 should be used within 48 hours. Adhesive will form a thick skin in the container that will not dissolve. Remaining adhesive can be used once the skinned layer has been removed.



Product Data Sheet

MULE-HIDE WBBA 2000

Precautions (continued)

11. Extended drying times can be expected in cool or humid conditions as well as shaded areas. Not allowing the adhesive to properly dry in a two-sided contact adhesive application will result in poor adhesive strength and/or blisters occurring over time.
12. Keep out of reach of children.

STORAGE & HANDLING

Job site storage in excess of 90°F (32°C) may affect product shelf life. DO NOT ALLOW WBBA 2000 TO FREEZE. Do not store below 40°F.

PROTECTION & SAFETY

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Product Data Sheet

HYDROBOND WATER-BASED PVC BONDING ADHESIVE

PRODUCT DESCRIPTION

HydroBond Water-Based PVC Bonding Adhesive is designed to bond PVC membranes to a clean, dry horizontal surface as a wet lay-in adhesive with slopes up to 2:12. HydroBond can be used with both smooth back and fleece backed PVC membranes. This product can also be used as a contact adhesive for vertical applications, such as flashings. This water-based adhesive is specially formulated to be in compliance with the state of California Clean Air Act of 1988 (updated in 1997) and as further regulated by California's Air Quality Control Districts listing VOC limitations. This product also meets the requirements of the OTC Model Rule for Single Ply Roofing Adhesive.



BASIC USES

HydroBond Water-Based PVC Bonding Adhesive is used for bonding PVC membranes and flashings to a variety of substrates.

TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics*		LEED Information	
Color	Light Tan	Pre-consumer Recycled Content	N/A
Avg. Net Weight	9 lbs / gallon	Post-consumer Recycled Content	N/A
Packaging	5 Gallon Pail	VOC Content	<120.5 g/l
Shelf Life	1 year	Manufacturing Location	Ohio

*General properties. Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product

BENEFITS & SUPPLEMENTAL STATEMENTS

- Single sided, wet lay-in application save time and labor
- Long lasting, high-strength bond
- No HAZMAT restrictions
- Applies quickly with medium nap roller
- 12-month shelf life (sealed container)

CODE APPROVALS/COMPLIANCE

A variety of Factory Mutual Ratings and Underwriter Laboratory Classifications are available. Contact Mule-Hide Technical Department for additional information.

COVERAGE RATES

Substrate	Roller (SF / Gallon)	Spray (SF / Gallon)
Smooth Back Membrane application rates		
Polyiso – Paper or Glass Facer	100 sf / gal (2.47 m ² / L)	133 sf / gal (3.27 m ² / L)
Dens Deck Prime or SECUROCK		
Plywood		
Fleece Back Membrane application rates		
Polyiso – Paper or Glass Facer	100 sf / gal (2.47 m ² / L)	133 sf / gal (3.27 m ² / L)
Dens Deck Prime or SECUROCK		
Plywood		
Concrete or Cellular deck	100 sf / gal (2.47 m ² / L)	100 sf / gal (2.47 m ² / L)



Product Data Sheet

HYDROBOND WATER-BASED PVC BONDING ADHESIVE

INSTALLATION TEMPERATURE

HydroBond adhesive can only be used when temperatures are 40°F and rising, and should not be used when temperatures are expected to fall below 40°F during the 72 hour curing period.

INSTALLATION INSTRUCTIONS

Surface Preparation

1. The surface, on or against which adhesive is to be applied, shall be clean, smooth, dry, free of fins, sharp edges, loose and foreign materials, oil and grease. Depressions greater than 1/4" (6 mm) should be feathered; using epoxy, mortar or other approved patching material. All sharp projections shall be removed by sweeping, blowing or vacuum cleaning.

Application

1. Prepare the membrane by positioning the roll. Unroll the membrane completely to achieve the required overlap. Roll up the membrane in preparation for adhesive application. Do not use the 'barn door' method as this may result in long open times allowing the HydroBond to dry. HydroBond is designed as a one-sided, WET lay-in adhesive with no flash-off time and adhesive must not be allowed to dry during the field application process.
2. HydroBond can be applied to the substrate using either an airless spray machine or a medium nap roller. Ensure that adhesive is not applied to the seam area. It is recommended that adhesive is applied no more than 3' to 4' in front of the roll to prevent drying. Drying can occur rapidly in high temperatures. Ensure that adhesive has not dried before the membrane is rolled into place. To ensure a wet lay-in, adjust application technique according to weather conditions. Avoid heavy or light applications of adhesive as the adhesive performance will be affected.
3. Roll the membrane into the WET adhesive coated substrate while avoiding wrinkles. Immediately broom the membrane starting from the center of the sheet and working out to the sides of the sheet using a soft bristle push broom to work out any air bubbles. Immediately after brooming, roll the adhered membrane in two directions using a criss cross pattern using a 75-lb split steel roller. Brooming and rolling of the membrane is required and must occur immediately after the membrane is placed into the wet adhesive.

Standard Membrane (vertical flashings – two sided contact method)

1. Apply a medium to heavy coat of adhesive to wall, and then apply a standard coat to the membrane flashing. ALLOW ADHESIVE TO DRY THOROUGHLY. Lack of thorough drying will result in poor adhesive strength and/or blistering over time.
2. Avoiding wrinkles, mate flashing membrane to adhesive coated wall. Immediately broom bonded flashing with a stiff bristle push broom, start at the angle change and roll the membrane flashing up the wall. Using a 3" wide 'J' roller (preferred) roll membrane flashing into place to assure maximum contact. Work up evenly from the base and in small sections, thus ensuring full attachment at the lower sections before moving to the top of the membrane. Temporarily tape or pin the top edge of flashing to the wall to prevent membrane curl-back until the termination detail can be completed.

REVIEW CURRENT MULE-HIDE SPECIFICATIONS AND DETAILS FOR SPECIFIC APPLICATION REQUIREMENTS.



Product Data Sheet

HYDROBOND WATER-BASED PVC BONDING ADHESIVE

PRECAUTIONS

1. Review the applicable Material Safety Data Sheet for complete safety information prior to use.
2. Keep container closed when not in use. Use with adequate ventilation.
3. If swallowed, **DO NOT INDUCE VOMITING**. Call a physician immediately.
4. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of clean water for at least 15 minutes. Contact a physician immediately.
5. Avoid contact with skin. Occasional contact with hands or skin does not result in significant irritation unless it is not allowed to evaporate. Prolonged contact may cause irritation and dermatitis. Wash your hand thoroughly after handling.
6. Job site storage temperatures in excess of 99°F (37°C) may affect product shelf life. **DO NOT ALLOW PRODUCT TO FREEZE**. Do not store at temperatures below 40°F.
7. Do not thin HydroBond Adhesive. Thinning will adversely affect performance.
8. HydroBond adhesive can only be used when temperatures are 40°F and rising. Do not apply if ambient temperature will drop below 40°F during the 72 hour curing period.
9. Adjust application technique according to weather conditions to ensure proper application.
10. **KEEP OUT OF REACH OF CHILDREN.**

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC MEMBRANE CLEANER

PRODUCT DESCRIPTION

Mule-Hide PVC Membrane Cleaner is a clear liquid solvent used to clean PVC membranes that have been exposed to the weather prior to heat welding.

BASIC USES

Mule-Hide PVC Membrane Cleaner is used to clean areas on the PVC membrane that has been exposed to weather prior to welding new material. This cleaner helps to loosen and remove dirt and other contaminants from the surface of the PVC membranes and leaves a suitable surface for welding.

TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics	
Color	Clear
Solids	0%
Flash Point	-4°F (-20°C)
Boiling Point	133°F (56°C)
Packaging	5-gallon (18.9 liter) closed top pail Cartons of 2 x 1-gallon (3.8 liter)
Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.	

LEED Information	
Pre-consumer recycle content	0%
Post-consumer recycle content	0%
Manufacturing Location	Carlisle, PA
VOC Content*	755 grams/liter
*This product is exempt from VOC regulations.	

BENEFITS & SUPPLEMENTAL STATEMENTS

- Easily removes dirt and other contaminants from PVC membranes
- Ready to use, no mixing required
- Improves heat welding of soiled PVC membranes

COVERAGE RATES

Coverage rate depends on the age of the membrane and amount of dirt/debris on the surface. Coverage is approximately 400 square feet (one surface) per gallon

INSTALLATION INSTRUCTIONS

1. Remove as much loose material as possible from the membrane surface where the adhesive or pressure-sensitive product will be applied by brooming or wiping the area with a dry rag. Extreme conditions of accumulated dirt may require a low sudsing detergent and water cleaning (rinse area thoroughly with CLEAN water and allow to dry).
2. Saturate a clean rag with Weathered Membrane Cleaner.
 - a. For AGED PVC, use a Scotch-Brite® pad and Weathered Membrane Cleaner, scrub the area to be welded
3. Wipe the area to be cleaned until the membrane is a consistent color with no streaking and allow to dry.
4. Weld the cleaned membrane together with an appropriate hot-air welder.

Review Mule-Hide Specifications and Details for additional information.



Product Data Sheet

MULE-HIDE PVC MEMBRANE CLEANER

PRECAUTIONS

1. Review the applicable Material Safety Data Sheet for complete safety information prior to use
2. Weathered Membrane Cleaner is **EXTREMELY FLAMMABLE** -It contains solvents that are dangerous fire and explosion hazards when exposed to heat, flame or sparks. Do not smoke while applying. Do not use in a confined or unventilated area. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point and flashback. All containers should be grounded when material is transferred from one container to another. A red caution label is required when shipping. A fire extinguisher should be available. In case of fire, use water spray, foam, dry chemical or carbon dioxide. Do not use a solid stream of water because it can scatter and spread the fire.
3. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately. During application, efforts must be made to prevent fumes from entering the building via air ventilation ducts. Do not place open containers or mix adhesive near fresh air intake units. When possible, shut down or seal off the closest units.
4. If swallowed, **DO NOT INDUCE VOMITING**. Call a physician immediately.
5. Avoid contact with skin. Wash hands thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water. Contact physician if irritation persists. **Note:** Permeation resistant gloves (that meet ANSI/ISEA 105-2005) are recommended to be worn when using this product to protect hands from irritating ingredients.
6. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of clean water for at least 15 minutes. Contact a physician immediately.
7. **KEEP OUT OF REACH OF CHILDREN.**

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC CUT-EDGE SEALANT

PRODUCT DESCRIPTION

Mule-Hide PVC Cut-Edge Sealant is a free flowing polymeric material designed for use at the cut edge (exposed scrim) of Mule-Hide PVC reinforced Membrane seams after the membrane has been welded to itself or to Mule-Hide PVC Coated Metal.

BASIC USES

Mule-Hide PVC-Edge Sealant is required to seal all cut edges of the PVC membrane where the reinforcing scrim is exposed to weather.



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics*	
Base	Synthetic Polymer
Color	Clear
Solids	18%
Viscosity	740 cps
Flash Point	1°F (-17°C)
Net Weight Gallon	7.8 lbs (3.5 kg)
Resistance to Ozone	Excellent
Resistance to UV	Excellent
Resistance to Water	Excellent
Packaging	12, 16-oz bottles/carton (3.8 L)
Shelf Life	1 Year

LEED Properties	
Pre-consumer Recycled Content	0%
Post-consumer Recycled Content	0%
Manufacturing Location	Rockland, MA
VOC	737 g/L

* Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

PACKAGING

Mule-Hide PVC Cut-Edge Sealant is available in 16 oz. bottles packaged 12 bottles per carton. PVC Cut-Edge Sealant must be stored in a dry area protected from weather and extreme temperatures until just prior to use. Do not allow the sealant to freeze. Close container tightly after each use.

BENEFITS & SUPPLEMENTAL STATEMENTS

- Squeeze-bottle packaging allows easy, no mess application
- Available in clear color
- Provides excellent sealing of exposed fabric at cut membrane edges

COVERAGE RATES

Approximately 225'–275' (70 – 85 m) per bottle when applied with 1/8" (3 mm) bead.

INSTALLATION INSTRUCTIONS

1. All surfaces to be sealed with PVC Cut-Edge Sealant must be clean, dry and free from oil, grease, dirt and other foreign materials.
2. Apply 1a/8" (3 mm) bead of PVC Cut-Edge Sealant from the plastic squeeze bottle to seal cut edges of reinforced PVC Membrane. Do not apply PVC Cut-Edge Sealant on vertical surfaces.

INSTALLATION INSTRUCTIONS (Continued)



Product Data Sheet

MULE-HIDE PVC CUT-EDGE SEALANT

3. Sealant should be tack-free in 2 hours and fully cured in 24 hours depending on weather conditions and application thickness.

Review Mule-Hide Specifications and details for complete application information.

PRECAUTIONS

1. Review the applicable Material Safety Data Sheets for complete safety information.
2. PVC Cut-Edge Sealant is FLAMMABLE – it contains solvents that are dangerous fire and explosion hazards when exposed to heat, flame or spark. Do not smoke while applying. Do not use in a confined area or unventilated area. Vapors are heavier than air and may travel along the ground to a distant ignition source and flashback.
3. Avoid breathing vapors. Keep container closed when not in use. Use with adequate ventilation. If inhaled, remove to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
4. If swallowed, DO NOT INDUCE VOMITING. Call a physician immediately
5. Avoid contact with eyes. Safety glasses or goggles are recommended. If splashed in eyes, immediately flush eyes with plenty of water for at least 15 minutes. Contact a physician immediately.
6. Avoid contact with skin. Permeation-resistant gloves (that meet ANSI/ ISEA 105-2005) recommended. Wash thoroughly after handling. In case of contact with skin, thoroughly wash affected area with soap and water.
7. Jobsite storage temperatures in excess of 90°F (32°C) may affect product shelf life. Should the Cut-Edge Sealant be stored at temperatures below 60°F (15°C), restore to room temperature prior to use.
8. KEEP OUT OF THE REACH OF CHILDREN

PROTECTION & SAFETY

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ADDITIONAL INFORMATION

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Product Data Sheet

MULE-HIDE PVC NON-REINFORCED FLASHING

PRODUCT DESCRIPTION

Mule-Hide PVC Non-Reinforced Flashing is a non-reinforced thermoplastic poly vinyl chloride based membrane.

BASIC USES

Mule-Hide PVC Non-Reinforced Flashing is used for sealing joints of Mule-Hide PVC Coated Metal, drain details and field flashing pipes and other details where reinforced membrane or the used of pre-molded accessories are not feasible.

TYPICAL PHYSICAL PROPERTIES

Property*	Test Method	Specification
Tolerance on nominal Thickness, %	ASTM D 751	+/- 8
Tensile Strength, min psi	ASTM D 638	1500
Elongation, ultimate, min %	ASTM D 638	250/200
Weight, lb/ft ² , typical		.51 lb/ft ²
Tear strength, min., lbf/in	ASTM D 1004	10
Heat aging: 28 days % Retention	ASTM D 4434	90
Resistance to Xenon-arc weathering	ASTM D 4434	No cracking/crazing
Xenon-arc, 5040 kJ/m ² total		Negligible
Radiant exposure, visual		discoloration
Condition at 7X		

* Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

COLORS

Available in White/Gray and White/Tan

PACKAGING

12" x 50' roll

24" x 50' roll

INSTALLATION INSTRUCTIONS

1. Mule-Hide PVC Flashing is used to flash a variety of roofing structures and penetrations and specific installation methods will vary. Refer to the appropriate Mule-Hide specification and/or detail for specific installation information.
2. A lower heat setting is required on the heat welder when hot air welding the un-reinforced flashing membrane. A typical starting setting is 6, on a scale of 1 to 10.
3. Use the edge of the roller to crease the flashing into any membrane step-offs to achieve a proper seal.

PRECAUTIONS

1. Review the applicable Material Safety Data Sheet for complete safety information prior to use.
2. UV filtering sunglasses are strongly recommended when working with Mule-Hide PVC roofing systems.



Product Data Sheet

MULE-HIDE PVC NON-REINFORCED FLASHING

PRECAUTIONS (Continued)

3. Store Mule-Hide PVC Flashing in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins.
4. PVC Flashing material that has been exposed to the weather for approximately 7 days or longer prior to use must be prepared with Weather Membrane Cleaner prior to hot-air welding.

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Product Data Sheet

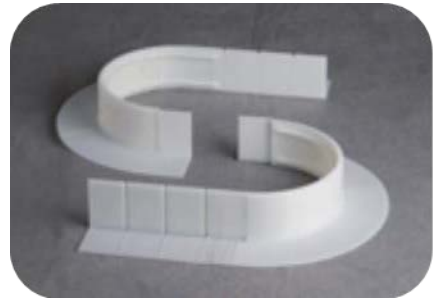
MULE-HIDE PVC MOLDED SEALANT POCKET

PRODUCT DESCRIPTION

Mule-Hide PVC Molded Sealant Pockets are Interlocking, two-piece prefabricated pockets of non-reinforced PVC material used to seal pipe clusters or other irregular shaped penetrations. Pockets length can be adjusted from 7 ½" to 11 ½" by following the pre-molded cutting lines.

BASIC USES

Mule-Hide PVC Molded Sealant Pockets are ideal for sealing irregular, hard to flash penetrations in a Mule-Hide system.



BENEFITS & SUPPLEMENTAL STATEMENTS

- Provides a reliable, cost saving method to waterproof odd shaped penetrations
- Pockets are easily adjustable by cutting on pre-molded cutting lines.
- Larger pockets can be created with the use of pocket extensions

SPECIFICATIONS

Color:	White
Size:	11.5" to 7.5" length by 6" oval (29 cm to 19 cm by 15 cm)
Packaging:	5 Pockets per carton
Weight:	0.55 lbs each (0.25 kg)

Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.

INSTALLATION INSTRUCTIONS

1. Place PVC Molded Sealant Pocket around penetration to determine if pocket requires re-sizing. Pocket must maintain a minimum 1" clearance from penetrations. Pocket can be reduced in size by cutting on pre-molded cut lines or enlarged by using pocket extensions.
2. Clean all surfaces of the PVC Molded Sealant Pocket that will be heat welded, along with all inside surfaces that will contact sealer with Weathered Membrane Cleaner.
3. Using Weathered Membrane Cleaner, also clean surface of membrane to which sealant pocket will be welded, along with surface of penetration(s). Use a primer pad with the cleaner if membrane surface has been exposed for an extended period of time.
4. Place PVC Molded Sealant Pocket around penetration(s), overlapping the two sections of the pocket.
5. Place a piece of cardboard (approximately 4" x 4") between the overlapped area of the Sealant Pocket and the field membrane. Cardboard will help prevent Sealant Pocket from becoming welded to membrane when overlaps are first welded.
6. Using a hand welder, weld the angle change in the overlap area. Use of a seam probe may assist in making this weld. Hand welder temperature is typically set between 5 or 6 for this step.
7. Hand weld the remainder of the horizontal overlap.
8. Repeat steps 4 – 6 to weld the overlap on opposite side of the Sealant Pocket.
9. Position Sealant Pocket so that vertical overlap is against the penetration. This will facilitate heat welding of vertical seam by allowing proper pressure to be applied with 2" silicon roller.
10. Weld both vertical overlaps starting at the angle change and working to the top of the pocket.
11. Position Sealant Pocket in final location and hold in place with tack welds on all four side of flange.
12. Weld entire deck flange to the deck membrane.



Product Data Sheet

MULE-HIDE PVC MOLDED SEALANT POCKET

INSTALLATION INSTRUCTIONS (continued)

13. Allow welds to completely cool and then check with seam probe. Make any repairs as needed.
14. Make sure all voids or openings between the penetration(s) and membrane inside the pocket are sealed (use caulk or tape for sealing) before filling pocket. Openings will allow sealer to penetrate into the deck and possibly the building.
15. Complete fill Sealant Pocket with Thermoplastic One-Part Sealer. Ensure that sealer is in contact with top rim of Sealant Pocket.

PRECAUTIONS

1. Maximum temperature of penetration(s) cannot exceed 160°F (71°C).
2. All surfaces coming in contact with sealer must be first cleaned with Weathered Membrane Cleaner. Tape Primer is NOT USED with PVC.
3. Mule-Hide Thermoplastic One-Part Sealer must completely fill the sealant pocket.
4. There must be a minimum clearance of 1" between sealer pocket and penetration(s).
5. When working on a Mule-Hide PVC roofing system, it is recommended that UV filtering sunglasses be worn.
6. Sealant Pockets or PVC membrane that has been exposed to the weather must be first cleaned with Weathered Membrane Cleaner prior to heat welding. Use a primer pad with the cleaner if surfaces have been exposed for an extended period of time.

STORAGE & HANDLING

Store sealant pockets in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC PIPE SEALS

PRODUCT DESCRIPTION

Mule-Hide PVC Pipe Seals are an injection molded, pre-formed flashing for pipes made of Mule-Hide non-reinforced PVC material. They are designed to add ease to the installation process while offering increased watertight security and improved aesthetics.

BASIC USES

Mule-Hide PVC Pipe Seals are designed as an economical flashing for single pipe penetrations on Mule-Hide PVC Membrane roof systems. PVC Pipe Seals can be used wherever the PVC Pipe Seals may be slipped over the top of the pipe.

TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristic	
Sizes	¾" to 8" od (19.0 to 203.2 mm)
Packaging	8 per box
Weight (each)	0.55 lbs (0.25 kg)
Material	Injection molded PVC
Color	White, Gray & Tan
Service Temp	Max 160°F (71°C)



BENEFITS & SUPPLEMENTAL STATEMENTS

Provides a reliable method of waterproofing round pipe penetrations
Offers substantial labor savings when compared to field fabrication

INSTALLATION INSTRUCTIONS

1. Remove all existing lead and other flashings.
2. Temperature of pipe must not exceed 160°F (71°C)
3. Cut pipe seal to the desired diameter by cutting between two raised 'ribs' as illustrated on flange of pipe seal. (Do not cut off both raised 'ribs')
4. Pull pipe seal over pipe until base flange is in contact with the membrane. Top portion of pipe seal may be heated to facilitate installation.
5. Mark pipe around top of pipe seal.
6. Pull pipe seal upward until mark on pipe is visible.
7. For mechanically attached systems, install seam plates and fasteners at base of projection. Seam plates must fit inside flange of pipe seal.
8. Install Water Cut-off Mastic below mark on pipe.
9. Pull pipe seal back down over pipe and into position with flange contacting membrane.
10. Heat weld pipe seal to field membrane. Hand gun should be set between 6 and 7.
11. Install stainless steel clamping ring at top of pipe seal to ensure constant compression of the sealant. Do not over tighten clamp.

STORAGE & HANDLING

Store pre-molded pipe seals in a cool, shaded area and cover with a light-colored breathable, waterproof tarpaulin. Pipe seals that have been exposed to the elements must be prepared with weathered membrane cleaner prior to heat welding.



Product Data Sheet

MULE-HIDE PVC PIPE SEALS

PROTECTION & SAFETY

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ADDITIONAL INFORMATION

Copper Tubing (C.T.S.)											
Nominal Tube Size	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"	5"	6"	8"
Pipe O.D.	0.88	1.13	1.38	1.63	2.13	2.63	3.13	4.13	5.13	6.13	N/A
Step of Boot Used	1	1	1	1 ½	2	2	3	4	5	6	N/A
Schedule 40 / 80 Steep Pipe – PVC Standard – Polyethylene Pipe IPS											
Nominal Pipe Size	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"	5"	6"	8"
Pipe O.D.	1.05	1.32	1.66	1.90	2.38	2.88	3.50	4.50	5.56	6.63	8.63
Step of Boot Used	1	1	1 ½	1 ½	2	3	3	4	5	6	8
Cast Iron Pipe	Pit Class A & Spun 100-250					Pit Class B, C & D					
Nominal Pipe Size	2"	3"	4"	6"	8"	2"	3"	4"	6"	8"	
Pipe O.D.	2.50	3.96	4.80	6.90	9.50	N/A	3.96	5.00	7.10	9.30	
Step of Boot Used	2	4	5	6	N/A	N/A	4	5	6	N/A	
Sewer Soil Pipe-PVC Plastic SFR 34 & 41-Cast Iron Soil Pipe no hub-service weight and extra heavy											
Nominal Pipe Size	4"				6"				8"		
Pipe O.D.	4.22 to 4.62				6.28 to 6.62				8.40 to 8.75		
Step of Boot Used	4				6				8		
Conduit EMT											
Nominal Pipe Size	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"		
Pipe O.D.	0.922	1.16	1.51	1.74	2.19	2.88	3.50	4.00	4.50		
Step of Boot Used	1	1	1	1 ½	2	3	3	4	4		
Conduit IMC											
Nominal Pipe Size	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"		
Pipe O.D.	1.02	1.29	1.63	1.88	2.36	2.85	3.47	3.97	4.46		
Step of Boot Used	1	1	1 ½	1 ½	2	3	3	4	4		
Conduit Rigid											
Nominal Pipe Size	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	5"	
Pipe O.D.	1.05	1.32	1.66	1.90	2.37	2.87	3.50	4.00	4.50	5.56	
Step of Boot Used	1	1	1 ½	1 ½	2	3	3	4	4	5	

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Product Data Sheet

MULE-HIDE PVC SPLIT PIPE SEALS

PRODUCT DESCRIPTION

PVC Split Pipe Seals are fabricated flashings made of 60-mil reinforced PVC-c membrane for pipes 1-inch (25.4 mm) to 6-inches (152.4 mm) in diameter. They are designed to add ease to the installation process while offering increased watertight security and improved aesthetics

BASIC USES

The PVC Split Pipe Seal contains a split (cut) and overlap tab that allows the pipe-boot to be opened and wrapped around a round pipe with an obstruction. Such obstructions prevent the use of a standard pre-molded pipe boot.



TYPICAL PHYSICAL PROPERTIES

Color:	White, Gray & Tan
Sizes Available:	1", 2", 3", 4", 5" and 6" O.D. Pipe (25.4, 50.8, 76.2, 101.6, 127.0 and 152.4 mm)
Weight per Carton:	8 lbs (3.6 kg)
Material:	Reinforced 60-mil PVC membrane
Packaging:	8 per carton

BENEFITS

- Offers substantial labor savings when compared to field fabricated flashings
- Provides a uniform, consistent appearance
- Simplifies the field installers job when flashing a pipe next to an obstruction
- Provides a reliable method of waterproofing round pipe penetrations

INSTALLATION INSTRUCTIONS

1. Clean the penetration to eliminate any rust or scale and wipe with a Splice Wipe saturated with Weathered Membrane Cleaner.
2. Confirm the outside diameter of the pipe. The nominal diameter of the Split Pipe Seal indicates the maximum size the part will effectively fit. Each Split Pipe Seal can accommodate a pipe that is 1-inch smaller in outside diameter. For example, a 2-inch Split Pipe Seal can be utilized to flash pipes ranging from 1-1/6" in diameter up to 2" in diameter.
3. Open the Split Pipe Seal and pulling apart the tack welds located on the vertical leg of the flashing.
4. Wrap the Split Pipe Seal around the pipe until the vertical leg is tight against the outside diameter of the pipe penetration.
5. Mark the pipe around the top of the Split Pipe Seal.
6. Remove the Split Pipe Seal from around the pipe.
7. Install Water Cut-Off Mastic below the mark indicating the top of the installed Split Pipe Seal.
8. Wrap the Split Pipe Seal back around the penetration until the vertical leg is tight against the outside diameter of the pipe penetration.
9. Tack weld the back edge of the Split Pipe Seal vertical leg ensuring that good contact is maintained between the Split Pipe Seal and the pipe. This process will hold the Split Pipe Seal in place.
10. Heat-weld the entire width of the vertical overlap. Hand roll against the outer surface of the pipe to create the pressure necessary to achieve an acceptable weld.
11. Heat-weld the base flange to the deck membrane and complete the horizontal overlap weld.
12. Once the flashing has completely cooled, check all splices for voids and cold welds. Make any needed repairs.



Product Data Sheet

MULE-HIDE PVC SPLIT PIPE SEALS

INSTALLATION INSTRUCTIONS (Continued)

13. Install a stainless steel universal clamping ring to provide constant compression of the sealant.
14. Apply Cut-Edge Sealant to all edges of the pipe-seal that are located on the horizontal plane. Do not apply the sealant to vertical surfaces.
Refer to Mule-Hide Specifications and detail drawings for installation information.

PRECAUTIONS

1. All lead and other flashings must be removed prior to installation.
2. Temperature of pipe penetration must not exceed 160°F (71°C).
3. For mechanically attached systems, install a minimum of four fastening plates equally spaced around base of pipe projections. Plates must be completely covered by the flange of the Split Pipe Boot and allow for a minimum 1 ½" wide heat weld. If plates cannot be installed to allow a minimum 1 ½" wide heat weld, install the plates outside of the Split Pipe Seal flange and cover with a target patch of PVC field membrane with heat welded seams.

STORAGE & HANDLING

Store Split Pipe Seals in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins. Mule-Hide PVC Split Pipe Seals or membrane that have been exposed to the weather prior to use must be prepared with Weathered Membrane Cleaner prior to hot air welding.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC SQUARE TUBING WRAP

PRODUCT DESCRIPTION

PVC Square Tubing Wraps are fabricated square penetration flashings made of white, gray or tan 60 mil reinforced PVC membrane. Overall height of the flashings is 11 inches. A split (cut) and overlap tab are incorporated into these parts to allow the flashings to be opened and wrapped around a square penetration with an obstruction. PVC Square Tubing Wraps are packaged in boxes of eight.

BASIC USES

The Mule-Hide PVC Square Tubing Wraps are primarily used to seal details where field fabrication is necessary, such as drain details, pipe flashings and pitch pocket flashings.



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics*	
Sizes	3" x 3" (76 mm x 76 mm)
	4" x 4" (102 mm x 102 mm)
	6" x 6" (152 mm x 152 mm)
Thickness	60 mil PVC membrane
Color	White, Gray & Tan

LEED Information	
Pre-Consumer Recycled Content	0%
Post-Consumer Recycled Content	0%
Manufacturing Location	Eugene, OR
Solar Reflective Index (SRI)	N/A

PACKAGING

8 per carton – 8lbs per carton

BENEFITS & SUPPLEMENTAL STATEMENTS

- Offers substantial labor savings compared to field fabricated flashings
- Reliable method of waterproofing square tubing penetrations
- Provides a more consistent professional appearance compared to field fabricated flashings

INSTALLATION INSTRUCTIONS

1. Clean the penetration to eliminate any rust or scale and wipe with a Splice Wipe saturated with Weathered Membrane Cleaner.
2. Open the Square Tubing Wrap and pull apart the tack welds located on the vertical leg of the flashing.
3. Wrap the Square Tubing Wrap around the penetration until the vertical leg is tight against the penetration.
4. Mark the penetration $\frac{1}{4}$ " above the top of the Square Tubing Wrap.
5. Remove the PVC Square Tubing Wrap from around the penetration.
6. Prime a 3"-wide area of the tubing directly below the previously made mark as well as the corresponding area of the Square Tube Wrap with Tape Primer.
7. Wrap a piece of 3"-wide In-Seam Tape (included in the box) around the penetration at the mark made previously. The In-seam Tape should overlap approximately 1".
8. Wrap the PVC Square Tubing Wrap around the penetration until the vertical leg is tight against the penetration. Use a 2" roller to roll the membrane into the In-Seam Tape.
9. Tack-weld the back edge of the PVC Square Tubing Wrap's vertical leg, ensuring that good contact is maintained between the tubing wrap and the penetration. This process will hold the PVC Square Tubing Wrap in place.



Product Data Sheet

MULE-HIDE PVC SQUARE TUBING WRAP

INSTALLATION INSTRUCTIONS (Continued)

10. Heat-weld the entire width of the vertical overlap. Hand roll against the outer surface of the penetration to create the pressure necessary to achieve an acceptable weld.
 11. Heat-weld the base flange to the deck membrane and complete the horizontal overlap weld.
 12. Once the flashing has completely cooled, check all splices for voids and cold-welds. Make any needed repairs.
 13. Apply a bead of Universal Single-Ply Sealant at the top of the tubing wrap.
 14. Apply Cut-Edge Sealant to all edges of the Square Tubing Wrap that are located on the deck. Do not apply the sealant to vertical surfaces.
- Review Mule-Hide specifications and details for installation information.*

PRECAUTIONS

1. All lead and other flashings must be removed prior to installation.
2. Temperature of penetration must not exceed 160°F (71°C).
3. For mechanically attached systems, install a minimum of four fastening plates equally spaced around base of pipe projections. Plates must be completely covered by the flange of the Split Pipe Boot and allow for a minimum 1 ½" wide heat weld. If plates cannot be installed to allow a minimum 1 ½" wide heat weld, install the plated outside of the Split Pipe Seal flange and cover with a target patch of PVC field membrane with heat welded seams.

STORAGE & HANDLING

Store PVC Square Tubing Wraps in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins. Mule-Hide PVC Square Tubing Wraps or membrane that have been exposed to the weather prior to use must be prepared with Weathered Membrane Cleaner prior to hot air welding.

PROTECTION & SAFETY

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ADDITIONAL INFORMATION

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Product Data Sheet

MULE-HIDE PVC T-JOINT COVERS

PRODUCT DESCRIPTION

PVC T-Joint Covers are made from 60-mil non-reinforced White, and 40-mil Gray and Tan, cut into a 4.5" diameter circle.

BASIC USES

PVC T-Joint Covers are used to seal step-offs at splice intersections. Installation is mandatory on all 60-mil and 80-mil PVC systems and on 50-mil systems where step-offs have not been properly sealed.



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics*	
Material	Non-reinforced PVC
Size	4.5" (114 mm) diameter
Thickness	60-mil (1.5 mm)
Packaging	100 per box
Weight	3.5 lbs (1.6 kg) per box
Color	White, Gray and Tan

*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this product.

BENEFITS

- More consistent performance compared to hand cutting
- Every T-Joint Patch is a perfect 4.5" diameter circle
- Offers labor savings compared to hand cut flashings
- Seals channels at splice intersections created by seam step-offs

INSTALLATION INSTRUCTIONS

1. If membrane has been exposed to the weather, clean splice intersection area with Weathered Membrane Cleaner.
2. Use a lower temperature setting on the hand heat welder than that used for welding reinforced PVC membrane. (Typically a setting of "6" on a scale of "10" is appropriate for welding PVC T-Joint Covers.)
3. Center the T-Joint Cover over the splice intersection, begin welding at the center point and work towards the outside. Use the edge of the roller to crease the T-Joint cover into membrane step-offs to achieve a proper seal.
4. Using a probe, check all splices for voids and cold welds only once the T-Joint Cover has completely cooled. Make any needed repairs.

Review Mule-Hide specifications and details for complete installation information.

PRECAUTIONS

1. Do not use PVC T-Joint Cover to overlay fasteners and plates.
2. Reinforced membrane is required to overlay fasteners and plates...



Product Data Sheet

MULE-HIDE PVC T-JOINT COVERS

STORAGE & HANDLING

1. Store T-Joint Covers in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins.
2. T-Joint Covers that have been exposed to the weather must be prepared with Weathered Membrane Cleaner before hot-air welding.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC UNIVERSAL CORNERS

PRODUCT DESCRIPTION

Mule-Hide PVC Universal Corners are pre-molded from non-reinforced thermoplastic poly vinyl chloride material.

BASIC USES

They are uniform in shape and size and provide water tightness at corners formed by PVC coated metal and flashing membrane. They provide a neat, finished look to building corners, curbs and parapet flashings with no cutting or stretching required.

SPECIFICATIONS

Colors: White, Gray (special order)
Thickness: .060" (1.52mm) thick molded material

PACKAGING

Packaged 20 units per carton

BENEFITS

- More consistent performance compared to hand cutting
- Every Universal Corner is consistent in size
- Offers labor savings compared to hand cut flashings

INSTALLATION INSTRUCTIONS

1. If membrane has been exposed to the weather, clean splice intersection area with Weathered Membrane Cleaner.
2. Use a lower temperature setting on the hand heat welder than that used for welding reinforced PVC membrane.
3. Mule-Hide PVC Universal Corners must be installed by heat welding. Refer to Mule-Hide Details published in the Mule-Hide PVC Specification Manual. Do not use adhesive to install.
4. Using a probe, check all splices for voids and cold welds only once the PVC Universal corner has completely cooled. Make any needed repairs.

Review Mule-Hide specifications and details for complete installation information.

STORAGE

Corners should be stored in a clean, dry area and protected from extreme temperatures.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC UNIVERSAL CORNERS

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Product Data Sheet

MULE-HIDE PVC INSIDE CORNERS

PRODUCT DESCRIPTION

Mule-Hide PVC Inside Corners are pre-molded from non-reinforced PVC (polyolefin) membrane.

BASIC USES

Mule-Hide PVC Inside Corners are uniform in shape and size and provide water tightness at inside corners formed by PVC coated metal and/or PVC flashing membrane. They provide a neat, finished look to building corners, curbs and parapet flashings with no cutting required.



TYPICAL PHYSICAL PROPERTIES

Color:	White, Gray & Tan
Material:	Non-reinforced PVC
Thickness:	.060" (1.52mm) thick molded material
Packaging:	12 pieces per bag

*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this product.

BENEFITS

- More consistent performance compared to hand cutting
- Forms easily to flash "out of square" corners that are not exactly 90 degrees
- Offers labor savings compared to hand cut flashings

INSTALLATION INSTRUCTIONS

1. If membrane has been exposed to the weather, clean splice intersection area with Weathered Membrane Cleaner.
2. Use a lower temperature setting on the hand heat welder than that used for welding reinforced PVC membrane.
3. Position PVC Inside Corner into the building corner and begin welding at the innermost corner point and work away from the corner.
4. Use the roller edge to crease the corner flashing into any membrane step-off to create a proper seal.
5. Using a probe, check all splices for voids and cold welds only once the PVC Inside corner has completely cooled. Make any needed repairs.

Review Mule-Hide specifications and details for complete installation information.

STORAGE

Corners should be stored in a clean, dry area and protected from extreme temperatures.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE PVC INSIDE CORNERS

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Product Data Sheet

MULE-HIDE PVC OUTSIDE CORNERS

PRODUCT DESCRIPTION

Mule-Hide PVC Outside Corners are pre-molded from non-reinforced PVC (polyolefin) membrane.

BASIC USES

Mule-Hide PVC Outside Corners are uniform in shape and size and provide water tightness at Outside corners formed by PVC coated metal and/or PVC flashing membrane. They provide a neat, finished look to building corners, curbs and parapet flashings with no cutting required.



TYPICAL PHYSICAL PROPERTIES

Color:	White, Gray & Tan
Material:	Non-reinforced PVC
Thickness:	.060" (1.52mm) thick molded material
Packaging:	12 pieces per bag

*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this product.

BENEFITS

- More consistent performance compared to hand cutting
- Forms easily to flash "out of square" outside corners that are not exactly 90 degrees
- Offers labor savings compared to hand cut flashings

INSTALLATION INSTRUCTIONS

1. If membrane has been exposed to the weather, clean splice intersection area with Weathered Membrane Cleaner.
2. Use a lower temperature setting on the hand heat welder than that used for welding reinforced PVC membrane.
3. Position PVC Outside Corner into the building corner and begin welding at the innermost corner point and work away from the corner.
4. Use the roller edge to crease the corner flashing into any membrane step-off to create a proper seal.
5. Using a probe, check all splices for voids and cold welds only once the PVC Outside corner has completely cooled. Make any needed repairs.

Review Mule-Hide specifications and details for complete installation information.

STORAGE

Corners should be stored in a clean, dry area and protected from extreme temperatures.

PROTECTION & SAFETY

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Product Data Sheet

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Product Data Sheet

MULE-HIDE 2.4" SEAM PLATE

PRODUCT DESCRIPTION

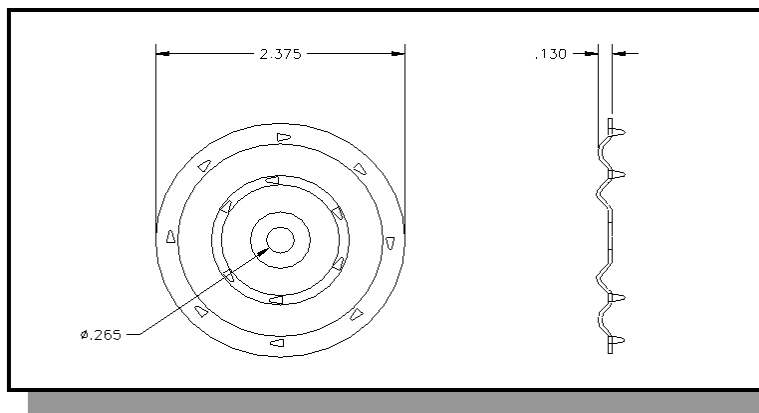
Mule-Hide's 2.4" Seam Plates are round Galvalume coated metal plates with (14) barbed anchors and reinforcing ribs for superior wind uplift resistance

BASIC USES

Mule-Hide's 2.4" Seam Plates are designed for the mechanical attachment of the Mule-Hide Reinforced EPDM, PVC and TPO membranes. The 2.4" Seam Plates are attached with Mule-Hide HDP Fasteners or EHD Fasteners. In addition to securing mechanically attached reinforced membranes, our 2.4" Seam Plates can be used with our reinforced 6" wide RMS, or our 6" wide and 10" wide RUSS™ Strips.

SPECIFICATIONS

Material: 20 ga. Galvalume coated metal
Coating: Galvalume AZ 55 meeting ASTM A 792 Grade 50A
Corrosion: Meets FM corrosion standard 4470
Pull Thru: Flat truss head pulled through the center hole of the plate, minimum pull thru: 800 lbs.



CODE APPROVALS/COMPLIANCE

Mule-Hide HDP Fasteners comply with the requirements of the following specifications, test and code requirements when properly installed.

* FM Standard 4450/4470 Approval * Metro-Dade Approved *Florida Product Approval

PACKAGING

Packaged in cartons of 1,000, approximate weight is 40# per box.

INSTALLATION INSTRUCTIONS

Install Mule-Hide 2.4" Seam Plates with barbs facing toward membrane (see appropriate detail drawing).
Secure 2.4" Seam Plate with Mule-Hide HDP or EHD fasteners in to substrate.
Use eye protection when installing fasteners.



Product Data Sheet

MULE-HIDE 2.4" SEAM PLATE

PROTECTION & SAFETY

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LEED INFORMATION

Recycled Content

Postconsumer (1)	40%
Preconsumer (2)	18%
Total Recycled Content (3)	58%
LEED – Eligible Recycled Content (4)	49%

- (1) Postconsumer material is defined as waste material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purposes.
- (2) Preconsumer material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e. rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
- (3) Total Recycled Content = Postconsumer Content + Preconsumer Content.
- (4) LEED-Eligible Recycled Content = Postconsumer + $\frac{1}{2}$ Preconsumer Content (per LEED Standard). Recycled content value is determined by weight.

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Product Data Sheet

MULE-HIDE 3" INSULATION PLATE

PRODUCT DESCRIPTION

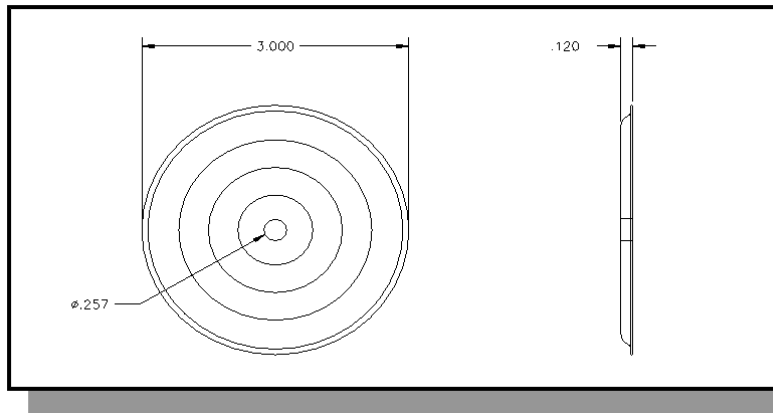
Mule-Hide's 3" Insulation Plates are round Galvalume coated metal plates with reinforcing ribs for superior wind uplift resistance

BASIC USES

Mule-Hide's 3" Insulation Plates are designed specifically for the mechanical attachment of Mule-Hide's Poly ISO 1 and Poly ISO 2 insulation and other FM Approved insulation / cover boards.

SPECIFICATIONS

Material: 26 ga. Galvalume coated metal
Coating: Galvalume AZ 50 meeting ASTM A 792 Grade 50A
Corrosion: Meets FM corrosion standard 4470



CODE APPROVALS/COMPLIANCE

Mule-Hide HDP Fasteners comply with the requirements of the following specifications, test and code requirements when properly installed.

* FM Standard 4450/4470 Approval * Metro-Dade Approved * Florida Product Approval

PACKAGING

Packaged in cartons of 1,000, approximate weight is 40# per box.

INSTALLATION INSTRUCTIONS

Install Mule-Hide 3" Insulation Plates with head indentation facing upward.
Secure 2.4" Seam Plate with Mule-Hide HDP or EHD fasteners in to substrate.
Use eye protection when installing fasteners.



Product Data Sheet

MULE-HIDE 3" INSULATION PLATE

PROTECTION & SAFETY

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LEED INFORMATION

Recycled Content

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Preconsumer (2)	18%
Total Recycled Content (3)	58%
LEED – Eligible Recycled Content (4)	49%

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Product Data Sheet

MULE-HIDE DRILL POINT FASTENERS

PRODUCT DESCRIPTION

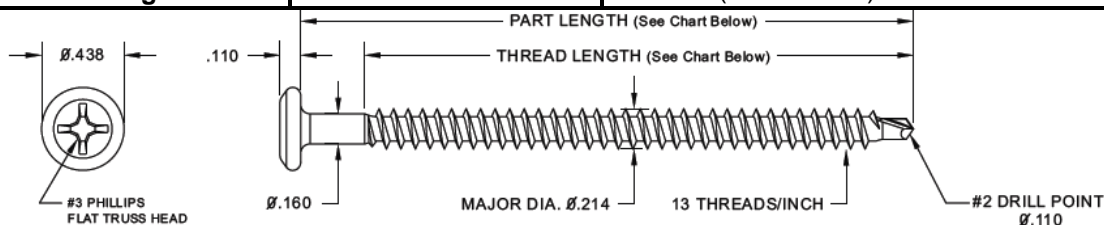
Mule-Hide Drill Point Fasteners are # 12 fasteners manufactured from C-1022 heat treated wire. These fasteners incorporate a No. 3 Phillips recess, flat truss head with a #2 double flute self-drilling point. The drill point has an exclusive tapered entry thread design that allows for fastener penetration into steel roof decks and offers exceptional back-out resistance.

BASIC USES

Mule-Hide's Drill Point Fasteners are designed specifically for the mechanical attachment of Mule-Hide's Poly ISO 1 and Poly ISO 2 roof insulation boards and other FM approved insulation / cover boards into steel and wood decks. The Mule-Hide Drill Point Fasteners may be used in conjunction with the Mule-Hide 3" Insulation Plates. Refer to Mule-Hide's appropriate Single-Ply Manuals for installation instructions and uses.

SPECIFICATIONS

Wire:	---	SAE C-1022, heat treated wire
Coating:	---	TRU-Kote PC-3
Corrosion Resistance	FM 4470, DIN 50018	<15% Red Rust after 30 cycles
Tensile Strength	ASTM F606-10	2500 lb.
Shear Strength	NASM 1312-20	1900 lb. (thread zone)



PACKAGING

Screw Length*	Thread Length*	Pieces/Box	Weight/Box
1-5/8"	1-5/8"	1000	11.8 lbs
2-1/4"	2-1/4"	1000	16.2 lbs
2-7/8"	2-7/8"	1000	19.7 lbs
3-1/4"	2-7/8"	1000	21.5 lbs
3-3/4"	2-7/8"	1000	24.6 lbs
4-1/2"	3-7/8"	1000	28.8 lbs
5"	3-7/8"	1000	31.5lbs
6"	3-7/8"	1000	37.1 lbs
7"	3-7/8"	500	20.9 lbs
8"	3-7/8"	500	23.9 lbs

Screw Length and Thread Length are $\pm 1/16"$

PERFORMANCE INFORMATION

Average Ultimate Pullout Values in Corrugated Steel Deck Substrates													
Thickness	24 ga.	22 ga.			20 ga.			18 ga.			16 ga.		
Strength, ksi	36.5	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0
Pullout (lbs)	230	285	410	465	355	505	580	540	715	800	710	1000	1142



Product Data Sheet

MULE-HIDE DRILL POINT FASTENERS

PERFORMANCE INFORMATION (continued)

Average Ultimate Pullout Values in Wood Substrates								
Type	APA Rated OSB				APA Rated Plywood			SPF #2
Thickness	7/16"	15/32"	19/32"	23/32"	15/32"	19/32"	23/32"	
Pullout (lbs)	265	300	325	440	365	475	720	700*

*lbf./in. of thread penetration including tip.

Pull out values are offered only as a guide and are not guaranteed in any way.
Designated holding powers are dependent upon quality of substrate and accuracy of installation.
Mule-Hide recommends that fastener pull out testing be performed to verify fastener performance.

CODE APPROVALS/COMPLIANCE

Mule-Hide Drill Point Fasteners comply with the requirements of the following specifications, test and code requirements when properly installed.

* FM Standard 4450/4470 Approval * Metro-Dade Approved *Florida Product Approval

INSTALLATION INSTRUCTIONS

Steel and Wood Decks

Install fasteners with #3 Phillips drive bit provided in box and a variable speed screw gun. Fastener must penetrate the deck a minimum of $\frac{3}{4}$ " as measured from the underside of the roof deck to the fastener tip. Ensure that fastener is installed perpendicular to surface of roof deck. Care should be taken to not overdrive the fastener causing damage to roof insulation, fastener or roof deck.

Use eye protection when installing fasteners.

PROTECTION & SAFETY

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LEED INFORMATION

Recycled Content

Postconsumer (1)	15%
Preconsumer (2)	10%
Total Recycled Content (3)	25%
LEED – Eligible Recycled Content (4)	20%

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- (2) Preconsumer material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e. rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
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Recycled content value is determined by weight.



Product Data Sheet

MULE-HIDE DRILL POINT FASTENERS

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Product Data Sheet

MULE-HIDE HDP FASTENERS

PRODUCT DESCRIPTION

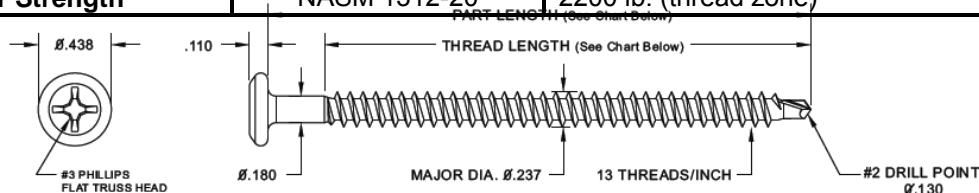
Mule-Hide HDP fasteners (Heavy Duty) are # 14 fasteners manufactured from C-1022 heat treated wire. These fasteners incorporate a No. 3 Phillips recess, flat truss head with a #2 double flute self-drilling point. The drill point has an exclusive tapered entry thread design that allows for fastener penetration into steel roof decks and offers exceptional back-out resistance.

BASIC USES

Mule-Hide's HDP Fasteners are designed specifically for the mechanical attachment of Mule-Hide's reinforced EPDM, TPO and PVC membranes and for the mechanical attachment of Poly ISO 1 and Poly ISO 2 roof insulation boards and other FM approved insulation / cover boards into steel, wood and concrete decks. The Mule-Hide HDP Fasteners may be used in conjunction with the Mule-Hide 2.4" Seam Plates, 3" Insulation Plates and All Purpose Bars. Refer to Mule-Hide's appropriate Single-Ply Manuals for installation instructions and uses.

SPECIFICATIONS

Wire:	---	SAE C-1022, heat treated wire
Coating:	---	TRU-Kote PC-3
Corrosion Resistance	FM 4470, DIN 50018	<15% Red Rust after 30 cycles
Tensile Strength	ASTM F606-10	3200 lb.
Shear Strength	NASM 1312-20	2200 lb. (thread zone)



PACKAGING

Screw Length*	Thread Length*	Pieces/Box	Weight/Box
1-1/2"	1-1/2"	1000	12.9 lbs
2"	2"	1000	15.5 lbs
2-1/2"	2-1/2"	1000	19.4 lbs
3"	2-7/8"	1000	23.7 lbs
3-1/2"	2-7/8"	1000	26.4 lbs
4"	3-7/8"	1000	30.9 lbs
4-1/2"	3-7/8"	1000	33.6 lbs
5"	3-7/8"	1000	37.3 lbs
5-1/2"	3-7/8"	1000	40.8 lbs
6"	3-7/8"	1000	44.0 lbs
7"	3-7/8"	500	25.9 lbs
8"	3-7/8"	500	29.7 lbs
9"	3-7/8"	250	16.6 lbs
10"	3-7/8"	250	18.5 lbs
11"	3-7/8"	250	20.1 lbs
12"	3-7/8"	250	22.0 lbs



Notes: Screw Length is $\pm 1/16"$
Thread Length is $\pm 1/16"$



Product Data Sheet

MULE-HIDE HDP FASTENERS

Performance Information

Average Ultimate Pullout Values in Corrugated Steel Deck Substrates													
Thickness	24 ga.	22 ga.			20 ga.			18 ga.			16 ga.		
Strength, ksi	36.5	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0
Pullout (lbs)	255	315	480	560	420	615	710	675	885	985	850	1115	1240

Average Ultimate Pullout Values in Wood Substrates								
Type	APA Rated OSB				APA Rated Plywood			SPF #2
Thickness	7/16"	15/32"	19/32"	23/32"	15/32"	19/32"	23/32"	
Pullout (lbs)	270	290	310	410	360	410	730	

*lbf./in. of thread penetration including tip.

Average Ultimate Pullout Values in 3000 psi Concrete	
Pullout (lbf.)	450*

*lbf./in. of thread penetration, including tip.

Pull out values are offered only as a guide and are not guaranteed in any way.
Designated holding powers are dependent upon quality of substrate and accuracy of installation.
Mule-Hide recommends that fastener pull out testing be performed to verify fastener performance.

CODE APPROVALS/COMPLIANCE

Mule-Hide HDP Fasteners comply with the requirements of the following specifications, test and code requirements when properly installed.

* FM Standard 4450/4470 Approval * Metro-Dade Approved *Florida Product Approval

INSTALLATION INSTRUCTIONS

Steel and Wood Decks

Install fasteners with #3 Phillips drive bit provided in box and a variable speed screw gun. Fastener must penetrate the deck a minimum of $\frac{3}{4}$ " as measured from the underside of the roof deck to the fastener tip. Ensure that fastener is installed perpendicular to surface of roof deck. Care should be taken to not overdrive the fastener causing damage to roof insulation, fastener or roof deck.

Concrete Decks

Pre-drill a $\frac{3}{16}$ " diameter hole using a drill bit that meets ANSI Standard B212.15 requirements and hammer drill. Drill hole a minimum of $\frac{1}{2}$ " deeper than fastener embedment and clean debris from hole. Using the #3 Phillips drill bit provided and a 0 to 1500 rpm screw gun, install fastener to a minimum embedment of 1" until fastener head is properly seated in bar or plate. Care should be taken to not overdrive the fastener causing damage to roof insulation, fastener or roof deck.

Use eye protection when installing fasteners.

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.



Product Data Sheet

MULE-HIDE HDP FASTENERS

LEED INFORMATION

Recycled Content

Postconsumer (1)	15%
Preconsumer (2)	10%
Total Recycled Content (3)	25%
LEED – Eligible Recycled Content (4)	20%

- (1) Postconsumer material is defined as waste material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purposes.
- (2) Preconsumer material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e. rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
- (3) Total Recycled Content = Postconsumer Content + Preconsumer Content.
- (4) LEED-Eligible Recycled Content = Postconsumer + $\frac{1}{2}$ Preconsumer Content (per LEED Standard). Recycled content value is determined by weight.

ADDITIONAL INFORMATION

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Product Data Sheet

MULE-HIDE EHD FASTENERS

PRODUCT DESCRIPTION

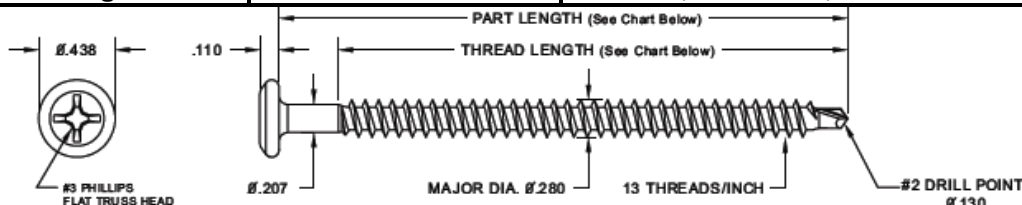
Mule-Hide EHD fasteners (Extra Heavy Duty) are # 15 fasteners manufactured from C-1022 heat treated wire. These fasteners incorporate a No. 3 Phillips recess, flat truss head with a #2 double flute self-drilling point. The drill point has an exclusive tapered entry thread design that allows for fastener penetration into steel roof decks and offers exceptional back-out resistance.

BASIC USES

Mule-Hide's EHD Fasteners are designed specifically for the mechanical attachment of Mule-Hide's reinforced EPDM, TPO and PVC membranes in steel and wood roof decks. Mule-Hide EHD fasteners can also be used for the mechanical attachment of Poly ISO 1 and Poly ISO 2 roof insulation boards and other FM approved insulation / cover boards. The Mule-Hide EHD Fasteners may be used in conjunction with the Mule-Hide 2.4" Seam Plates, 3" Insulation Plates and All Purpose Bars. Refer to Mule-Hide's appropriate Single-Ply Manuals for installation instructions and uses.

SPECIFICATIONS

Wire:	---	SAE C-1022, heat treated wire
Coating:	---	TRU-Kote PC-3
Corrosion Resistance	FM 4470, DIN 50018	<15% Red Rust after 30 cycles
Tensile Strength	ASTM F606-10	4200 lb.
Shear Strength	NASM 1312-20	2400 lb. (thread zone)



PACKAGING

Screw Length*	Thread Length*	Pieces/Box	Weight/Box
1-1/4"	1-1/4"	1000	12.6 lbs
2"	2"	1000	19.5 lbs
3"	3"	1000	28.2 lbs
4"	3"	1000	37.8 lbs
5"	4"	1000	48.1 lbs
6"	4"	500	27.9 lbs
7"	4"	500	33.6 lbs
8"	4"	500	37.3 lbs
9"	4"	250	20.7 lbs
10"	4"	250	23.7 lbs
11"	4"	250	25.3 lbs
12"	4"	250	28.9 lbs
14"	4"	250	33.1 lbs
16"	4"	250	36.9 lbs
18"	4"	250	41.7 lbs
20"	4"	250	46.7 lbs
22"	4"	250	51.1lbs
24"	4"	250	56.1 lbs

Screw Length and Thread Length is $\pm 1/16"$





Product Data Sheet

MULE-HIDE EHD FASTENERS

Performance Information

Average Ultimate Pullout Values in Corrugated Steel Deck Substrates													
Thickness	24 ga.	22 ga.			20 ga.			18 ga.			16 ga.		
Strength, ksi	36.5	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0	33.0	80.0	102.0
Pullout (lbs)	390	465	695	805	605	855	970	925	1125	1215	1175	1370	1460

Average Ultimate Pullout Values in Wood Substrates								
Type	APA Rated OSB				APA Rated Plywood			SPF #2
Thickness	7/16"	15/32"	19/32"	23/32"	15/32"	19/32"	23/32"	
Pullout (lbs)	295	300	310	515	400	525	685	

*lbf./in. of thread penetration including tip.

Pull out values are offered only as a guide and are not guaranteed in any way.
Designated holding powers are dependent upon quality of substrate and accuracy of installation.
Mule-Hide recommends that fastener pull out testing be performed to verify fastener performance.

CODE APPROVALS/COMPLIANCE

Mule-Hide EHD Fasteners comply with the requirements of the following specifications, test and code requirements when properly installed.

* FM Standard 4450/4470 Approval * Metro-Dade Approved *Florida Product Approval

INSTALLATION INSTRUCTIONS

Steel and Wood Decks

Install fasteners with #3 Phillips drive bit provided in box and a variable speed screw gun. Fastener must penetrate the deck a minimum of $\frac{3}{4}$ " as measured from the underside of the roof deck to the fastener tip. Ensure that fastener is installed perpendicular to surface of roof deck. Care should be taken to not overdrive the fastener causing damage to roof insulation, fastener or roof deck. **Use eye protection when installing fasteners.**

LEED INFORMATION

Recycled Content

Postconsumer (1)	15%
Preconsumer (2)	10%
Total Recycled Content (3)	25%
LEED – Eligible Recycled Content (4)	20%

- (1) Postconsumer material is defined as waste material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purposes.
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- (3) Total Recycled Content = Postconsumer Content + Preconsumer Content.
- (4) LEED-Eligible Recycled Content = Postconsumer + $\frac{1}{2}$ Preconsumer Content (per LEED Standard). Recycled content value is determined by weight.



Product Data Sheet

MULE-HIDE EHD FASTENERS

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE ALL PURPOSE BAR

PRODUCT DESCRIPTION

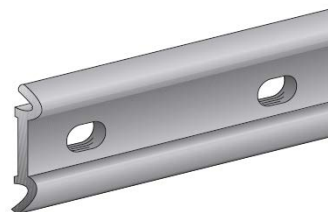
Mule-Hide's All Purpose Bar is a specially extruded aluminum bar without sharp edges.

BASIC USES

Mule-Hide's All Purpose Bar is designed for use as an anchor bar for attachment of the Mule-Hide EPDM membranes. The All Purpose Bar may be installed in the field seam as a batten bar and used at the base of curbs, parapet walls and angle changes as an anchor bar. The All Purpose Bar may also be used with any of the Mule-Hide single-ply membranes as a termination bar. Refer to the Mule-Hide Single-Ply Manuals for specific use and installation instructions.

SPECIFICATIONS

Material: Extruded Aluminum
Dimensions: .050" thick x 1" wide x 10' long per piece.
Holes: 1/4" x 3/8" slotted holes on 6 inch centers.



PACKAGING

Packaged: 50 pieces per tube
Approx. shipping weight: 45 lbs per tube

INSTALLATION INSTRUCTIONS

Position Mule-Hide All Purpose Bar as per detail drawings (ribs facing outward or ribs facing inward). When used as edge termination, ensure that water block sealant has been installed as per appropriate detail drawing, position bar with ribs facing substrate (to form sealant pocket) and attach with appropriate fastener into substrate. When used for base attachment (see appropriate detail) position All Purpose Bar with ribs facing outward and attach with appropriate fastener into substrate.

LEED INFORMATION

Recycled Content

Postconsumer (1)	12%
Preconsumer (2)	32%
Total Recycled Content (3)	44%
LEED – Eligible Recycled Content (4)	28%

- (1) Postconsumer material is defined as waste material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purposes.
- (2) Preconsumer material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e. rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
- (3) Total Recycled Content = Postconsumer Content + Preconsumer Content.
- (4) LEED-Eligible Recycled Content = Postconsumer + ½ Preconsumer Content (per LEED Standard). Recycled content value is determined by weight.



Product Data Sheet

MULE-HIDE ALL PURPOSE BAR

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Product Data Sheet

MULE-HIDE POLY ISO 1™ ROOF INSULATION

PRODUCT DESCRIPTION

The Mule-Hide Poly ISO 1™ polyisocyanurate insulation (flat or tapered) is a closed-cell polyisocyanurate foam core laminated to (non-asphaltic) glass fiber reinforced felt facers. The Mule-Hide Poly ISO 1 is compatible with all Mule-Hide membranes and accessories. Available in 20 psi and 25 psi.

BASIC USES

The Mule-Hide Poly ISO 1™ insulation board may be used for ballasted, mechanically attached and fully adhered single- ply roofing systems. The Poly ISO 1™ insulation board may be installed over approved decks and substrates on new construction, tearoffs, and recover (retrofit) projects. The Poly ISO 1™ insulation board may be used in UL Class A and FM Class 1 assemblies.

TYPICAL PHYSICAL PROPERTIES

Property	Test Method	Typical Results
Dimensional Stability	ASTM D-2126	2% Linear Change (7 days)
Compressive Strength	ASTM D-1621	20 PSI (Grade 2) 25 PSI (Grade3)
Water Absorption	ASTM D-209	Less than 1% By Volume
Moisture Vapor Transmission	ASTM E-96	Less than One (1) Perm
Service Temperature	---	-100°F to 250°F Max
Flame Spread (foam core)	ASTM E 84	< 70**
Smoke Development	ASTM E 84	< 250**

*The physical properties above are presented as typical average values as determined by accepted ASTM test methods and are subject to change. All information can be confirmed by contacting Mule- Hide Products.

** The numerical ratings are determined by ASTM Test Method E-84 are not intended to reflect hazards presented by this or any other material under actual fire conditions. A flame spread index of 75 or less and smoke development of 450 or less meet code requirements regarding flame spread and smoke development for foam plastic roof insulation. However, the codes exempt foam plastic insulation when used in roof deck constructions that comply as an assembly with FM 4450 or UL 1256 (see IBC, NBC, UBC and SBS Sections on Foam Plastic Insulation (Chapter 26). Smoke development does not apply to roofing

Poly ISO 1™				
Nominal Thickness** (Inches)	(mm)	LTTR R-Value (revised Jan-2014)	C-Value	Metal Deck Max. Flute
1.0	25	5.7	.175	2 5/8
1.5	38	8.6	.116	4 3/8
1.8	46	10.3	.097	4 3/8
2.0	51	11.4	.088	4 3/8
2.5	64	14.4	.069	4 3/8
2.6	66	15.0	.067	4 3/8
3.0	76	17.4	.057	4 3/8
3.5	89	20.5	.049	4 3/8
3.8	97	22.3	.045	4 3/8
4.0	102	23.6	.042	4 3/8
4.3	109	25.5	.039	4 3/8
4.5	114	26.8	.037	4 3/8

*Long Term Thermal Resistance Values are based on ASTM C1289 (revised Jan-2014) and CAN/ULC S770 which provides for a 15-year time weighted average.

**Other thicknesses available upon special request.



Product Data Sheet

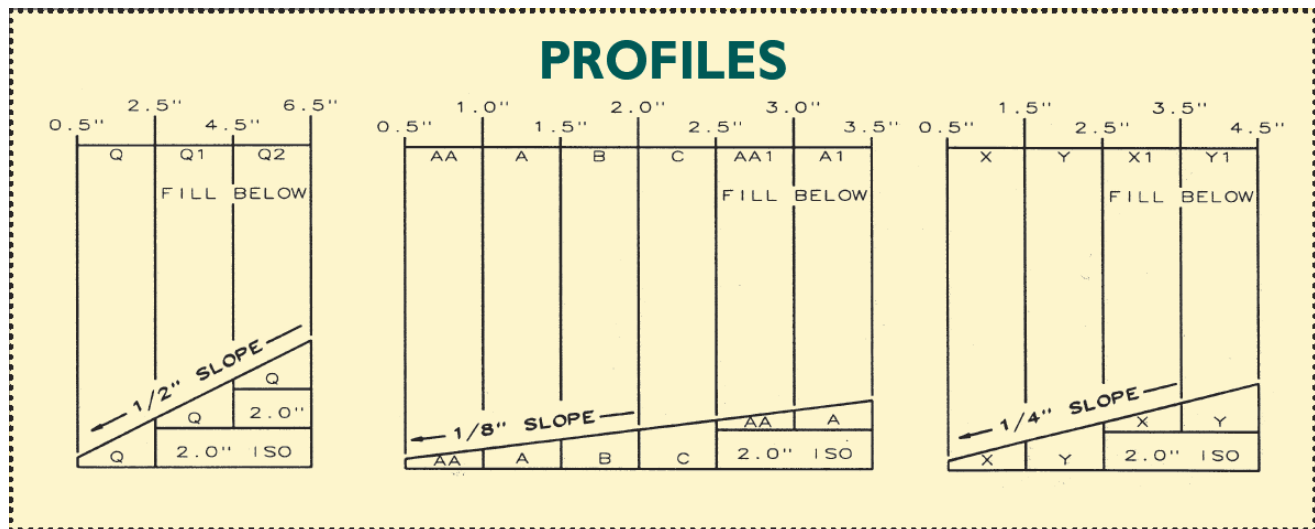
MULE-HIDE POLY ISO 1™ ROOF INSULATION

LTR Value	ASTM C1289-11 (revised Jan-2014)
20	2 layers of 1.8" Poly ISO
25	2 layers of 2.2" Poly ISO
30	2 layers of 2.6" Poly ISO
35	2 layers of 3.1" Poly ISO
40	2 layers of 3.5" Poly ISO

Poly ISO 1 Recycle Content

Between 16% and 43% by weight, depending upon thickness (55% post consumer and 45% post industrial). Refer to LEED Memo for Mule-Hide Products.

SUPPLEMENTAL INFORMATION



PACKAGING

Factory applied packaging is only intended for protection during transit. When stored outside or at the job site, the insulation must be stored at least 4" above ground level and completely covered with a weatherproof covering such as a tarpaulin. **Warning - Do Not Leave Exposed:** This product will burn if exposed to an ignition source of sufficient heat and intensity, or an open flame.

CODE APPROVALS/COMPLIANCE

Poly ISO 1™ complies with the requirements of the following specifications, test and code requirements when properly installed.

- * Federal Specification HH-I-1972/GEN and HH-I-1972/2, Class 1
- * ASTM C 1289-05a, Type II, Class 1, Grade 2 (20 psi), Grade 3 (25 psi)
- * FM Standard 4450/4470 Approval, Class 1
- * UL Standard 1256 Classification
- * UL Standard 790 Classification
- * UL Standard 263 Fire Resistance Classification

Mule-Hide Poly ISO 1™ is manufactured with NexGen Chemistry: Contains no CFCs, HCFCs, is Zero ODP, EPA Compliant and has virtually no GWP



Product Data Sheet

MULE-HIDE POLY ISO 1™ ROOF INSULATION

INSTALLATION INSTRUCTIONS

Ballasted Single-Ply Membrane Systems - Mule-Hide Poly ISO 1™ does not require attachment to the deck in this system. All boards must be tightly fitted together to prevent movement, separation or damage during the installation of the membrane system. All gaps greater than 1/4" must be filled. After the membrane is installed, sufficient amounts of ballast must be applied to prevent membrane and insulation movement. Refer to the Mule-Hide Manual and FM Loss Prevention Data Sheet 1-29 for information regarding ballasting guidelines.

Mechanically Attached Single-Ply Membrane Systems - Mule-Hide Poly ISO 1™ should be attached with Mule-Hide fasteners and insulation plates (or FM Approved fasteners) using a minimum of 4 fasteners per 4'x 4' board (1 fastener per 4 square feet) and a minimum of 6 fasteners per 4'x 8' board (1 fastener per 5.33 square feet).

Refer to the Mule-Hide Manual for proper fastener placement.

Fully Adhered Single-Ply Membrane Systems - Mule-Hide Poly ISO 1™ should be installed with the perforated side down. Insulation attachment will vary depending upon insulation thickness and job requirements. If the top layer is less than 2" thick, install a minimum of 8 fasteners per 4'x 4' board (1 fastener per 2 square feet) and a minimum of 16 fasteners per 4'x 8' board (1 fastener per 2 square feet). If the top layer is 2" thick or thicker, install 4 fasteners per 4' x 4' or 8 fasteners per 4' x 8' insulation board. Refer to the Mule-Hide Manual for proper fastener density and placement. Additional fastening may be required for certain job conditions. In some instances hot steep asphalt or insulation adhesive may be used to attach the Mule-Hide Poly ISO 1™ to approved concrete decks. Only 4'x 4' boards may be used. Contact Mule-Hide's Technical Department for specific requirements and procedures.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE POLY ISO2™ ROOF INSULATION

PRODUCT DESCRIPTION

Mule-Hide Poly ISO 2™ (flat) and Poly ISO 2™ Tapered (Poly ISO 2™ insulations consist of a closed-cell polyisocyanurate foam core laminated to heavy, (non-asphaltic) glass fiber reinforced felt facers. Poly ISO 2™ insulations are compatible with all Mule-Hide membranes and accessories and are available in 20 and 25 psi densities.

BASIC USES

Mule-Hide Poly ISO 2™ insulation boards may be used for ballasted, mechanically attached and fully adhered single-ply roofing systems. Poly ISO 2™ insulation board may be installed over approved decks and substrates on new construction, tearoffs, and recover (retrofit) projects. Rated for use in UL Class A and FM Class 1 assemblies.

TYPICAL PHYSICAL PROPERTIES (flat and tapered)

Property	Test Method	Typical Results
Dimensional Stability	ASTM D-2126	Less than 2% Linear Change
Compressive Strength	ASTM D-1621 (10% deformation)	20 PSI or 25 PSI
Water Absorption	ASTM C-209, ASTM D-2842	< 1.5%, < 3.5%
Moisture Vapor Transmission	ASTM E-96	Less than 1.5 Perm
Product Density	ASTM D-1622	Nominal 2.0 lbs per cubic foot
Flame Spread (foam core)	ASTM E-84 (full 10 min. test)	40 to 60*
Smoke Developed	ASTM E-84 (full 10 min. test)	50 to 170*
Service Temperature	---	-100°F to +250°F Max**
Tensile Strength	ASTM D-1623	>730 psf (35 kPa)

* The numerical ratings are determined by ASTM Test Method E-84 are not intended to reflect hazards presented by this or any other material under actual fire conditions. A flame spread index of 75 or less and smoke development of 450 or less meet code requirements regarding flame spread and smoke development for foam plastic roof insulation. However, the codes exempt foam plastic insulation when used in roof deck constructions that comply as an assembly with FM 4450 or UL 1256 (see IBC, NBC, UBC and SBS Sections on Foam Plastic Insulation (Chapter 26). Smoke development does not apply to roofing.

**ASTM C1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation. The physical properties above are presented as typical average values as determined by accepted ASTM test methods and are subject normal manufacturing variation.

Mule-Hide Poly ISO 2™ (flat)					
LTTR R-Value ¹	Thickness ²		RSI ⁴	Flute Spanability	
(Revised Jan-2014)	Inches	mm		Inches	mm
5.7	1.0	25.4	1.00	2.625	66.68
8.6	1.5	38.1	1.51	4.375	111.13
11.4	2.0	50.8	2.01	4.375	111.13
14.4	2.5	63.5	2.53	4.375	111.13
17.4	3.0 ³	76.2	3.06	4.375	111.13
20.5	3.5 ³	88.9	3.61	4.375	111.13
23.6	4.0 ³	101.6	4.16	4.375	111.13

1. LTTR (Long Term Thermal Resistance) values were determined in accordance with CAN/ULC-S770 and ASTM C1289 (Revised Jan-2014), 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
2. Other thicknesses available upon special request
3. Multi-layer application is suggested when the insulation thickness exceeds 2.7".
4. RSI is the metric expression of R-value ($m^2 \cdot K/W$)

LTTR Value	ASTM C1289-11 (revised Jan-2014)
20	2 layers of 1.8" Poly ISO 2
25	2 layers of 2.2" Poly ISO 2
30	2 layers of 2.6" Poly ISO 2
35	2 layers of 3.1" Poly ISO 2
40	2 layers of 3.5" Poly ISO 2

Poly ISO 2™ Recycle Content for Flat and Tapered Material
Between 52.9% and 28.9% recycled materials by weight Refer to Mule-Hide LEED memo



Product Data Sheet

MULE-HIDE POLY ISO2™ ROOF INSULATION

PACKAGING

Factory applied packaging is only intended for protection during transit. When stored outside or at the job site, the insulation must be stored at least 4" above ground level and completely covered with a weatherproof covering such as a tarpaulin. **Warning - Do Not Leave Exposed:** This product will burn if exposed to an ignition source of sufficient heat and intensity, or an open flame.

CODE APPROVALS/COMPLIANCE

Poly ISO 2™ complies with the requirements of the following specifications, test and code requirements when properly installed.

- * Federal Specification HH-I-1972/GEN and HH-I-1972/2, Class 1 (have been cancelled)
- * ASTM C 1289, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi)
- * CAN/ULC-S704 Type 2, Class 3 or Type 3, Class 3
- * FM Standard 4450/4470 Approval, Class 1
- * UL Standard 1256 Classification
- * UL Standard 790 Classification
- * UL Standard 263 Fire Resistance Classification

Mule-Hide Poly ISO 2™ is manufactured using CFC-, HCFC-, and HFC-free foam blowing technology with zero ozone depletion potential (ODP) and virtually no (negligible) global warming potential (GWP).

INSTALLATION INSTRUCTIONS

Ballasted Single-Ply Membrane Systems - Mule-Hide Poly ISO 2™ does not require attachment to the deck in this system. All boards must be tightly fitted together to prevent movement, separation or damage during the installation of the membrane system. All gaps greater than 1/4" must be filled. After the membrane is installed, sufficient amounts of ballast must be applied to prevent membrane and insulation movement. Refer to the Mule-Hide Manual and FM Loss Prevention Data Sheet 1-29 for information regarding ballasting guidelines.

Mechanically Attached Single-Ply Membrane Systems - Mule-Hide Poly ISO 2™ should be attached with Mule-Hide fasteners and insulation plates (or FM Approved fasteners) using a minimum of 4 fasteners per 4' x 4' board (1 fastener per 4 square feet) and a minimum of 6 fasteners per 4' x 8' board (1 fastener per 5.33 square feet). Refer to the Mule-Hide Manual for proper fastener placement.

Fully Adhered Single-Ply Membrane Systems - Mule-Hide Poly ISO 2™ should be installed with the perforated side down. Insulation attachment will vary depending upon insulation thickness and job requirements. If the top layer is less than 2" thick, install a minimum of 8 fasteners per 4' x 4' board (1 fastener per 2 square feet) and a minimum of 16 fasteners per 4' x 8' board (1 fastener per 2 square feet). If the top layer is 2" thick or thicker, install 4 fasteners per 4' x 4' or 8 fasteners per 4' x 8' insulation board. Refer to the Mule-Hide Manual for proper fastener density and placement. Additional fastening may be required for certain job conditions.

In some instances hot steep asphalt or insulation adhesive may be used to attach the Mule-Hide Poly ISO 2™ to approved concrete decks. Only 4' x 4' boards may be used. Contact Mule-Hide's Technical Department for specific requirements and procedures.

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.



Product Data Sheet

MULE-HIDE POLY ISO2™ ROOF INSULATION

ADDITIONAL INFORMATION

The information given on this PDS is subject to change without notice. Always check the Mule-Hide website at www.mulehide.com for the latest information, changes and updates or contact Mule-Hide Products Company at 800-786-1492.

DISCLAIMER

The statements provided concerning the material shown are intended as a guide for material usage and are believed to be true and accurate at the time of printing. No statement made by anyone may supersede this information, except when done in writing by Mule-Hide Products Co., Inc. Since the manner of use is beyond our control, Mule-Hide does not authorize anyone to make any warranty of merchantability or fitness for any particular purpose or any other warranty, guarantee or representation, expressed or implied, concerning this material. This product may be eligible for a Mule-Hide warranty, please check the Mule-Hide website at www.mulehide.com or contact Mule-Hide directly at 800-786-1492 for details. Buyer and user accept the product under these conditions and assume the risk of any failure, any injury person or property (including that of the user), loss or liability resulting from the handling, storage or use of the product whether or not it is handled, stored or used in accordance with the directions or specifications. Mule-Hide must be notified in writing of any claims and be given the opportunity to inspect the alleged failure before repairs are made.



Product Data Sheet

MULE-HIDE POLY ISO 1- HD

PRODUCT DESCRIPTION

Mule-Hide Poly ISO 1-HD is ½" thick, high density polyisocyanurate insulation board that was specifically designed for use as a cover board. This product consists of a closed-cell polyisocyanurate foam core laminated to premium performance coated glass fiber felt facers. Mule-Hide Poly ISO 1-HD is compatible with all Mule-Hide membranes and accessories. In addition to providing a durable underlayment roofing membranes, Poly ISO HD-1 has a R-value of 2.5 which is significantly higher than that of other cover board products such as woodfiber or gypsum.

BASIC USES

Mule-Hide Poly ISO 1-HD is designed for use as a cover board over roof insulation boards or existing membranes. It is compatible with Single-Ply roofing systems (ballasted, mechanically attached and fully adhered) and Modified Bitumen Roofing Systems, on new construction, tearoff, and recover (retrofit) projects. Suitable for use with approved fasteners and plates, and low-rise adhesive. Poly ISO 1-HD can achieve a FM hail resistance rating of SH-1 with certain membranes.

TYPICAL PHYSICAL PROPERTIES (polyisocyanurate foam core only)

Property	Test Method	Typical Results
Dimensional Stability	ASTM D-2126	Less than 0.5% Linear Change
Compressive Strength	ASTM D-1621	>100 psi
Water Absorption	ASTM D-209	Less than 1% By Volume
Resistance to Mold	ASTM D-3273	Passed (10)
Service Temperature	---	260°F or less
Recycled Content	---	>8%
R-Value @ ½" (13 mm)	ASTM C-518	2.5
*The physical properties above are presented as typical average values as determined by accepted ASTM test methods and are subject to change. All information can be confirmed by contacting Mule-Hide Products.		

PACKAGING

PACKAGING & WEIGHT		
Weight	11 lbs. per 4' x 8' panel	0.3431 lbs / sq. ft.
Packaging	96 pieces per bundle	

Factory applied packaging is only intended for protection during transit. When stored outside or at the job site, the insulation must be stored at least 4" above ground level and completely covered with a weatherproof covering such as a tarpaulin. **Warning - Do Not Leave Exposed:** This product will burn if exposed to an ignition source of sufficient heat and intensity, or an open flame.

CODE APPROVALS/COMPLIANCE

Poly ISO 1-hd complies with the requirements of the following specifications, test and code requirements when properly installed.

- * ASTM E-108
- *FM Approved – consult RoofNav for specific assemblies
- *UL Classified 790

Mule-Hide Poly Iso 1 is manufactured with NexGen Chemistry™ – Zero ODP, CFC Free, EPA Compliant.



Product Data Sheet

MULE-HIDE POLY ISO 1- HD

INSTALLATION INSTRUCTIONS

General

All boards must be tightly fitted together to prevent movement, separation or damage during the installation of the membrane system. All gaps greater than 1/4" must be filled.

Ballasted Single-Ply Membrane Systems - Mule-Hide Poly ISO 1-HD does not require attachment to the deck in this system. Sufficient amounts of ballast must be applied to prevent membrane and insulation movement. Refer to the Mule-Hide Manual and FM Loss Prevention Data Sheet 1-29 for information regarding ballasting guidelines.

Mechanically Attached Single-Ply Membrane Systems - Mule-Hide Poly ISO 1-HD should be attached with Mule-Hide fasteners and insulation plates (or FM Approved fasteners) using a minimum of 4 fasteners per 4'x 4' board (1 fastener per 4 square feet) and a minimum of 6 fasteners per 4'x 8' board (1 fastener per 5.33 square feet). Refer to the Mule-Hide Manual for proper fastener placement.

Fully Adhered Single-Ply Membrane Systems - Mule-Hide Poly ISO 1-HD should be attached using a minimum of 8 fasteners per 4'x 4' board (1 fastener per 2 square feet) and a minimum of 16 fasteners per 4'x 8' board (1 fastener per 2 square feet). Refer to the Mule-Hide Manual for proper fastener placement.

Attachment - In some instances insulation adhesive may be used to attach the Mule-Hide Poly ISO 1-HD to approved substrates. Only 4'x 4' boards may be used. Contact Mule-Hide's Technical Department for specific requirements and procedures.

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.

ADDITIONAL INFORMATION

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DISCLAIMER

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Manufacturer

Georgia-Pacific Gypsum Georgia-Pacific Canada
 133 Peachtree Street 2180 Meadowvale Boulevard, Suite 200
 Atlanta, GA 30303 Mississauga, ON L5N 5S3
 Technical Service Hotline: 1-800-225-6119

Description

DensDeck® Prime Roof Board has been enhanced to provide a broader compatibility and higher performance with roofing adhesives. Face mat enhancements allow adhesives to be applied more uniformly and consistently. In adhered, single ply membrane testing, enhanced DensDeck Prime demonstrated an average of 24% better bond than the original products, when using solvent based adhesives. (Average based on 60 sq.ft./gal coverage rates.)* Choose DensDeck Prime Roof Boards for adhered and self-adhered "peel & stick" roofing systems, as well as hot mopped, cold mastic and torch-applied modified bitumen roofs. Enhanced DensDeck Prime Roof Boards create a stronger and more economical installation by reducing the amounts of mastic or adhesive used and potentially eliminates the field primer. Consult with membrane manufacturer for actual priming requirements.

DensDeck Prime Roof Boards are the first and only fiberglass mat gypsum roof boards with a 90-day weather exposure limited warranty when applied vertically on a parapet wall. ** (Limited to 1/2" and 5/8" products only.)

Primary Uses

Roof system manufacturers and designers have found DensDeck Prime Roof Board to be compatible with many types of roofing systems, including: modified asphalt, single-ply, metal systems, recover board, as well as an overlayment for polyisocyanurate and polystyrene insulation. DensDeck Prime Roof Board can also be used as a form board for poured gypsum concrete deck in roof applications as well as a substrate for spray foam roofing systems. 1/2" (12.7 mm) and 5/8" (15.9 mm) DensDeck Prime Roof Board may also be used in vertical applications as a backer board or liner for the roof side of parapet walls.

DensDeck Prime Roof Board may allow the bonding of cold mastic modified bitumen and torching directly to the surface. *Consult with the system manufacturer for recommendations on this application.*

DensDeck Prime Roof Board is the preferred substrate for vapor retarders.

Standards and Code Approvals

DensDeck Prime Roof Boards are manufactured to meet ASTM C1177 and have the following approvals:

- Florida Product Approved
- Miami-Dade County Product Control Approved

Recommendations and Limitations

DensDeck Prime Roof Boards are manufactured to act with a properly designed roof system following good roofing practices. The actual use of DensDeck Prime Roof Board as a roofing component in any system or assembly is the responsibility of the roofing system's design authority. Consult with the appropriate system manufacturer and/or design authority for system and assembly specifications and instructions on applying other products to DensDeck Prime Roof Board. Georgia-Pacific does not warrant and is not responsible for any systems or assemblies utilizing DensDeck Prime Roof Board or any component in such systems or assemblies other than DensDeck Prime Roof Board.

The need for a separator sheet between the DensDeck Prime Roof Board and the roofing membrane must be determined by the roof membrane manufacturer or roofing system designer.

* Testing was done in accordance with FM approvals 4470, Appendix C: Small Scale Tests, Membrane Delamination Tests for Roofing Membranes and Substrates Using Tensile Loading.

** For complete warranty details, visit www.DensDeck.com. (Limited to 1/2" and 5/8" products only.)

Confirm any priming requirements with the membrane manufacturer. When applying solvent-based adhesives or primers, allow sufficient time for the solvent to flash off to avoid damage to roofing components.

DensDeck Prime Roof Boards should not be subjected to abnormal or excessive loads or foot traffic, such as, but not limited to, use on plaza decks or under steel-wheeled equipment that may fracture or damage the panels. Provide suitable roofing system protection when required.

When using DensDeck Prime Roof Boards for hot-mopped applications, Georgia-Pacific recommends maximum asphalt application temperatures for Type III asphalt of 425°F (218°C) to 450°F (232°C). Application temperatures above these recommended temperatures may adversely affect roof system performance. For application temperatures in excess of 450°F (232°C) and for mopping of type IV asphalt, ribbon or spot mopping or the installation of a perforated base sheet are recommended methods of bonding asphalt in lieu of full mopping. Consult and follow the roofing system manufacturer's specifications for full mopping applications and temperature requirements.

When using DensDeck Prime Roof Board as a substrate for torch applications, ensure that the product is dry and that the proper torching technique is used. Limit the heat to the DensDeck Prime Roof Board. Maintain a majority of the torch flame directly on the roll.

Conditions beyond the control of Georgia-Pacific, such as weather conditions, dew, leaks, application temperatures and techniques may cause adverse effects with roofing systems.

Handling and Use—CAUTION

This product contains fiberglass facings which may cause skin irritation. Dust and fibers produced during the handling and installation of the product may cause skin, eye and respiratory tract irritation. Avoid breathing dust and minimize contact with skin and eyes. Wear long sleeve shirts, long pants and eye protection. Always maintain adequate ventilation. Use a dust mask or NIOSH/MSHA approved respirator as appropriate in dusty or poorly ventilated areas.

Moisture Management

DensDeck Prime Roof Boards, like other components used in roofing systems, must be protected from exposure to moisture before, during and after installation.

Remove the plastic packaging from all DensDeck Prime Roof Board immediately upon receipt of delivery. Failure to remove the plastic packaging may result in entrapment of condensation or moisture. DensDeck Prime Roof Board stored outside must be stored level and off the ground and protected by a breathable waterproof covering. Provide means for air circulation around and under stored bundles of DensDeck Prime Roof Board. DensDeck Prime Roof Board must be covered the same day as installed.

Avoid application of DensDeck Prime Roof Boards during rain, heavy fog and any other conditions that may deposit moisture on the surface, and avoid the overuse of non-vented, direct-fired heaters during winter months. When roofing systems are installed on new poured concrete or light weight concrete decks or when re-roofing over an existing concrete deck, a vapor barrier should be installed above the concrete to retard the migration of water from the concrete into the roof assembly. Always consult the roofing system manufacturer or design authority for specific instructions for applying other products to DensDeck Prime Roof Boards.

Moisture vapor movement by convection must be eliminated, and the flow of water by gravity through imperfections in the roof system must be controlled. After a leak has occurred, no condensation on the upper surface of the system should be tolerated, and the water introduced by the leak must be dissipated to the building interior in a minimum amount of time.

Although DensDeck Prime Roof Boards are engineered with fiberglass facings and high density gypsum cores, the presence of free moisture can have a detrimental

Submittal Approvals

Job Name _____

continued →

Contractor _____

Date _____

Stamps / Signatures

effect on the performance of the product and the installation of roofing membranes. For example, hot asphalt applications can blister; torched modified bitumen may not properly bond; and adhesives for single ply membranes may not dry properly. Moisture accumulation may also significantly decrease wind uplift and vertical pull resistance in the system or assembly. DensDeck® Prime Roof Boards containing excessive free moisture content may need to be evaluated for structural stability to assure wind uplift performance.

Fire Resistance Classifications

DensDeck Prime Roof Boards are excellent fire barriers over combustible and noncombustible roof decks, including steel decks.

UL 790 Classification. DensDeck Prime Roof Boards have been classified by Underwriters Laboratories LLC (UL) for use as a fire barrier over combustible and noncombustible decks in accordance with the ANSI/UL 790 test standard. The UL classification includes a comprehensive Class A, B or C rating. For additional information concerning the UL 790 classification, consult the UL Certification Directory.

UL 1256 Classification. DensDeck Prime Roof Boards have also been classified by UL in roof deck constructions for internal (under deck) fire exposure in accordance with the ANSI/UL 1256 Steiner Tunnel test. For additional information concerning the UL 1256 classification, consult the UL Certification Directory.

FM Class 1 Approvals. DensDeck Prime Roof Boards are included in numerous roofing assemblies with a Factory Mutual (FM) Class 1 fire rating. 1/4" (6.4 mm) DensDeck

Prime Roof Boards have passed testing under the FM Calorimeter Standard 4450 and have been approved by FM as such for insulated steel deck roofs when installed according to the conditions identified by FM. For more information concerning FM Approvals and FM Class 1 assemblies with DensDeck Prime Roof Boards, consult FM or RoofNav®.

Type X. 5/8" (15.9 mm) DensDeck® Prime Fireguard® Roof Boards are manufactured to meet the "Type X" requirements of ASTM C1177 for increased fire resistance beyond regular gypsum board.

UL Fire Resistance Ratings. 5/8" (15.9 mm) DensDeck Prime Fireguard Roof Boards are designated as **Type DD** by UL and included in assembly designs investigated by UL for hourly fire resistance ratings. 5/8" (15.9 mm) DensDeck Prime Fireguard Roof Boards may also replace any unclassified 5/8" (15.9 mm) gypsum board in an assembly in the UL Fire Resistance Directory under the prefix "P".

Flame Spread and Smoke Developed. When tested in accordance with ASTM E84, DensDeck Prime Roof Boards had Flame Spread 0, Smoke Developed 0.

Wind Uplift

DensDeck Prime Roof Boards are included in numerous assemblies evaluated by FM or other independent laboratories for wind uplift performance. For information concerning such assemblies, please visit www.roofnav.com.

Physical Properties

Properties	1/4" (6.4 mm)	1/2" (12.7mm)	5/8" (15.9 mm)
Thickness, nominal	1/4" (6.4 mm) ± 1/16" (1.6 mm)	1/2" (12.7 mm) ± 1/32" (.8 mm)	5/8" (15.9 mm) ± 1/32" (.8 mm)
Width, standard	4' (1219 mm) ± 1/8" (3 mm)	4' (1219 mm) ± 1/8" (3 mm)	4' (1219 mm) ± 1/8" (3 mm)
Length, standard	4' (1219 mm) and 8' (2438 mm) ± 1/4" (6.4 mm)	4' (1219 mm) and 8' (2438 mm) ± 1/4" (6.4 mm)	4' (1219 mm) and 8' (2438 mm) ± 1/4" (6.4 mm)
Weight, nominal, lbs./sq. ft. (Kg/m²)	1.2 (5.9)	2.0 (9.8)	2.5 (12.2)
Surfacing	Fiberglass mat with non-asphaltic coating	Fiberglass mat with non-asphaltic coating	Fiberglass mat with non-asphaltic coating
Flexural Strength¹, parallel, lbf. min. (N)	≥40 (178)	≥80 (356)	≥100 (444)
Flute Spanability²	2-5/8" (66.7 mm)	5" (127 mm)	8" (203 mm)
Permeance³, Perms (ng/Pa•S•m²)	>30 (>1710)	>23 (>1300)	>17 (>970)
R Value⁴, ft²•°F•hr/BTU (m²•K/W)	.28	.56	.67
Linear Variation with Change in Temp., in/in °F (mm/mm/°C)	8.5 x 10⁻⁶ (15.3 x 10⁻⁶)	8.5 x 10⁻⁶ (15.3 x 10⁻⁶)	8.5 x 10⁻⁶ (15.3 x 10⁻⁶)
Linear Variation with Change in Moisture	6.25 x 10⁻⁶	6.25 x 10⁻⁶	6.25 x 10⁻⁶
Water Absorption⁵, % max	<10	<10	<10
Compressive Strength⁶, psi nominal	900	900	900
Surface Water Absorption, grams, nominal	<2.0	<2.0	<2.0
Flame Spread, Smoke Developed (ASTM E84)	0/0	0/0	0/0
Bending Radius	4' (1219 mm)	6' (1829 mm)	8' (2438 mm)

1. Tested in accordance with ASTM C473 method B.

2. Tested in accordance with ASTM E661.

3. Tested in accordance with ASTM E96 (dry cup method).

4. Tested in accordance with ASTM C518 (heat flow meter).

5. Specified values per ASTM C1177.

6. Tested in accordance with ASTM C473.



U.S.A. Georgia-Pacific Gypsum LLC
 Georgia-Pacific Gypsum II LLC
 Canada Georgia-Pacific Canada LP

SALES INFORMATION AND ORDER PLACEMENT

U.S.A. West: **1-800-824-7503**
 Midwest: **1-800-876-4746**
 South Central: **1-800-231-6060**
 Southeast: **1-800-327-2344**
 Northeast: **1-800-947-4497**

CANADA Canada Toll Free: **1-800-387-6823**
 Quebec Toll Free: **1-800-361-0486**

TECHNICAL INFORMATION

U.S.A. and Canada: **1-800-225-6119**, www.gpgypsum.com

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WARRANTIES, REMEDIES AND TERMS OF SALE For current warranty information for this product, please go to www.gpgypsum.com and select the product for warranty information. All sales of this product by Georgia-Pacific are subject to our Terms of Sale available at www.gpgypsum.com.

UPDATES AND CURRENT INFORMATION The information in this document may change without notice. Visit our website at www.gpgypsum.com for updates and current information.

CAUTION For product fire, safety and use information, go to www.buildgp.com/safetyinfo or call 1-800-225-6119.

FIRE SAFETY CAUTION Passing a fire test in a controlled laboratory setting and/or certifying or labeling a product as having a one-hour, two-hour, or any other fire resistance or protection rating and, therefore, as acceptable for use in certain fire rated assemblies/systems, does not mean that either a particular assembly/system incorporating the product, or any given piece of the product itself, will necessarily provide one-hour fire resistance, two-hour fire resistance, or any other specified fire resistance or protection in an actual fire. In the event of an actual fire, you should immediately take any and all actions necessary for your safety and the safety of others without regard for any fire rating of any product or assembly/system.

USG Securock® Brand Gypsum-Fiber Roof Board



High-performance gypsum-fiber roof board for use in low-slope commercial roofing systems

- Exceptional bond and low absorption in adhered systems
- Moisture and mold resistant
- Excellent wind-uplift performance
- Manufactured from 97% recycled material

Description

USG Securock® Gypsum-Fiber Roof Board is a high-performance roof board for use in low-slope roofing systems. Its unique, fiber-reinforced, homogenous composition gives the panel strength and water resistance through to the core. USG Securock Gypsum-Fiber Roof Board provides exceptional bond and low absorption in adhered systems and with its homogenous composition achieves high wind-uplift ratings with no risk of facer delamination. Made from 97% recycled material, USG Securock Gypsum-Fiber Roof Board combines superior performance with sustainable design for all types of roofing systems including single-ply, fluid-applied, built-up, spray foam, metal and modified bitumen roofing.

Advantages

Exceptional Strength Engineered to provide superior wind-uplift performance for a wide variety of roof assemblies. USG Securock Gypsum-Fiber Roof Board has uniform composition providing enhanced bond strength of membrane systems with no risk of facer delamination.

Fire Performance Provides excellent fire performance and demonstrates exceptional surface burning characteristics (ASTM E84 (CAN/ULC-S102) Flame Spread 5, Smoke Developed 0).

Moisture and Mold Uniform water-resistant core ensures excellent moisture and mold resistance. Scored a maximum "10" for mold resistance on ASTM D3273.

Versatile Can be used as a component in single-ply, fluid-applied, built-up, spray foam, metal and modified bitumen roofing.

Sustainability Made from 97% recycled materials and has earned independent certification from Scientific Certification Systems for this achievement.

Limitations

- USG Securock Gypsum-Fiber Roof Board is engineered to perform within a properly designed roof system. The use of USG Securock Gypsum-Fiber Roof Board as a roofing component is the responsibility of the design professional.
- Consult roofing manufacturers for specific instructions on the application of their products to USG Securock Gypsum-Fiber Roof Board
- Weather conditions, dew, application temperature, installation techniques and moisture drive can have adverse effects on the performance of the roof system and are beyond the control of USG.
- Keep USG Securock Gypsum-Fiber Roof Board panels dry before, during and after installation. USG Securock Gypsum-Fiber Roof Board should not be installed during rains, heavy fogs and any other conditions that deposit moisture on the surface of the board. Apply only as much USG Securock Gypsum-Fiber Roof Board that can be covered by final roof membrane system in the same day. Avoid exposure to moisture from leaks or condensation.
- For re-roof or re-cover applications, existing roofing system must be dry throughout prior to application of USG Securock Gypsum-Fiber Roof Board.
- Plastic or poly packaging applied at the plant to protect board during rail or other transit should be removed upon receipt to prevent condensation or trapping of moisture, which may cause application problems.
- USG Securock Gypsum-Fiber Roof Board should be stored flat and off the ground with protection from the weather. If stored outdoors, a breathable waterproof covering should be used.
- When applying solvent-based adhesives or primers, allow sufficient time for the solvent to evaporate to avoid damage to roofing components.
- USG allows the bonding of cold mastic modified bitumen and torching directly to the surface. Consult with the system manufacturer for recommendations on this application.
- USG recommends maximum asphalt application temperature for Type III asphalt of 455 °F when using USG Securock Gypsum-Fiber Roof Board. Application temperatures above these recommended temperatures may adversely affect roof system performance.

Installation

- Refer to roof system manufacturer's written instructions, local code requirements and Factory Mutual Global (FMG) and/or Underwriters Laboratories (UL) requirements for proper installation techniques.
- Use fasteners specified in accordance with above requirements. Install approved fasteners with plates into the USG Securock Gypsum-Fiber Roof Board, flush with the surface. Fasteners should be installed in strict compliance with the roof system manufacturer's installation recommendations and FMG Loss Prevention Data Sheet 1-29. Proper fastener spacing is essential to achieve wind-uplift performance.

- Locate edge joints on, and parallel to, deck ribs. Stagger end joints of adjacent lengths of USG Securock Gypsum-Fiber Roof Board. Butt board edges and ends loosely in typical installations.
- Butt board edges and ends loosely (minimum 1/16" gap on all edges) in typical installations. This gap may need to be larger depending on factors like the roof deck's size, membrane color, ultimate deck surface temperature and time of year the roof assembly is installed. Installations during temperatures below 50°F may require larger spacing. Please refer to USG's published physical properties below to calculate the actual gap needed for your specific project for all thicknesses.
- Roof boards should never be installed frozen.
- See product data table below for maximum flute span when panels are applied directly over metal decking.
- For vertical parapet applications, only 1/2" or 5/8" panels should be used. Maximum framing spacing is 24" o.c.

Fire Performance

- UL Classified as to Surface Burning Characteristics and Non-Combustability in accordance with ASTM E84 (CAN/ULC-S102)
 - Flame Spread 5 and Smoke Developed 0
- 1/4", 3/8", 1/2" and 5/8" Thickness — Class A in accordance with UL790 (CAN/ULC-S107). See the UL Building Materials Directory for more information.
- 5/8" Thickness — Meets requirements of Type X per ASTM C1278 and may be used in P series designs as a thermal barrier.

System Performance

- FM Approved
 - Complies with requirements of FM 4450 and FM 4470
 - Meets FM Class 1

Standards Compliance

USG Securock Gypsum-Fiber Roof Board is manufactured to conform to ASTM C1278, "Standard Specification for Fiber-Reinforced Gypsum Panel."

Physical Properties

	USG Securock Gypsum-Fiber Roof Board			
	1/4" (6.6 mm)	3/8" (9.5 mm)	1/2" (12.7 mm)	5/8" (15.9 mm)
Width, standard	4' (1220 mm)	4' (1220 mm)	4' (1220 mm)	4' (1220 mm)
Length, standard	4' (1220 mm) and 8' (2440 mm)	4' (1220 mm) and 8' (2440 mm)	4' (1220 mm) and 8' (2440 mm)	4' (1220 mm) and 8' (2440 mm)
Pieces per unit for 4' x 8' sheets	50	40	30	24
Weight, nominal lbs./unit, 4' x 8' sheet	2,575	2,575	2,725	2,525
Weight, nominal lbs./sq. ft.	1.57	1.96	2.76	3.20
Flexural strength, parallel, lbs. min., per ASTM C 473	40	70	110	161
Compressive strength, psi nominal	1800	1800	1800	1800
Flute spanability per ASTM E 661	2-5/8"	5"	8"	10"
Permeance, perms, per ASTM E 96	30	26	26	24
R Value per ASTM C 518	0.2	0.3	0.5	0.6
Coefficient of thermal expansion, inches/inch • °F, per ASTM E 831	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶
Linear variation with change in moisture, inches/inch • %RH, per ASTM D 1037	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶	8.0 x 10 ⁻⁶
Water absorption, % max, per ASTM C 473	10	10	10	10
Surface water absorption, nominal grams, per ASTM C 473	1.6	1.6	1.6	1.6
Mold resistance per ASTM D 3273*	10	10	10	10
Bending Radius	25'	25'	25'	30'

***ASTMD3273 Mold Resistance Testing** - In independent lab tests conducted on USG Securock Gypsum-Fiber Roof Board and USG Securock Glass-Mat Roof Board at the time of manufacture per ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber, both panels scored a 10. The ASTM lab test may not accurately represent the mold performance of building materials in actual use. Given unsuitable project conditions during storage, installation or after completion, any building material can be overwhelmed by mold. To manage the growth of mold, the best and most cost-effective strategy is to protect building products from water exposure during storage and installation and after completion of the building. This can be accomplished by using good design and construction practices.

Submittal Approvals:

Job Name	
Contractor	Date

Product Information

See usg.com for the most up-to-date product information.

Trademarks

The trademarks Securock®, the USG Logo™ and related marks are trademarks of USG Corporation or its subsidiaries or affiliates.

Note

Products described here may not be available in all geographic markets. Consult your U.S. Gypsum Company sales office or representative for information.

Notice

We shall not be liable for incidental or consequential damages, directly or indirectly

sustained, nor for any loss caused by application of these goods not in accordance with current printed instructions or for other than their intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from the date it was or reasonably should have been discovered.

Safety First!

Follow good safety and industrial hygiene practices during handling and installation of all products and systems. Take necessary precautions and wear the appropriate personal protective equipment as needed. Read material safety data sheets and related literature on products before specification and/or installation.



Manufactured by
United States Gypsum Company
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Chicago, IL 60661

800.USG.4YOU (874.4968)
usg.com

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Product Data Sheet

MULE-HIDE PVC COATED METAL

PRODUCT DESCRIPTION

Mule-Hide PVC Coated Metal is a 24-gauge galvanized steel sheet that is coated with a layer of 0.035" non-reinforced PVC flashing.

BASIC USES

PVC Coated Metal is cut into the appropriate width and used to fabricate metal drip edges or other roof perimeter edging profiles. PVC-c membrane may be welded directly to the coated metal edging, eliminating the need to strip in the metal with a separate piece of membrane.



TYPICAL PHYSICAL PROPERTIES

Typical Properties and Characteristics	
Sheet Size	4' x 10' (1.2m by 3.0 m)
Weight	1.1 lb/ft ² (5.4 kg/m ²)
Color	White, Gray & Tan
Flashing Thickness	.035" (0.9 mm) nominal
Steel Thickness	.024" (0.6 mm) nominal (24 ga)
Steel Type	Hot Dipped Galvanized – G90 Conforms to ASTM A653
Packaging	10 sheets per pallet
Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification or specification range for any particular property of this product.	

BENEFITS & SUPPLEMENTAL STATEMENTS

- Allows direct welding of PVC membrane to metal
- Easy to cut and form for creating a variety of edge sizes and shapes

INSTALLATION INSTRUCTIONS

1. Install PVC coated metal with 1/8" to 1/4" (3 to 6 mm) wide joints between adjoining sections.
2. Install 2" wide (5 cm) duct tape over joints in PVC metal (to act as a bond breaker).
3. Heat-weld 6" wide (15.5 cm) strip of PVC non-reinforced flashing membrane over joint.
4. Position PVC reinforced membrane and heat-weld to PVC clad metal achieving a min 1 1/2" wide weld.
Review Mule-Hide specifications and details for complete installation information.

STORAGE & HANDLING

Store coated metal in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins.

PRECAUTIONS

PVC Coated Metal that has been exposed to the weather must be prepared with Weathered Membrane Cleaner prior to hot-air welding.



Product Data Sheet

MULE-HIDE PVC COATED METAL

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.

ADDITIONAL INFORMATION

The information given on this PDS is subject to change without notice. Always check the Mule-Hide website at www.mulehide.com for the latest information, changes and updates or contact Mule-Hide Products Company at 800-786-1492.

DISCLAIMER

The statements provided concerning the material shown are intended as a guide for material usage and are believed to be true and accurate at the time of printing. No statement made by anyone may supersede this information, except when done in writing by Mule-Hide Products Co., Inc. Since the manner of use is beyond our control, Mule-Hide does not authorize anyone to make any warranty of merchantability or fitness for any particular purpose or any other warranty, guarantee or representation, expressed or implied, concerning this material. This product may be eligible for a Mule-Hide warranty, please check the Mule-Hide website at www.mulehide.com or contact Mule-Hide directly at 800-786-1492 for details. Buyer and user accept the product under these conditions and assume the risk of any failure, any injury person or property (including that of the user), loss or liability resulting from the handling, storage or use of the product whether or not it is handled, stored or used in accordance with the directions or specifications. Mule-Hide must be notified in writing of any claims and be given the opportunity to inspect the alleged failure before repairs are made.



Product Data Sheet

MULE-HIDE PVC WALKWAY ROLLS

PRODUCT DESCRIPTION

Mule-Hide PVC Walkway Rolls incorporate an aggressive, non-slip, diamond plate tread pattern of polyester reinforced PVC material that offers excellent tear and puncture resistance

BASIC USES

The Mule-Hide PVC Walkway Roll is designed to protect the PVC membrane in those areas exposed to repetitive foot traffic and other hazards. Mule-Hide specifications require the use of such a product in walkway concentration points (i.e., roof hatches, access doors, rooftop ladders, etc.) regardless of traffic frequency. Walkways must also be installed if regular maintenance (once a month or more) is necessary to service rooftop equipment.



SPECIFICATIONS

*Typical Properties		
Surface Texture:	N/A	Diamond Plate pattern
Material:	N/A	Polyester reinforced PVC
Thickness:	ASTM D412	Min. 0.072" (1.83 mm) Max. 0.088" (2.24 mm)
Tensile Strength:	ASTM D638	600 psi (4.1 MPa)
Tear Strength:	ASTM D624	100 lbf/in (17.5 kN/m)
*Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this material		

LEED Information	
Pre-consumer Recycled Content	45%
Post-consumer Recycled Content	20%
Manufacturing Location	Mountain Top, PA
Solar Reflectance Index (SRI)	N/A

COLORS

- Gray

PACKAGING

- Size: 36" wide x 60' long (91.4 cm x 18.3 m) – 95 lbs per roll
- Each roll is individually bagged.
- Nine rolls per skid.
- Store rolls in a clean, cool, dry location.

BENEFITS & SUPPLEMENTAL STATEMENTS

- Increased slip resistance with aggressive diamond plate tread design
- Superior weathering package for long term performance

INSTALLATION INSTRUCTIONS

SURFACE PREPARATION

1. If membrane or walkway roll has been exposed for over 7 days, use Weathered Membrane Cleaner and a Scotch-Brite Pad to prepare the area to be welded to the walkway material. Allow membrane cleaner to dry completely.



Product Data Sheet

MULE-HIDE PVC WALKWAY ROLLS

INSTALLATION INSTRUCTIONS (continued)

APPLICATION

1. Position the walkway in desired location. Cut walkway rolls into maximum 10 (ten) foot lengths and position with a minimum 1-inch gap between adjacent pieces to allow for water drainage. Cut the walkway roll to allow for a minimum 4-inch gap over any field splice. (Since the attachment of the walkway roll is permanent, this will allow access to the field seams for future repairs).
2. Using an automated welder, weld all four sides of the walkway material to the membrane. (Welding temperature and speed is typically the same as used for the roofing membrane) A hand welder may be used but productivity will be reduced.

Review Mule-Hide Specifications and Details for installation information.

PRECAUTIONS

1. Walkway rolls are a maintenance item and are not covered under the roofing warranty.
2. This product is intended to be utilized as a walkway only and is not designed as a perimeter warning line or substitution for ballast. Walkway rolls cannot be positioned within 10-feet of the roof perimeter.
3. Allowing walkway to relax and warm up in the sun light will facilitate installation.

PROTECTION & SAFETY

Mule-Hide maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers. Mule-Hide's Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Mule-Hide products in your facilities.

ADDITIONAL INFORMATION

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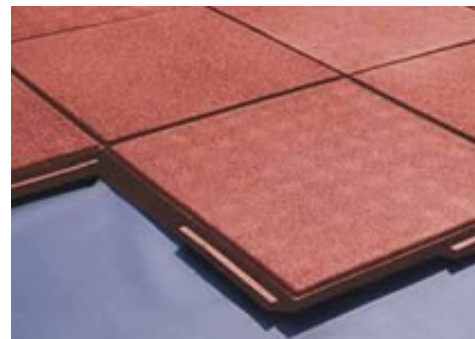


Product Data Sheet

MULE-HIDE RUBBER PAVER BLOCKS

PRODUCT DESCRIPTION

Mule-Hide Rubber Paver Blocks are an environmentally friendly product that provides superior protection to the underlying membrane. These Rubber Paver Blocks feature a resilient, shock-absorbing, weather-resistant traffic surface. Pavers lock together to provide multi-directional drainage patterns eliminating the need for protective mats. The pavers consist of 90% post-consumer recycled content, providing an environmentally friendly product.



BASIC USES

Used as a paver system for all Mule-Hide Membranes.

TYPICAL PHYSICAL PROPERTIES

Property	Test Method	Typical Characteristics
Dimensions @ 78°F (26°C)	N/A	24" x 24" ± 1/4"
Weight	N/A	6 lbs per square foot
Water Surface Density	ASTM D3676	66 lbs per cubic foot
Coefficient of Thermal Expansion	N/A	1.10 x 10 ⁻³ in. / ft. / °F
Tensile Strength	ASTM D412	107 psi
Elongation at Break	ASTM D412	165%
Tear Resistance	ASTM D624	33 lbs / in.
Abrasion Testing, Taber Abrader 1000 g. wt., 2000 cycles, H-21 wheel	ASTM D3389	0.75 g. loss
Resistance to Outdoor Ultraviolet Weathering	Xenon Arc, 500 hrs. exposure, 178°F (81°C), 50% relative humidity	85% tensile retention 100% elongation retention
Burning Pill Test	ASTM D2859	Pass
Freeze / Thaw Cycling	ASTM C67	No Deterioration
Typical properties and characteristics are based on samples tested and are not guaranteed for all samples of this product. This data and information is intended as a guide and does not reflect the specification range for any particular property of this product.		

COLORS

Available in BLACK and TERRA COTTA

INSTALLATION INSTRUCTIONS

Mule-Hide Rubber Paver Blocks are installed over a completed roofing membrane. The pavers are loose laid and interlocked, offering superior protection to the membrane while still maintaining accessibility to the membrane. This system can be used over a variety of roofing systems and is ideal for those roofs that are prone to heavy maintenance traffic. The Mule-Hide Rubber Paver Blocks are not recommended for use in areas that are subject to small, narrow point loading, such as chairs with narrow legs or high heeled shoes.

PROTECTION & SAFETY

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Product Data Sheet

MULE-HIDE RUBBER PAVER BLOCK

ADDITIONAL INFORMATION

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Product Data Sheet

MULE-HIDE HP PROTECTION MAT

PRODUCT DESCRIPTION

A nominal 6.0-ounce per square yard (140 grams per square meter) UV resistant polypropylene needle punched fabric.

BASIC USES

Can be used above the membrane as a slipsheet for crushed stone or pavers or below the membrane as a minimum underlayment mat for Mule-Hide's Mechanically-Attached or Ballasted System applications. Consult current specifications for underlayment requirements.

TYPICAL PHYSICAL PROPERTIES

Description	ASTM Test Method	Average Roll Values
Tensile Strength (Grab)	D 4632	160 lbs. (68 Kg)
Burst Strength (Mullen)	D 3786	350 psi (2413 kPa)
Elongation (Ultimate)	D 4632	> 50%
Puncture Strength	D 4833	90 lbs. (41 Kg)
Trapezoidal Tear	D 4533	65 lbs. (30 Kg)
UV Resistance (500 Hr St. Ref)	D 4355	> 70%
Permeability Coefficient	D 4491	0.2 cm/sec
pH Resistance		2 - 13
Thickness		0.65 in (1.65 mm)

PACKAGING

Packaged in rolls 15' x 300' (4.6m x 92m)
Coverage: 4500 SF (405 SM)
Weight per Roll: 210 lbs (83Kg)
Roll Diameter: 18 in (460 mm)

INSTALLATION INSTRUCTIONS

Mechanically Attached Roofing Systems: Install Mule-Hide HP Protective Mat over the substrate with all edges overlapped a minimum of 3" (75 mm). HP Protective Mat must be fastened to the roof deck with a minimum of one insulation fastener and plate per every 4 square feet.

Ballasted Roofing Systems: When specified under Mule-Hide roofing membrane, position the Mule-Hide HP Protective Mat loosely over the substrate with all edges overlapped a minimum of 6" (150 mm). The roofing membrane must be positioned to completely cover the previously installed HP Protective Mat.

The HP Protection Mat can also be installed on top of the Mule-Hide roofing membrane as a protection layer, typically under pavers or crushed stone. After completing all of the membrane and flashing seams, loosely lay the Mule-Hide HP Protective Mat over the membrane with the side laps overlapped a minimum of 6" (150 mm) and end laps overlapped 12" (300 mm). Prior to placement of ballast, extend the HP Protective Mat a minimum of 2" (50 mm) above the anticipated ballast level at the perimeter and penetrations, except at roof drains and scuppers.

The fabric must extend to drain bases and scupper openings but must not cover or restrict flow to the drains. Additional matting must be installed around penetrations to prevent direct contact between crushed stone and flashing.



Product Data Sheet

MULE-HIDE HP PROTECTION MAT

INSTALLATION INSTRUCTIONS (Continued)

Note: Following placement of the fabric, install ballast, temporary ballast, or spot adhere with bonding adhesive to prevent the movement or displacement of unballasted fabric.

PROTECTION & SAFETY

This product is not hazardous as defined in CFR 1910.1200.

Dust may be irritating to respiratory tract and eyes.

Material is flammable. Do not expose to flame.

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SECTION 09

MULE-HIDE PVC MATERIAL SAFETY DATA SHEETS (MSDS)

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Please consult the Mule-Hide website for the most current information at
www.mulehide.com

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Material Safety Data Sheet for PVC Membrane and PVC Accessories (Exemption)

Mule Hide Products Co., Inc.
P.O. Box 1057
Beloit, WI 53512
800-786-1492

"Article"

Revised: April 2009

Product Names	Mule-Hide PVC Reinforced Membrane, PVC Reinforced Strips, PVC Non-Reinforced Flashing, PVC Pre-Molded Pipe Seals, PVC Molded Sealant Pockets, PVC Extension Legs, PVC Universal Corners, PVC Coated Metal, PVC Walkway Rolls, PVC T-Joint Covers.		
Chemical Name	Polyvinyl Chloride Polymer with Flame Retardant		
Manufacturer Address	Carlisle SynTec Incorporated 1285 Ritner Highway Carlisle, PA 17013 800-479-6832 www.Carlisle-SynTec.com	Supplier Address:	Mule-Hide Products Co., Inc. P.O. Box 1057 Beloit, WI 53511 608-365-3111 www.mulehide.com
Phone	800-479-6832	Phone:	608-365-3111
Internet	www.Carlisle-SynTec.com	Internet:	www.mulehide.com
Emergency Phone	800-424-9300 Chemtrec		
MSDS Number	N/A		
Effective Date	November 1, 2005		
NFPA Rating	Health 0, Reactivity 0, Flammability 0 0-least, 1-slight, 2-moderate, 3-high, 4-extreme These ratings should be used only as part of fully implemented H.M.I.S. Program		

United States version: Sheeting and Accessories

To Whom it may concern:

Thank you for your inquiry regarding an MSDS for Mule-Hide sheeting and accessory products. Please be aware that no MSDS exists for these as they are considered an **"article"** under the Hazard Communication Standard (HCS) and are exempt from the MSDS requirement.

A hazardous chemical, as defined by the Hazard Communication Standard (HCS), is any chemical, which can cause a physical or a health hazard. This determination is made by the chemical manufacturer, as described in 29 CFR 1910.1200(d). Listed below is the section of the standard that defines an **"article"**.

Chemical manufacturers are not required to provide MSDSs for chemicals not covered under the HCS. OSHA realizes that manufacturers often provide MSDSs for reasons other than those of meeting the requirements of the HCS and that this can cause confusion to downstream users. Employers should contact the manufacturer when they question the hazard status of a chemical.

An **"article"** is defined in paragraph (c) of the HCS as: "a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees." A product meeting this criterion is **exempt** from the MSDS requirement.

The raw material formulations and process used in the manufacture of our products are considered propriety. This standard provides for both the need to protect against potential exposure and the need to maintain confidentiality or proprietary information. The standard provides for the limited disclosure of certain proprietary information upon official request, either in a medical emergency or a non-emergency to a qualified health professional under specific conditions of need and confidentiality. Since our sheeting and accessories do not release or otherwise result in exposure to a hazardous chemical under normal recommended conditions of use, disclosure of proprietary materials and processes is available as described in the trade secret section of the standard.

While Mule-Hide Products Co., Inc. believes the information contained herein is accurate: it is not to be taken as warranty or representation for which Mule-Hide Product Co., Inc. assumes any legal responsibility for product liability. This information is offered solely for our customers' consideration, investigation and any necessary verification. Any use of this information or of the sheeting and accessories provided by Mule-Hide Products Co., Inc. must be determined by the user to be acceptable for their intended purpose and in accordance with the appropriate federal, state or local laws and regulations including 29 CFR in its entirety.

Canadian version: Sheeting and Accessories

Material Safety Data Sheet for PVC Membrane and PVC Accessories (Exemption)

Mule Hide Products Co., Inc.
P.O. Box 1057
Beloit, WI 53512
800-786-1492

"Article"

Revised: April 2009

Please be aware that no MSDS exists for these as they are considered a **"manufactured article"** under the Canadian WHMIS Standard and are exempt from the MSDS requirement.(1)

A hazardous product, as defined by the Hazard Products Act and WHMIS Standard, is any chemical, which can cause a physical or a health hazard. This determination is made by the chemical manufacturer, as described in the Hazardous Products Act. Listed below is the section of the standard that defines an **" manufactured article"**.

(1)manufactured article" means any article that is formed to a specific shape or design during manufacture, the intended use of which when in that form is dependent in whole or in part on its shape or design, and that, under normal conditions of use, will not release or otherwise cause a person to be exposed to a controlled product;

Chemical manufacturers are not required to provide MSDSs for chemicals not covered under the Hazardous Products Act. COSH realizes that manufacturers often provide MSDSs for reasons other than those of meeting the requirements of WHMIS and that this can cause confusion to downstream users. Employers should contact the manufacturer when they question the hazard status of a chemical. A product which falls within any of the hazard criteria set out in Part IV of the *Controlled Products Regulations (CPR)* is a WHMIS "controlled product" and, unless exempt under Section 12 of the *Hazardous Products Act (HPA)*, is subject to the MSDS and labelling requirements of the *HPA*.

Section 12. This Part does not apply in respect of the sale or importation of any

- (a) explosive within the meaning of the *Explosives Act*;
- (b) cosmetic, device, drug or food within the meaning of the *Food and Drugs Act*;
- (c) control product within the meaning of the *Pest Control Products Act*;
- (d) nuclear substance, within the meaning of the *Nuclear Safety and Control Act*, that is radioactive;
- (e) hazardous waste;
- (f) product, material or substance included in Part II of Schedule I and packaged as a consumer product;
- (g) wood or product made of wood;
- (h) tobacco or a tobacco product as defined in section 2 of the *Tobacco Act*; or
- (i) *manufactured article*.**

The raw material formulations and process used in the manufacture of our products are considered propriety. This standard provides for both the need to protect against potential exposure and the need to maintain confidentiality or proprietary information. The standard provides for the limited disclosure of certain proprietary information upon official request, either in a medical emergency or a non-emergency to a qualified health professional under specific conditions of need and confidentiality. Since our sheeting and accessories do not release or otherwise result in exposure to a hazardous chemical under normal recommended conditions of use, disclosure of proprietary materials and processes is available as described in the trade secret section of the standard.

While Mule-Hide Products Co., Inc. believes the information contained herein is accurate: it is not to be taken as warranty or representation for which Mule-Hide Products Co., Inc. assumes any legal responsibility for product liability. This information is offered solely for our customers' consideration, investigation and any necessary verification. Any use of this information or of the sheeting and accessories provided by Mule-Hide Products Co., Inc. must be determined by the user to be acceptable for their intended purpose and in accordance with the appropriate federal, state or local laws and regulations including CPR in its entirety.

Should you have any further questions or need additional information please contact our Customer Service Department at 800-786-1492.

Material Safety Data Sheet

Mule-Hide Universal Single Ply Sealant

MSDS No. 10-2105

Date of Preparation: 9/15/11

Revision: 002

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Universal Single Ply Sealant

Chemical Formula: Silyl Terminated Polyether

CAS Number:

Other Designations:

General Use: Moisture Cure Sealant

Supplier: Mule-Hide Products Co., Inc. 1195 Prince Hall Dr, Beloit, WI 53511 Phone: 800-786-1492

Manufacturer: Carlisle SynTec Inc., P.O. Box 7000, 1285 Ritner Hwy, Carlisle, PA, 17013-0925 (717) 245-7000
Chemtrec (800) 424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Warning – Causes mild skin irritation

Warning – causes eye irritation

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Potential Health Effects

Routes of Entry: Dermal contact, Eye.

Acute Eye Contact: Direct contact can cause severe irritation.

Acute Skin Contact: Direct contact may cause slight irritation.

Skin Absorption: Not Toxic.

Acute Inhalation: Product is extremely low in volatility and, therefore, not likely to pose a problem from inhalation.

Acute Ingestion: May be harmful if ingested, not a likely route of entry.

Chronic Effects of Exposure: Repeated or prolonged direct contact to the skin may cause dermatitis.

Medical Conditions Aggravated by exposure: Pre-existing skin and eye disorders may be aggravated by direct contact to this product.

Carcinogenicity: There are not components in this product that are listed as a carcinogen by NTP, IARC, ACGIH or OSHA.

Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Additional Ingredients	CAS Number	% wt
Amino Silane	1760-24-3	1-5

Section 4 - First Aid Measures

First Aid for Eyes: Flush with large amounts of water for at least 15 minutes. Consult a physician if ill effects or irritation occurs.

First Aid for Skin: Clean product from affected area with Ethyl alcohol, then wash with soap and water.

First Aid for Inhalation: An unlikely route of entry. Remove to fresh air. Consult a physician.

First Aid for Ingestion: An unlikely route of entry. Consult a physician.

Section 5 - Fire-Fighting Measures

Flash Point: Not Applicable

Flash Point Method: Not Applicable

Autoignition Temperature: Not Applicable

LEL: Not Applicable

UEL: Not Applicable

Flammability Classification: Not considered flammable.

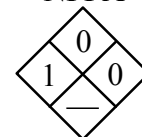
Extinguishing Media: Carbon Dioxide (CO₂), water, dry chemical, foam

Unsuitable Extinguishing Media:

Unusual Fire or Explosion Hazards: None known.

Hazardous Decomposition Products: Thermal decomposition may release toxic fumes of carbon monoxide and/or carbon dioxide.

NFPA



Fire-Fighting Procedures: Wear full protective clothing including helmet, self contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask and protective covering for exposed areas of the head.

Section 6 - Accidental Release Measures

Personal Precautions: Observe all personal protective equipment recommendations described in Sections 5 and 8.

Environmental Precautions: Disposal of collected product, residues and cleanup materials may be governmentally regulated. Observe all applicable local, state and federal waste management regulations.

Spill /Leak Procedures: Collect spill with absorbent material such as cardboard and place into a container approved for waste disposal.

Section 7 - Handling and Storage

Handling: Use personal protection recommended in section 8. Avoid eye, skin and clothing contact.

Storage: Store in a cool dry area (this product polymerizes when in contact with moisture.)

Section 8 - Exposure Controls / Personal Protection

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Amino Silane	none estab.	none estab.	none estab.	none estab.	none estab.	none estab.	none estab.

Exposure Guidelines: No established limits.

Engineering Controls: No specific controls are needed.

Personal Protective Equipment:

Eye Protection: Wear safety glasses or goggles to avoid eye contact.

Skin Protection: Wear impervious gloves such as vinyl to minimize contact with skin.

Respiratory Protection: Not required.

Work/Hygienic Practices: Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or drinking.

Section 9 - Physical and Chemical Properties

Physical State: Solid (Paste)

Appearance and Odor: Mild ester odor

Odor Threshold: Not determined

Vapor Pressure: Not established

Vapor Density: > 1

Formula Weight:

Density: 13.35 LBS/GAL

Specific Gravity (H₂O=1, at 4 °C): > 1

pH: Not established

Water Solubility: NIL

Other Solubilities:

Boiling Point: Not established

Freezing/Melting Point: Not established

Viscosity: Greater than 800,000 cps at 77°F/25°C

Refractive Index:

Surface Tension:

% Volatile by Volume:

Evaporation Rate: Not applicable

Volatile Organic Content: 0 g/L

Flash Point: Not Applicable

Flash Point Method: Not Applicable

Autoignition Temperature: Not Applicable

LEL: Not Applicable

UEL: Not Applicable

Section 10 - Stability and Reactivity

Stability: Stable

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Chemical Incompatibilities: None known

Conditions to Avoid: None known

Hazardous Decomposition Products: None known

Section 11- Toxicological Information**Toxicity Data:**

Information below is based on Amino Silane (refer to sections 2 and 3).

Oral: Result: LD50 > 2,000 mg/kg. Remark: Very low order of toxicity.

Skin Absorbtion: Result: LD50 > 2,000 mg/kg. Remark: Very low order of toxicity.

Skin /Direct Contact: Result: Slight irritation.

Eye Direct Contact: Result: Severe irriation. Remark: Causes corneal injury.

Exposure Limits: Not Applicable.

Sensitization: No.

Reproductive Toxicity: No.

Mutagenicity: No.

Teratogenicity: No.

Synergistic Products: None.

Section 12 - Ecological Information

No known applicable information.

Section 13 - Disposal Considerations

Dispose in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

Special Shipping Information: None.

DOT: Not regulated.

TDG: Not available

PIN: Not available.

Section 15 - Regulatory Information

OSHA 29 CFR 1910-1200: Irritant

TSCA: All components of this product are listed on TSCA inventory.

CERCLA Reportable Quantity: Not applicable.

SARA Title III:

Section 302 Extremely Hazardous Substances: None

Section 304: Not Applicable.

Section 311/312: Immediate (acute) health hazard.

Section 313: None.

RCRA: Refer to section 13.

California Proposition 65: This product contains no levels of listed substances which the state of California has found to cause cancer, birth defects, or other reproductive harm.

WHMS Classification: D2B.

Section 16 - Other Information

Prepared By: Research and Development
Revision Notes: General Review

Additional Hazard Rating Systems:

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

Material Safety Data Sheet

Mule-HideWATER CUT-OFF MASTIC

MSDS No. 10-2110

Date of Preparation: 05/10/14

Revision: 024

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Mule-Hide WATER CUT-OFF MASTIC

Chemical Formula: Mixture **General Use:** Elastomeric Sealer

Manufacturer: Carlisle SynTec, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-479-6832

Supplier: Mule-Hide Products Co., Inc. 1195 Prince Hall Drive, Beloit, WI 53511 Phone: 800-786-1492

24 hour Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger – Highly flammable liquid and vapor

Warning – Causes skin irritation

Warning – Causes eye irritation

Warning – May be harmful if swallowed and enters airways

Warning – May cause an allergic skin reaction

Warning – May cause drowsiness and dizziness

Potential Health Effects

Primary Entry Routes: Skin contact, skin absorption, eye contact, inhalation, ingestion.

Target Organs:

Acute Effects

Inhalation: nose and throat irritation on short-term exposure to liquid or vapor.

Eye: irritation on short-term exposure to liquid or vapor

Skin: irritation on short-term exposure to liquid or vapor

Ingestion: irritation of gastrointestinal tract

Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: Pre-existing eye, skin, and pulmonary disorders may be aggravated by exposure to this product. Respiratory symptoms associated with pre-existing lung disorders and pre-existing heart disorders may be aggravated by exposure to this material.

Chronic Effects: Overexposure may result in headache, dizziness, fatigue, nausea, convulsions, and loss of consciousness. Anorexia and nervousness may persist for several months following acute overexposure. Moderate irritation of skin, eyes, and mucous membranes of upper respiratory tract on prolonged, repeated contact. Dermatitis and defatting of the skin. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage.

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Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Aliphatic Petroleum Distillate	64742-89-8	10-30
Amorphous Silica	7631-86-9	1-5
Additional Ingredients	CAS Number	% wt
Isobutylene-Isoprene Copolymer	9010-85-9	
Polybutene Homopolymer	9003-29-6	
Hydrous Clay	12174-11-7	
Paraffinic Oil	64742-01-4	
Calcium Carbonate	1317-65-3	

Section 4 - First Aid Measures

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.

Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.

Ingestion: Do not induce vomiting. Get medical attention immediately.

Special Precautions/Procedures: Whenever possible, remove the worker from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: 40 °F (4 °C)

Flash Point Method: TCC

Autoignition Temperature: 480.4 °F (249 °C)

LEL: 0.9% v/v

UEL: 7% v/v



Flammability Classification: Division 2. Ignition can occur when this product is exposed to heat, sparks, or flame.

Extinguishing Media: In case of fire, use dry chemical, carbon dioxide, or foam. Water may not be effective as an extinguishing agent. Water fog or spray may be used to provide a smothering effect on fire and to cool fire-exposed container and surrounding combustibles. Do not use a solid stream of water because it can scatter and spread the fire.

Unusual Fire or Explosion Hazards: Flammable. Store and use away from all sources of heat, flame, or sparks. DO NOT smoke while applying. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at location distant from material handling point and flash back. All containers should be grounded when material is transferred.

Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide, carbon dioxide, or aldehydes may be released in a fire.

Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame. Fire fighters should wear self-contained breathing apparatus and full protective clothing with full-face pieces operated in the positive pressure demand mode.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Remove all sources of ignition. Avoid breathing vapors. Use self-contained breathing apparatus in enclosed area. Ventilate area. Contain and remove with inert absorbent materials and non-sparking tools.

Large Spills

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup: Clean-up spill as soon as possible. Collect any excess material with absorbent pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal. Comply with all laws and regulations.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use away from all sources of heat, flame, or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with non-sparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. KEEP OUT OF REACH OF CHILDREN.

Storage Requirements: Keep containers cool, dry, and store away from all sources of heat, flame, and sparks. Keep containers tightly closed and store with adequate ventilation. Do not pressurize, cut, weld, or grind the containers or empty containers which may contain residual product and solvent vapors that may ignite explosively.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Aliphatic Petroleum Distillate	300 ppm	400 ppm	300 ppm	none estab.	350 ppm	none estab.	none estab.
Amorphous Silica	6.0mg/m ³ (total dust)	none estab.	none estab.	none estab.	none estab.	none estab.	none estab.

Engineering Controls: Do not use in enclosed areas without proper explosion-proof ventilation. General and local exhaust ventilation must be sufficient to control vapor concentrations and keep the vapor concentration below 300 ppm.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Respiratory Protection: A NIOSH approved respirator must be used if vapor concentration is 300 ppm or above.

Protective Clothing/Equipment: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) recommended. Glasses or goggles recommended. Wear industrial boots to protect feet from contact with sealant. Impervious clothing is recommended to protect skin from contact with sealant. Protective skin creams or emollients useful.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance and Odor: Gray viscous liquid with mild solvent odor

Odor Threshold(ppm): Not available

Vapor Pressure: 45 mm Hg at 25 °C(77°F)

Vapor Density (Air=1): 3.9

Density: 9.98 – 10.82 lbs./gal. (calculated)

Specific Gravity (H₂O=1, at 4°C/39°F): 1.20-1.30

pH: N/A

Water Solubility: 0.5

Other Solubilities:

Boiling Point(°C): 115-140 (239 - 284°F)

Freezing/Melting Point(°C): -18 (-0.4°F)

% Volatile: 10-20

Evaporation Rate: 2.0

VOC: 250 gms. / l.

Flash Point: 40 °F (4 °C)

Flash Point Method: TCC

Autoignition Temperature: 480.4 °F (249 °C)

LEL: 0.9% v/v

UEL: 7% v/v

Section 10 - Stability and Reactivity

Stability: Stable.

Possibility of hazardous reactions: Will not occur.

Chemical Incompatibilities: Strong oxidizing agents, acids, bases.

Conditions to Avoid: Heat, sparks, and flames; ignition sources.

Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide, carbon dioxide, or aldehydes may be released in a fire.

Section 11- Toxicological Information

Toxicity Data:

Acute Inhalation Effects: Product toxicity has not been determined.

Acute Oral Effects: Product toxicity has not been determined.

The following is component data:

Aliphatic Petroleum Distillates - Rat, oral, LD₅₀: >5000mg/kg

Amorphous Silica - Rat, oral, LD₅₀: 3160mg/kg

Carcinogenicity: Not listed in IARC or NTP.

Mutagenicity: No evidence

Teratogenicity: No evidence

Section 12 - Ecological Information

This product has not been tested. No data available.

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

For Inner Packages less than or equal to 0.3 gallons (1 liter) -- cartridges

Shipping Name: Adhesives
Shipping Symbols: Limited Quantity
Hazard Class: 3
ID No.: UN1133
Packing Group: II
Label: Limited Quantity label
Special Provisions (172.102):
 149,B52,IB2

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging:
 173.173
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: N/A

For Inner Packages greater than 0.3 gallons (1 liter) – cans, pails, & drums

Shipping Name: Adhesives
Shipping Symbols: Flammable
Hazard Class: 3
ID No.: UN1133
Packing Group: II
Label: Red Caution label required
Special Provisions (172.102):
 149,B52,IB2

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging:
 173.173
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: N/A

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number: Not listed (40 CFR 261.33)
 RCRA Hazardous Waste Classification (40 CFR 261.31): Not classified
 CERCLA Hazardous Substance (40 CFR 302.4) listed/unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112: Not listed
 SARA 311/312 Codes:
 SARA Toxic Chemical (40 CFR 372.65): Not listed
 SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

State Regulations:

Massachusetts Hazardous Substance Codes: Amorphous Silica 7631-86-9 2,4,5,F5
 Calcium Carbonate 1317-65-3 4

Minnesota Hazardous Substance: Amorphous Silica Codes: ANOR Carcinogen: Yes
 Calcium Carbonate Codes: A Carcinogen: No

Pennsylvania Hazardous Substance Code: Amorphous Silica 7631-86-9 Code: None
 Calcium Carbonate 1317-65-3 Code: None

Canadian WHMIS Classification: Class: B
 Division 2

Section 16 - Other Information

Prepared By: Research & Development

Revision Notes: Updated Section 14-Transportation Information

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

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Material Safety Data Sheet

MULE-HIDE THERMOPLASTIC ONE-PART POURABLE SEALER

MSDS No. 10-2205

Date of Preparation: 3/12/12

Revision: 007

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: MULE-HIDE THERMOPLASTIC ONE-PART POURABLE SEALER
Chemical Formula: Mixture **General Use:** Moisture Cure Sealant
Supplier: Mule-Hide Products Co., Inc. 1195 Prince Hall Drive, Beloit, WI 53511 Phone: 800-786-1492
Manufacturer: Carlisle SynTec, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-4SYNTEC
Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Warning – Causes mild skin irritation

Warning – Causes eye irritation

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†Sec. 8

Potential Health Effects

Primary Entry Routes: Skin contact, skin absorption, eye contact.

Target Organs:

Acute Effects

Inhalation: Product is extremely low in volatility and therefore not likely to pose a problem from inhalation.

Eye: Direct contact can cause severe irritation.

Skin: Direct contact may cause slight irritation.

Ingestion: May be harmful if ingested.

Carcinogenicity: IARC, NTP, ACGIH and OSHA do not list this product as a carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: Pre-existing skin and eye disorders may be aggravated by exposure to this product.

Chronic Effects: Repeated or prolonged direct contact to the eyes may cause chemical burns. Repeated or prolonged direct contact to the skin may cause dermatitis.

Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Additional Ingredients	CAS Number	% wt
Amino Silane	1760-24-3	Proprietary

Section 4 - First Aid Measures

Inhalation: If irritation, headache, nausea or drowsiness occurs, remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.

Skin Contact: Clean affected area with ethyl alcohol; then wash with soap and water.

Ingestion: An unlikely route of entry. Consult a physician.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians:

Special Precautions/Procedures: Whenever possible, remove the worker from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: N/A

Flash Point Method: N/A

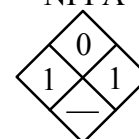
Burning Rate:

Autoignition Temperature: N/A

LEL: N/A

UEL: N/A

NFPA



Flammability Classification: Not flammable.

Extinguishing Media: In case of fire, use water spray, foam, CO₂ and dry chemical.

Unusual Fire or Explosion Hazards: None. This product is not considered flammable.

Sensitivity to Impact – Not applicable.

Hazardous Combustion Products: Thermal decomposition may produce toxic fumes of carbon monoxide and/or carbon dioxide.

Fire-Fighting Instructions: Fire fighters should wear self-contained breathing apparatus and full protective clothing with a full-face piece operated in the positive pressure demand mode.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures:

Small Spills: For minor spill, collect with an absorbent material and dispose of in accordance to governmental regulations.

Large Spills: Contain large spill by building a dike with absorbent material. Collect remaining material and place the material in a container approved for waste disposal.

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup:

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use personal protection recommended in Section 8. Avoid eye, skin and clothing contact. Wash with soap and water before eating, drinking, or smoking. KEEP OUT OF REACH OF CHILDREN. Clean equipment as soon as possible after use.

Storage Requirements: Store in cool, dry place (60-80°F) away from moisture or incompatible materials. Keep container tightly closed when not in use. Do not freeze. Store away from heat, sparks and flame.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Amino Silane	N/A	N/A	N/A	N/A	N/A	N/A.	none estab.

Engineering Controls: Do not use in enclosed areas without proper ventilation.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls:

Respiratory Protection: Not ordinarily required. Use NIOSH or MSHA approved respirator as appropriate.

Protective Clothing/Equipment: Vinyl or permeation resistant gloves recommend. Wear safety glasses or goggles to avoid eye contact; industrial shoes to protect feet from sealant contact and long sleeves, long trousers to protect skin from sealant contact. Avoid prolonged or repeated contact with skin. Wash thoroughly with soap and water after use.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance and Odor: Viscous white liquid, mild ester odor until cured-no odor when cured.

Odor Threshold(ppm): N/A

Vapor Pressure: Not established.

Vapor Density (Air=1): >1

Density: 11.9 lbs/gal.

Specific Gravity (H₂O=1, at 4 °C): Heavier than water.

pH: Not established.

Water Solubility: Negligible

Other Solubilities:

Boiling Point (°C): Not established.

Freezing/Melting Point (°C): Not established.

Viscosity: 30,000 cps.

% Volatile: <1%

Evaporation Rate: N/A

Flash Point: N/A

Flash Point Method: N/A

Burning Rate:

Autoignition Temperature: N/A

LEL: N/A

UEL: N/A

Section 10 - Stability and Reactivity

Stability: Considered stable.

Possibility of Hazardous Reactions: Will not occur.

Chemical Incompatibilities: None known.

Conditions to Avoid: None known.

Hazardous Decomposition Products: None known.

Section 11- Toxicological Information

Toxicity Data:*

Eye Effects: Severe irritation. May cause corneal injury.

Acute Inhalation Effects:

Human, inhalation, LC₅₀; Not acutely toxic

Skin Effects: LD₅₀ >2,000 mg/kg

Acute Oral Effects:

Rat, oral, LD₅₀: > 2,000 mg/kg

Chronic Effects:

Carcinogenicity: No evidence

Mutagenicity: No evidence

Teratogenicity: No evidence

Section 12 - Ecological Information

No known applicable information.

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Special Shipping Information:

None

DOT: Not regulated.

Section 15 - Regulatory Information

EPA Regulations:

TSCA – All components of this product are listed on TSCA Inventory.

RCRA Hazardous Waste Number: Not listed.

RCRA Hazardous Waste Classification: Not classified

CERCLA Reportable Quantity (RQ): Not applicable.

SARA 311/312 Codes: Immediate (acute) health hazard.

SARA Toxic Chemical (40 CFR 372.65): Not listed

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed.

OSHA Regulations:
Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed
OSHA Specifically Regulated Substance (29CFR 1910.-1200) - Irritant
State Regulations: California Proposition 65: This product does not contain any chemicals currently on the California list of known Carcinogens and Reproductive Toxins.
WHIMS –D2B

Section 16 - Other Information

Prepared By: Research & Development
Revision Notes: Changed name from Thermoplastics One-Part Pourable Sealer to White One-Part Pourable Sealer to better describe product.

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

Material Safety Data Sheet

MULE-HIDE LOW VOC PVC BONDING ADHESIVE

MSDS 10-2410

Date of Preparation: 04/14/09

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Low VOC PVC Bonding Adhesive

Chemical Formula: Nitrile Adhesive Mixture **General Use:** Contact Bonding Adhesive

Supplier: Mule-Hide Products Co. Inc., 1195 Prince Hall Dr, Beloit, WI 53511, Phone: 800-786-1492

Manufacturer: Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA, 17013, Phone: 800-479-6832

Emergency Phone Number: CHEMTREC(USA): 800-424-9300

Section 2 – Hazards Information

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger – Highly flammable liquid and vapor

Warning – Causes skin irritation

Warning – Causes serious eye irritation

Danger – May be fatal if swallowed and enters airways

Danger – May damage fertility or the unborn child

Warning – May cause an allergic skin reaction

Warning – Suspected of causing genetic defects (skin)

Warning – May cause drowsiness and dizziness

Warning – May cause damage to organs (liver, kidney, ear) through prolonged or repeated exposure

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†Sec. 8

Potential Health Effects

Emergency and Hazards Overview:

Mixture contains flammable components and the vapors may ignite explosively. Vapors are heavier than air and may travel to distant sources of ignition and flash back. Harmful if swallowed or inhaled. Overexposure to vapors may cause dizziness, headache or central nervous depression. May cause irritation to the eyes, skin and respiratory tract.

Primary Entry Routes: Skin contact, skin absorption, eye contact, inhalation, and ingestion.

Acute Effects

Inhalation: May cause irritation of the nose, throat and respiratory tract. Excessive inhalation may result in headache, dizziness, fatigue, nausea, loss of consciousness, and even death.

Eye: May cause eye irritation on short-term exposure to liquid or vapor.

Skin: May cause skin irritation on short-term exposure to liquid or vapor. Solvents may be absorbed through the skin in toxic amounts.

Ingestion: Ingestion may cause symptoms similar to those of inhalation. The oral toxicity is estimated to be low, therefore not expected to be harmful in small amounts. Aspiration of material into lungs can cause chemical pneumonitis, which can be fatal.

Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.

Medical Conditions Aggravated by Long - Term Exposure: Respiratory symptoms associated with pre-existing lung disorders and pre-existing heart disorders may be aggravated by exposure to this material. Prolonged skin contact with this product may defat skin leading to irritation or dermatitis resulting in itching, redness and rash.

Chronic Effects: Overexposure may result in headache, dizziness, fatigue, nausea and loss of consciousness.

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Chronic exposure may cause reversible kidney and liver injury.

Section 3 – Ingredient Information

Ingredient Name	CAS Number	% wt or % vol
Methyl Ethyl Ketone	78-93-3	10 – 20
Toluene	108-88-3	0 – 5
Acetone	67-64-1	50 - 60

Hazardous Ingredients:

OSHA PEL

ACGIH TLV

NIOSH REL

NIOSH

Ingredient	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Methyl Ethyl Ketone	200 ppm	300 ppm	200 ppm	300 ppm	200 ppm	300 ppm	3000 ppm
Toluene	200 ppm	150 ppm	50 ppm	none estab.	100 ppm	150 ppm	500 ppm
Acetone	1000 ppm	1000 ppm	500 ppm	750 ppm	250 ppm	None estab.	2500 ppm

Section 4 - First Aid Measures

Inhalation: Move victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.

Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.

Ingestion: DO NOT induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Note to Physicians: This product contains methyl ethyl ketone (MEK), acetone and toluene.

Special Precautions/Procedures: Whenever possible, remove the victim from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: -20°C (-4°F)

Flash Point Method: SETA

Autoignition Temperature: 516°C (961°F)

LEL: 2.0% by volume

UEL: 11.5% by volume

Flammability Classification: Division 2

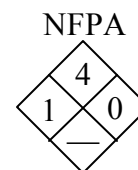
Extinguishing Media: In case of fire, use dry chemical, carbon dioxide, or foam. Water may not be effective as an extinguishing agent. Water fog or spray may be used to provide a smothering effect on fire and to cool fire-exposed containers and surrounding combustibles. Do not use a solid stream of water because it can scatter and spread the fire.

Unusual Fire or Explosion Hazards: Extremely flammable. Store and use away from all sources of heat, flame, or sparks. Do not smoke while applying. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point and flash back. All containers should be grounded when material is transferred.

Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide or carbon dioxide, various hydrocarbons, nitrogen compounds, and hydrogen cyanide may be released in a fire.

Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame. Fire fighters should wear a self-contained breathing apparatus and full protective clothing with a full-face piece operated in the positive-pressure demand mode.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full-face piece operated in pressure-demand or positive-pressure mode.



Section 6 - Accidental Release Measures

Spill /Leak Procedures: Remove all sources of ignition. Avoid breathing vapors. Use self-contained breathing apparatus in enclosed area. Ventilate area. Contain and remove with inert absorbent materials and non-sparking tools.

Personnel Safeguards: Immediately evacuate all non-essential personnel to safe areas. Emergency responders should wear proper protective gear before entering the affected area. Observe all precautions noted above.

Regulatory Notifications: Waste of this product is defined as hazardous according to U.S. EPA. Spill reporting requirements and reportable quantities vary by region. Consult all applicable state and local regulations.

Containment and Cleanup: Remove all sources of ignition. Do not use metal shovels or other tools that could create sparks. Prevent liquids from entering sewers, drains or waterways by diking with sand or earth. Absorb with vermiculite or other absorbent material and remove for disposal.

Section 7 - Handling and Storage

Handling Precautions: Use away from all sources of heat, flame, or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with nonsparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. KEEP OUT OF REACH OF CHILDREN.

Storage Requirements: Keep containers cool, dry, and store away from all sources of heat, flame, and sparks. Keep containers tightly closed and store with adequate ventilation. Do not pressurize, cut, weld, or grind the containers or empty containers that may contain residual product and solvent vapors that may ignite explosively.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Do not use in enclosed areas without proper explosionproof ventilation. General and local exhaust ventilation must be sufficient to control vapor concentrations and keep the PEL below TLV/TWA. Use explosion proof ventilation equipment. Take care not to draw vapors into nonexplosion proof or spark generating equipment.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Respiratory Protection: Provide adequate ventilation to maintain vapors below TLV/TWA. If vapor levels are exceeded, use NIOSH approved respirator, both during and immediately after application, until vapor levels are below limits.

Protective Clothing/Equipment: Hycron, Neoprene, Nitrile or equivalent solvent permeation resistant gloves REQUIRED. Protective glasses or goggles recommended. Industrial boots to protect feet from adhesive contact. Long sleeves, long trousers to protect skin from adhesive contact. Protective skin creams or emollients useful.

Safety Stations: Source of clean water should be available in the work area for flushing skin and eyes.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics. KEEPOUT OF REACH OF CHILDREN!

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance and Odor: Pale yellow to amber liquid with strong ketone odor.

Odor Threshold: Not available

Vapor Pressure: 70.0mm Hg at 20°C

Vapor Density (Air=1): 2.4

Specific Gravity (H₂O=1, at 4 °C): 0.854

pH: N/A

Water Solubility: Negligible

Boiling Point: 79.6°C (175°F)

Freezing/Melting Point: 85.9°C

% Volatile: 70-80

Evaporation Rate: 3.8 (nBuAc=1)

VOC: max 250 gpl

Flash Point: -20°C (-4°F)

Flash Point Method: SETA

Autoignition Temperature: 516°C (961°F)

LEL: 2.0% by volume

UEL: 11.5% by volume

Section 10 - Stability and Reactivity

Stability: Stable under normal conditions.

Polymerization: Will not occur.

Chemical Incompatibilities: Strong oxidizing agents, strong acids, or bases, alkali metals and halogens.

Conditions to Avoid: Heat, sparks, flames and other sources of ignition.

Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide and carbon dioxide, may be released in a fire. Contact with strong oxidizing agents may cause fire and explosions.

Section 11- Toxicological Information

Toxicity Data:

Eye Effects: Irritating

Skin Effects: Irritating

Acute Inhalation Effects: Product toxicity has not been determined.

Following are the component data:

Methyl ethyl ketone: Rat, inhalation, LC₅₀: > 8000 ppm / 8 hr

Toluene: Rat > 26,700 ppm 1 hr; Mouse 400 ppm 24 hr

Acetone: Rat > 20,700 ppm 8 hr

Acute Oral Effects: Product toxicity has not been determined.

Following are the component data:

Methyl ethyl ketone: Rat, oral, LD₅₀: 2.9 gm/kg

Toluene: Rat 5,000 mg/kg

Acetone: Rat 5,800 mg/kg

Mouse 3,000 mg/kg

Rabbit 5,340 mg/kg

Acute Dermal Effects: Product toxicity has not been determined.

Following are the component data:

Methyl ethyl ketone: Rabbit, dermal, LD₅₀: > 5 mL/kg

Chronic Effects: May cause skin sensitization in some people.

Carcinogenicity: Not listed in IARC or NTP

Mutagenicity: Some evidence in animal exposure to Toluene.

Teratogenicity: Some evidence in animal exposure to Toluene.

Reproductive Toxicity: Effects have been observed in rats exposed to >1000 ppm MEK vapors.

Section 12 - Ecological Information

Ecotoxicity: Not known

Environmental Fate: Not known

Environmental Degradation: Not known

Soil Absorption/Mobility: Not known

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Disposal Regulatory Requirements: Consult all regulations (federal, state, provincial, local) or a qualified waste disposal firm when characterizing waste for disposal.

Container Cleaning and Disposal: Dispose of waste in accordance with all applicable regulations. Waste which results from the clean up of spilled product, absorbed by a noncombustible absorbing media, would not be considered a hazardous waste once the methyl ethyl ketone and toluene have evaporated.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Adhesives, 3,
UN 1133, PGII

Shipping Symbols: Flammable

Hazard Class: 3

ID No.: UN1133

Packing Group: II

Label: red caution label required

Special Provisions (172.102):

149, B52, IB2, T4, TP1, TP8

Packaging Authorizations

a) Exceptions: 173.150

b) Non-bulk Packaging: 173.173

c) Bulk Packaging: 173.242

Quantity Limitations

a) Passenger, Aircraft, or Railcar: 5L

b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements

a) Vessel Stowage: B

b) Other: ---

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number (40 CFR 261.33): Methyl ethyl ketone, CAS #78-93-3, RCRA Code U159

RCRA Hazardous Waste Classification (40 CFR 261.31): F005 (methyl ethyl ketone, Toluene and Acetone).

RCRA Groundwater List:

Chemical Name	CAS #	Methods	PQL
Methyl ethyl ketone	78-93-3	8015, 8240	10, 100

CERCLA Hazardous Substance (40 CFR 302.4) listed/unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112:

Methyl ethyl ketone	RQ 5,000 lb (2,272.7 kg)
Toluene	RQ 1,000 lb (454.5 kg)
Acetone	RQ 5,000 lb (2,272.7 kg)

SARA 311/312 Codes:

SARA Toxic Chemical (40 CFR 372.65): Methyl Ethyl Ketone, CAS#78-93-3, 10 – 20%

Toluene, CAS#108-88-3, 0-5%

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ)

OSHA Regulations:

Clean Water Act Priority Pollutants: Toluene is listed as a priority pollutant. RQ: 1,000 lb (454.5 kg)

Clean Water Act Hazardous Substances: none listed

Clean Air Act SOGMI Chemicals: Methyl ethyl ketone; CAS #7893-3, Toluene, CAS #108-88-3; Acetone, CAS #67-64-1

Clean Air Act Hazardous Air Pollutants: Methyl ethyl ketone, CAS #7893-3, Toluene, CAS 108-88-3, Acetone, CAS #67-64-1

Marine Pollutants: none listed

OSHA, IARC, NTP Carcinogens: none listed

State Regulations:

California Proposition 65 Chemicals: This product contains the following chemical(s) known to the state of California to cause birth defects or other reproductive harm: Toluene.

Delaware Air Quality Management List:

Methyl ethyl ketone	CAS #7893-3	DRQ: 5000	State? No
Toluene	CAS #108-88-3	DRQ: 1000	State? Yes
Acetone	CAS #67-64-1	DRQ: 5000	State? Yes

Florida Toxic Substances List:

Methyl ethyl ketone	CAS #78-93-3
Toluene	CAS #108-88-3
Acetone	CAS #67-64-1

Massachusetts Hazardous Substances List:

Chemical Name	CAS #	Code
Methyl ethyl ketone	78-93-3	2, 4, 5, 6, F8, F9
Toluene	108-88-3	2, 4, 5, 6, F7, F8
Acetone	67-64-1	2, 4, 5, 6, F8, F9

Michigan Critical Materials Register: Toluene 108-88-3 Report: -- Class: --

Minnesota Hazardous Substances List:

Chemical Name	CAS #	Codes	Hazards	Carcinogen
Methyl ethyl ketone	78-93-3	ANO	--	No
Toluene:	108-88-3	ANO	skin	No
Acetone	67-64-1	AON	---	No

New Jersey RTK Hazardous Substance List:

Chemical Name	CAS #	Substance #	DOT #	TPQ	EHS
Methyl ethyl ketone	78-93-3	1258	1193	--	
Toluene:	108-88-3	1866	1294	---	

New York List of Hazardous Substances:

Chemical Name	CAS #	RQ Air	RQ Land	Note
Methyl ethyl ketone	78-93-3	5000	1	--
Toluene	108-88-3	1000	1	--
Acetone	67-64-1	5000	1	--

Pennsylvania Hazardous Substances List:

Chemical Name	CAS #	Code	
2-Butanone	78-93-3	E	Code E = Environmental hazard
Methyl benzene	108-88-3	E	
2-Propanone	67-64-1	E	

Washington Permissible Exposure Limits for Air Contaminants:

Chemical Name	CAS #	TWA	TWA	STEL	STEL	Ceiling	Ceiling	Skin
		Ppm	mg	ppm	mg	ppm	mg	
Methyl ethyl ketone	78-93-3	200	590	300	885	--	--	--
Toluene	108-88-3	100	375	150	560	--	--	--
Acetone	67-64-1	750	1800	1000	2400	--	--	--

Section 16 - Other Information**Prepared By:** Research & Development**Revision Notes:** Original Entry

Disclaimer: The information contained in this document is based upon data that was supplied to Mule-Hide by other companies & organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

Revision Number: 006.0

Issue date: 08/06/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Mule-Hide WBBA 2000 Bonding Adhesive
Product type: Adhesive
Restriction of Use: None identified

IDH number: 1065806

Region: United States

Contact information:

Telephone: (860) 571-5100
MEDICAL EMERGENCY Phone: Poison Control Center
1-877-671-4608 (toll free) or 1-303-592-1711
TRANSPORT EMERGENCY Phone: CHEMTREC
1-800-424-9300 (toll free) or 1-703-527-3887
Internet: www.henkelna.com

Manufacturer: Henkel Corporation
One Henkel Way Rocky Hill, Connecticut 06067

Supplier: Mule-Hide Products Co, Inc.
1195 Prince Hall Drive, Beloit, WI 53511

2. HAZARDS IDENTIFICATION**EMERGENCY OVERVIEW**

WARNING: MAY CAUSE AN ALLERGIC SKIN REACTION.
CAUSES SERIOUS EYE IRRITATION.

HAZARD CLASS	HAZARD CATEGORY
EYE IRRITATION	2A
SKIN SENSITIZATION	1

PICTOGRAM(S)**Precautionary Statements**

Prevention: Avoid breathing vapors, mist, or spray. Wash thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. Wear eye and face protection. Wear protective gloves.

Response: IF ON SKIN: Wash with plenty of soap and water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to remove. Continue rinsing. If skin irritation or rash occurs: Get medical attention. If eye irritation persists: Get medical attention. Wash contaminated clothing before reuse.

Storage: Not prescribed

Disposal: Dispose of contents and/or container according to Federal, State/Provincial and local governmental regulations.

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

See Section 11 for additional toxicological information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Component(s)	CAS Number	Percentage*
Kaolin	1332-58-7	5 - 10
Vinyl acetate	108-05-4	0.1 - 1

Mule-Hide WBBA 2000 Bonding Adhesive

Triethanolamine	102-71-6	0.1 - 1
Ammonium hydroxide	1336-21-6	0.1 - 1

* Exact percentage is a trade secret. Concentration range is provided to assist users in providing appropriate protections.

4. FIRST AID MEASURES

Inhalation:	If symptoms develop and persist, get medical attention. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Move to fresh air.
Skin contact:	Wash affected area immediately with soap and water.
Eye contact:	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes.
Ingestion:	If symptoms develop and persist, get medical attention. DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Symptoms:	See Section 11.

5. FIRE FIGHTING MEASURES

Extinguishing media:	water, carbon dioxide, foam, powder
Special firefighting procedures:	Wear self-contained breathing apparatus and full protective clothing, such as turn-out gear.
Unusual fire or explosion hazards:	None
Hazardous combustion products:	Thermal decomposition can lead to release of irritating gases and vapors. Oxides of carbon.

6. ACCIDENTAL RELEASE MEASURES

Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Environmental precautions:	Do not allow product to enter sewer or waterways.
Clean-up methods:	Small spills can be absorbed with vermiculite, clay or other suitable non-biodegradable absorbent material, scooped up and placed in containers. For large spills dike ahead and collect liquid.

7. HANDLING AND STORAGE

Handling:	Use only with adequate ventilation. Avoid contact with eyes, skin and clothing. Keep container closed. Do not breathe gas/fumes/vapor/spray. Wash thoroughly after handling.
Storage:	Keep containers closed when not in use. Store between 40°F and 100°F. (5° and 38°C).

For information on product shelf life, please review labels on container or check the Technical Data Sheet.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.

Hazardous Component(s)	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Kaolin	2 mg/m3 TWA Respirable fraction.	15 mg/m3 PEL Total dust. 5 mg/m3 PEL Respirable fraction.	None	None
Vinyl acetate	10 ppm TWA 15 ppm STEL	None	None	None
Triethanolamine	5 mg/m3 TWA	None	None	None
Ammonium hydroxide	None	None	None	None

Engineering controls:

Work should be done in an adequately ventilated area (i.e., ventilation sufficient to maintain concentrations below one half of the PEL and other relevant standards). Local exhaust ventilation is recommended when general ventilation is not sufficient to control airborne contamination.

Respiratory protection:

No personal respiratory protective equipment normally required. Use a NIOSH approved respirator if ventilation is inadequate. Observe OSHA regulations for respirator use (29 CFR 1910.134).

Eye/face protection:

Safety goggles or safety glasses with side shields.

Skin protection:

Use impermeable gloves and protective clothing as necessary to prevent skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Liquid
Color:	Off white
Odor:	Mild
Odor threshold:	Not available.
pH:	7 - 9
Vapor pressure:	18 mbar (20 °C (68°F))
Boiling point/range:	100 °C (212°F)
Melting point/ range:	0 °C (32°F)
Specific gravity:	1.0 - 1.2
Vapor density:	Heavier than air.
Flash point:	not applicable
Flammable/Explosive limits - lower:	Not applicable
Flammable/Explosive limits - upper:	Not applicable
Autoignition temperature:	Not applicable
Evaporation rate:	0.36 (Butyl acetate = 1)
Solubility in water:	Dispersible
Partition coefficient (n-octanol/water):	Not applicable
VOC content:	< 1.0 % (by weight)
Viscosity:	Not available.
Decomposition temperature:	Not available.

10. STABILITY AND REACTIVITY

Stability:	Stable at normal conditions.
Hazardous reactions:	Will not occur.
Hazardous decomposition products:	Oxides of carbon. Thermal decomposition can lead to release of irritating gases and vapors.
Incompatible materials:	Keep away from strong oxidizing agents, strong Lewis or mineral acids.
Reactivity:	Not available.
Conditions to avoid:	Store away from incompatible materials.

11. TOXICOLOGICAL INFORMATION

Relevant routes of exposure: Skin, Lungs, Ingestion, Eyes

Potential Health Effects/Symptoms

Inhalation:	Inhalation of mist or spray may cause irritation of the respiratory tract and nasal passages.
Skin contact:	Contact with skin can cause irritation and allergic reaction (sensitization) in some individuals.
Eye contact:	May cause slight irritation to eyes on contact.
Ingestion:	Not expected under normal conditions of use. May cause gastrointestinal tract irritation if swallowed.

Hazardous Component(s)	LD50s and LC50s	Immediate and Delayed Health Effects
Kaolin	Oral LD50 (RAT) = > 5,000 mg/kg Dermal LD50 (RAT) = > 5,000 mg/kg	Nuisance dust
Vinyl acetate	Oral LD50 (RAT) = 2,920 mg/kg Dermal LD50 (RABBIT) = 2,335 mg/kg Inhalation LC50 (RABBIT, 4 h) = 2500 ppm Inhalation LC50 (RABBIT, 4 h) = 2511 ppm Inhalation LC50 (RABBIT, 4 h) = 8800 ppm Inhalation LC50 (RAT, 4 h) = 3680 ppm	Central nervous system, Irritant, Mutagen, Some evidence of carcinogenicity
Triethanolamine	Oral LD50 (RAT) = 8.0 g/kg Dermal LD50 (RABBIT) = > 20,000 mg/kg	Irritant, Allergen
Ammonium hydroxide	Oral LD50 (RAT) = 350 mg/kg	Irritant, Corrosive

Hazardous Component(s)	NTP Carcinogen	IARC Carcinogen	OSHA Carcinogen (Specifically Regulated)
Kaolin	No	No	No
Vinyl acetate	No	Group 2B	No
Triethanolamine	No	No	No
Ammonium hydroxide	No	No	No

12. ECOLOGICAL INFORMATION

Ecological information: Not available.

13. DISPOSAL CONSIDERATIONS

Information provided is for unused product only.

Recommended method of disposal: This product is not a RCRA hazardous waste when discarded. Processing, use, or contamination of this product may change the hazard classification and waste management options. Follow all local, state, federal and provincial regulations for disposal.

Hazardous waste number: Not hazardous.

14. TRANSPORT INFORMATION

The transport information provided in this section only applies to the material/formulation itself, and is not specific to any package/configuration.

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name: Not regulated
Hazard class or division: None
Identification number: None
Packing group: None

International Air Transportation (ICAO/IATA)

Proper shipping name: Not regulated
Hazard class or division: None
Identification number: None
Packing group: None

Water Transportation (IMO/IMDG)

Proper shipping name: Not regulated
Hazard class or division: None
Identification number: None
Packing group: None

15. REGULATORY INFORMATION**United States Regulatory Information**

TSCA 8 (b) Inventory Status: All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory.

TSCA 12 (b) Export Notification: None above reporting de minimis

CERCLA/SARA Section 302 EHS: None above reporting de minimis
CERCLA/SARA Section 311/312: Immediate Health, Delayed Health
CERCLA/SARA Section 313: This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372). Vinyl acetate (CAS# 108-05-4).

California Proposition 65: This product contains a chemical known in the State of California to cause cancer. This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Canada Regulatory Information

CEPA DSL/NDL Status: All components are listed on or are exempt from listing on the Canadian Domestic Substances List.

16. OTHER INFORMATION

This safety data sheet contains changes from the previous version in sections: New Safety Data Sheet format.

Mule-Hide WBBA 2000 Bonding Adhesive

Prepared by: Jennifer Altman, Sr. Regulatory Affairs Specialist

Issue date: 08/06/2014

DISCLAIMER: The data contained herein are furnished for information only and are believed to be reliable. However, Henkel Corporation and its affiliates ("Henkel") does not assume responsibility for any results obtained by persons over whose methods Henkel has no control. It is the user's responsibility to determine the suitability of Henkel's products or any production methods mentioned herein for a particular purpose, and to adopt such precautions as may be advisable for the protection of property and persons against any hazards that may be involved in the handling and use of any Henkel's products. In light of the foregoing, Henkel specifically disclaims all warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, arising from sale or use of Henkel's products. Henkel further disclaims any liability for consequential or incidental damages of any kind, including lost profits.

Material Safety Data Sheet

Product Name: Mule-Hide PVC Membrane Cleaner

MSDS No. 10-3110

Date of Preparation: 09/15/2008

Revision: 004

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: PVC Membrane Cleaner **General Use:** Cleaning Solution for Weathered PVC Membrane
Supplier: Mule-Hide Products Co., Inc., P.O. Box 1057, Beloit, WI 53512 Phone: 800-786-1492
Manufacturer: Carlisle SynTec Incorporated, P.O. Box 7000, 1295 Ritner Hwy, Carlisle, PA, 17013-0925 (717) 245-7000
Chemtrec (800) 424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger – Highly flammable liquid and vapor

Warning – Causes skin irritation

Warning – Causes serious eye irritation

Danger – May be fatal if swallowed and enters airways

Warning – May cause an allergic skin reaction

Warning – May cause respiratory irritation

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Potential Health Effects

Eye: Exposure can cause eye irritation. Symptoms may include stinging, tearing, redness and swelling.

Skin: Exposure may cause mild skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying and cracking, and skin burns. Skin absorption is possible, but harmful effects are not expected from this route of exposure under normal conditions of handling and use.

Swallowing: Single dose oral toxicity is low. Swallowing small amounts during normal handling is not likely to cause harmful effects; swallowing large amounts may be harmful. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.

Inhalation: Exposure to vapor or mist is possible. Short-term inhalation toxicity is low. Breathing small amounts during normal handling is not likely to cause harmful effects; breathing large amounts may be harmful. Symptoms are more typically seen at air concentrations exceeding the recommended exposure limits.

Symptoms of Exposure: Mouth and throat irritation, gastrointestinal irritation (nausea, vomiting, diarrhea), irritation (nose, throat, respiratory tract), cough, central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), central nervous system (CNS) depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness) and other CNS effects, high blood sugar, coma.

Target Organ Effects: This material (or a component) shortens the time of onset or worsens the liver and kidney damage induced by other chemicals. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals, and may aggravate pre-existing disorders of these organs in humans: mild, reversible liver effects, mild, reversible kidney effects.

Developmental Information: This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies. Harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain.

Cancer Information: No data

Other Health Effects: No data

Primary Route(s) of Entry: Inhalation, Skin absorption, Skin contact, Eye contact

Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Acetone	67-64-1	100%
Additional Ingredients	CAS Number	% wt

Section 4 - First Aid Measures

Eyes: If symptoms develop, immediately move individual away from exposure and into fresh air. Flush eyes gently with water for at least 15 minutes while holding eyelids apart; seek immediate medical attention.

Skin: Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Swallowing: Do not induce vomiting. This material is an aspiration hazard. If individual is drowsy or unconscious, place on left side with the head down. Seek medical attention. If possible, do not leave individual unattended.

Inhalation: If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Note to Physicians: This material (or a component) has produced hyperglycemia and ketosis following substantial ingestion.

Section 5 - Fire-Fighting Measures

Flash Point: -4°F (-20°C)

Flash Point Method: Closed Cup

Autoignition Temperature: 465°C (869°F)

LEL: 2.6%

UEL: 12.8%

Flammability Classification: Flammable Liquid

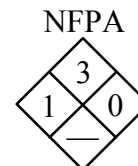
Extinguishing Media: Alcohol foam, carbon dioxide, dry chemical.

Unusual Fire or Explosion Hazards: Material is highly volatile and readily gives off vapors which may travel along the ground or be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from the material handling point. Never use welding or cutting torch on or near can (even empty) because product (even just residue) can ignite explosively.

Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide or carbon dioxide may be released in a fire.

Fire-Fighting Instructions:

Fire-Fighting Equipment: Water may be ineffective. Water may be used to keep fire-exposed containers cool until fire is out. Wear a self-contained breathing apparatus with a full face piece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of this MSDS.



Section 6 - Accidental Release Measures

Small Spills: Absorb liquid on vermiculite, floor absorbent or other absorbent material.

Large Spills: Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Persons not wearing protective equipment should be excluded from the area of spill until clean-up has been completed. Stop spill at source. Prevent from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Pump or vacuum transfer spilled product to clean containers for recovery. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal. Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

Section 7 - Handling and Storage

Handling Precautions: Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. All five-gallon pails and larger metal containers should be grounded and/or bonded when material is transferred. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Acetone	1000 ppm	1000 ppm	500 ppm	750 ppm	250 ppm	None estab.	2500 ppm

Engineering Controls: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Eye Protection: Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin Protection: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) recommended. To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Clear, colorless, volatile liquid
Appearance and Odor: Characteristic sweetish odor
Odor Threshold(ppm): 100 ppm
Vapor Pressure: 181 mm of Hg (@20°C/68°F)
Vapor Density (Air=1): 2
Formula Weight: 58.1 Molecular Weight
Density: 6.590 lbs/gal @ 68°F (20°C)
Specific Gravity (H₂O=1, at 4°C/39°F): 0.79
pH: 7
VOC (gpl): VOC Exempt

Water Solubility: Complete
Other Solubilities: Easily Soluble in methanol and diethyl ether.
Boiling Point(°C): 56.1 (133°F)
Freezing/Melting Point(°C): -95.4 (-139.6°F)
Viscosity: N/A
Refractive Index: N/A
Surface Tension: N/A
% Volatile: 100
Evaporation Rate: 11.6 (Butyl Acetate = 1)
Flash Point: -4°F (-20°C)
Flash Point Method: Closed Cup
Autoignition Temperature: 465°C (869°F)
LEL: 2.6%
UEL: 12.8%

Section 10 - Stability and Reactivity

Stability: Stable.

Possibility of Hazardous Reactions: Will not occur.

Chemical Incompatibilities: Avoid contact with acids, strong oxidizing agents.

Conditions to Avoid: Avoid heat, sparks and open flame

Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide, carbon dioxide, or oxides of nitrogen may be released in a fire.

Section 11- Toxicological Information

Toxicity Data: No Data

Section 12 - Ecological Information

Ecotoxicity: Not Determined

Environmental Fate: Not Determined

Environmental Degradation: Not Determined

Soil Absorption/Mobility: Not Determined

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information**DOT Transportation Data (49 CFR 172.101):**

Shipping Name: Acetone
Shipping Symbols: (3)
Hazard Class: Flammable (3)
ID No.: UN1090
Packing Group: II
Label: 3
Special Provisions (172.102):
IB2, T4, TP1

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 liters
b) Cargo Aircraft Only: 60 liters

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: ---

Section 15 - Regulatory Information**EPA Regulations:**

RCRA Hazardous Waste Number: Not listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261): D001
CERCLA Hazardous Substance (40 CFR 302.4): Acetone
CERCLA Reportable Quantity (RQ), 5000 lbs.
SARA 311/312 Codes: Hazard Class – 40 CFR 370.2 Immediate (X) Delayed (X) Fire (X) Reactive ()
 Sudden Release of Pressure ()

SARA Toxic Chemical (40 CFR 372.65): Not listed
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ)

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed
OSHA Specifically Regulated Substance (29CFR 1910.106)

State Regulations: California Proposition 65: This product contains the following chemical(s) known to the state of California to cause birth defects or other reproductive harm:

New Jersey RTK– Acetone 67-64-1
Pennsylvania RTK – 2-Propanone 67-64-1

Section 16 - Other Information

Prepared By: Research & Development

Formatting Changes: Section 8- Revised limits for Acetone.

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

Material Safety Data Sheet

PVC CUT-EDGE SEALANT

MSDS 10-3410

Date of Preparation: 4/20/09

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: PVC CUT -EDGE SEALANT

Chemical Formula: Mixture

CAS Number: None Assigned

Other Designations:

General Use: To Seal Cut Edges of Reinforced PVC Membrane

Supplier: Mule-Hide Products Co., Inc 1195 Prince Hall Dr, Beloit, WI 53511 Phone: 800-786-1492

Manufacturer: Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-4SYNTEC

Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger- Extremely flammable liquid and vapor

Warning- Causes skin irritation

Warning- Causes eye irritation

Warning- May be harmful if swallowed and enters airways

Warning- May cause damage to heart, lungs, kidney, liver and central nervous system through prolonged or repeated exposure.

Potential Health Effects

Primary Entry Routes: inhalation, skin and eye contact

Target Organs: skin, eye, lungs, central nervous system (CNS), heart, kidney, liver

Acute Effects

Inhalation: may cause upper respiratory irritation

Eye: irritation

Skin: irritation

Ingestion: gastrointestinal irritation, vomiting, diarrhea.

Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.

Medical Conditions Aggravated by Long -Term Exposure: Pre-existing respiratory and skin disorders; CNS, heart liver and/or kidney disease.

Chronic Effects: Prolonged, excessive exposure to vapors may cause nervous system, heart, lungs, kidney, and liver damage, and repeated or prolonged exposure will defat the skin, causing drying, cracking and dermatitis.

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Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Tetrahydrofuran	109-99-9	40-70
Cyclohexane	108-94-1	7-13
Additional Ingredients	CAS Number	% wt

Section 4 - First Aid Measures

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately. Respiratory symptoms associated with pre-existing lung disorders, skin allergies, and pre-existing heart disorders may be aggravated by exposure to this material.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.

Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.

Ingestion: DO NOT induce vomiting. Get medical attention immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Skin contact may aggravate existing dermatitis.

Special Precautions/Procedures: Use away from all sources of heat, flame or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with non-sparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. KEEP OUT OF REACH OF CHILDREN.

Section 5 - Fire-Fighting Measures

Flash Point: 1°F (-17°C)

Flash Point Method: TCC

Burning Rate: N/A

Autoignition Temperature: 321°C

LEL: 2%

UEL: 11.8%

Flammability Classification: Division 3

Extinguishing Media: Water, spray, fog, carbon dioxide (CO₂), dry chemical, foam

Unusual Fire or Explosion Hazards: Vapor may form flammable atmosphere in confined spaces or low areas. Pressure build-up may also occur in closed, heated containers. Water spray or fog should be used to keep containers cool.

Hazardous Combustion Products: Carbon monoxide and carbon dioxide.

Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame. Fire fighters should wear self-contained breathing apparatus and full protective clothing with a full face piece operated in the positive pressure demand mode.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.



Section 6 - Accidental Release Measures

Containment Procedures: Remove all sources of ignition. Evacuate and ventilate spill area. Dam spill area with sand, earth or other suitable absorbent. Prevent entry of materials into sewers, other water sources, or land areas. Wear full protective clothing and respiratory protection during clean-up as required to maintain exposures below the applicable exposure limit. Shovel absorbed material into containers in well-ventilated area.

Disposal: This product is classified as ignitable hazardous waste by the Resource Conservation and Recovery Act (RCRA 40 CFR 261: Waste # D001). Dispose of spilled material in accordance with federal, state and local regulations in a hazardous waste facility. Incineration is the preferred method of disposal. Empty containers must be handled with care due to product residue. Decontaminate empty containers prior to disposal. Do not heat or cut empty containers with electric or gas torch. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the Environmental Protection Agency (EPA).

Section 7 - Handling and Storage

Storage/Handling: Use protective equipment as described in section 8 of this material safety data sheet when handling uncontained material. Warehouse storage should be in accordance with package directions, if any. Material should be kept cool and dry and protected from the elements. Store in tightly closed containers to prevent contamination. Handle with non-sparking tools. Store at 15.5-32.2°C (60-90°F) and out of the sun.

Conditions to Avoid: Keep away from ignition sources, such as heat, sparks, pilot lights, static electricity and open flames. Containers exposed to elevated temperatures may develop pressure buildup and rupture.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Tetrahydrofuran	200 ppm	250 ppm	200 ppm	250 ppm	200 ppm	250 ppm	2000 ppm
Cyclohexane	300 ppm		300 ppm		300 ppm		1300 ppm

Summary: Protective equipment should be provided as necessary to prevent inhalation of vapors, prolonged skin contact, and to keep exposure levels below the applicable exposure limits identified in Section 2.

Ventilation: Local exhaust or general dilution ventilation may be required to maintain exposures below the applicable exposure limits. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Respiratory Protection: Use a NIOSH approved organic respirator to protect against inhalation of vapors. A respirator should be used if ventilation is unavailable, or is inadequate for keeping vapor levels below the applicable exposure limits.

Eye: Chemical goggles or a face shield is recommended.

Skin: Nitrile gloves should be used to help prevent excessive skin contact.

Other: Chemical apron, eye bath, and safety shower.

Special Considerations for Repair/Maintenance of Contaminated Equipment. Use personal protective equipment as discussed above.

Section 9 - Physical and Chemical Properties

Physical State: Liquid.

Appearance and Odor: White, clear, or gray liquid with chemical odor.

Odor Threshold: Not determined

Vapor Pressure: Not determined

Vapor Density (Air=1): >1

Formula Weight:

Density:

Specific Gravity (H₂O=1, at 4 °C): 0.92

pH: Not determined

Water Solubility: Not determined

Other Solubilities:

Boiling Point: 66-156°C/151-312°F

Freezing/Melting Point(°C): Not determined.

Viscosity: Not determined

% Volatile: 81.6

Evaporation Rate(nBuAc=1): Not determined

Flash Point: 1°F (-17°C)

Flash Point Method: TCC

Burning Rate: N/A

Autoignition Temperature: 321°C

LEL: 2%

UEL: 11.8%

Section 10 - Stability and Reactivity

Stability: Stable

Possibility of Hazardous Reactions: Will not occur.

Chemical Incompatibilities: Strong oxidizing agents, acids and bases.

Conditions to Avoid: Heat, sparks, and flames; ignition sources.

Hazardous Decomposition Products: Carbon monoxide, and carbon dioxide.

Section 11- Toxicological Information

This product has not been tested as a separate entity. Therefore, the hazards must be evaluated on the basis of the individual ingredients, and those hazards must be assumed to be additive in the absence of complete information. The hazards described in this document have been evaluated based on a threshold of 1.0% for all hazardous ingredients and 0.1% for all carcinogens.

Acute Effects: Excessive exposure to the vapor from this product is irritating to the eyes, skin, and respiratory tract. It may cause fatigue, weakness, confusion, headache, dizziness, and drowsiness. Very high concentrations are anesthetic and may have other central nervous system effects, including death. Repeated or prolonged exposure will defat the skin, causing drying, cracking, and dermatitis and may cause blistering.

Chronic Effects: Prolonged, excessive exposure to vapors may cause nervous system, heart, kidney and liver damage.

Section 12 - Ecological Information

Ecotoxicity: This material is harmful to aquatic organisms

Environmental Fate: Not Determined

Environmental Degradation: Not Determined

Soil Absorption/Mobility: Not Determined

Section 13 - Disposal Considerations

Summary: This product is classified as ignitable hazardous waste by the Resource Conservation and Recovery Act (RCRA; 40 CFR 261: Waste # D001). Dispose of spilled material in accordance with federal, state and local regulations in a hazardous waste facility. Incineration is the preferred method of disposal. Empty containers must be handled with care due to product residue. Decontaminate empty containers prior to disposal. Do not heat or cut empty containers with electric or gas torch. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the Environmental Protection Agency (EPA).

Section 14 - Transport Information**DOT Transportation Data (49 CFR 172.101):**

Shipping Name: Flammable Liquid NOS 3 PGII
limited quantity

Hazard Class: 3

ID No.: UN1993

Packing Group: II limited quantity

Hazard Label: Flammable Liquid.

Section 15 - Regulatory Information**USA Regulations**

Federal Regulations: The Occupational Safety and Health Administration (OSHA), National Toxicology Program (NTP), Internal Agency for Research on Cancer (IARC), and American Conference on Governmental Industrial Hygienists (ACGIH) have not classified this product as a carcinogen. The following is information on carcinogen classifications on this product's components:

IARC Group 3 Not Classifiable as to it's carcinogenicity to humans: Cyclohexane

ACGIH A4 Not Classifiable as a human carcinogen: Cyclohexane

The Permissible Exposure Limits (PELs) reported in this MSDS are from the air contaminants standard OSHA issued in 1989. While an appeals court eventually vacated this standard, it was without authority to reverse state law under which states, operating with their own OSHA programs, has adopted the 1989 standard. Below is a list of states enforcing the 1989 standard. Please also refer to 29 CFR 1910.10000 and to relevant state statutes for other applicable exposure limits.

State Regulations:

States Enforcing 1989 Air Contaminants Standard: AK, CA, CT, ME, MI, MN, NM, TN, WA, WI

Component	CAS#	State(s)
Tetrahydrofuran	109-99-9	CA, MA, MN, NJ, PA, RI
Cyclohexane	108-94-1	CA, NJ, PA

Environmental Regulations:

Component	CAS #	Percent	SARA 313	SARA 302 TPQ (lbs)	CERCLA RQ (lbs)
Tetrahydrofuran	109-99-9	50-75	No	NA	Yes 1,000
Cyclohexane	108-94-1	5-20	No	NA	Yes 5,000

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):

Under CERCLA and SARA Title III Section 304 emergency notification requirements, releases of the CERCLA hazardous substance(s) listed in the table above, in quantities equal to or greater than the reportable quantity (RQ), are subject to reporting to the National Response Center, and state and local emergency commissions.

Resource Conservation and Recovery Act (RCRA):

Pursuant to Resource Conservation and Recovery Act (RCRA; 40 CFR 261) regulations, this product is classified as an ignitable hazardous waste, code D001

Toxic Substances Control Act Inventory (TSCA 8(b)):

This product and its components are listed.

Other TSCA Requirements:

Tetrahydrofuran (109-99-9) is regulated under Section 4(e) dermal absorption testing; Section 8(a), PAIR and inventory update reporting; and Section 12(b), notification of export. Cyclohexanone (108-94-1) is regulated under Section 8(a), PAIR and inventory update reporting.

International Regulations

Canada Environmental Protection Act Domestic Substance List (Section 25(1) DSL): This product and its components are not listed.

Section 16 - Other Information

Prepared By: Research & Development

Revision Notes: Revised sections 2, 14 and 15.

Disclaimer: The information contained in this document is based upon data that was supplied to Mule-Hide by other companies & organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

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MATERIAL SAFETY DATA SHEET

These products do not meet the criteria of hazardous chemicals as defined by the Federal Occupational Safety and Health Communication Standard 29 CFR 1910.1200(c). This form is being provided solely as general information and should not be construed as a determination that the product(s) are hazardous chemical(s).

GENERAL INFORMATION

Manufacturer: TRUFAST, LLC
02105 Wms. County Rd. 12-C
Bryan, OH 43506
Telephone No.: 419-636-6715

Supplier: Mule-Hide Products Co., Inc.
1195 Prince Hall Drive
Beloit, WI 53511
800-786-1492

PRODUCT IDENTIFICATION

Product Name:	Metal Fastener (screws)
Formula:	N/A

TYPICAL CHEMICAL COMPOSITION

Various metal, ferrous and nonferrous platings/coatings.
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PRODUCT IDENTIFICATION

Physical State:	Solid	Specific Gravity:	7.6 - 7.8
Appearance:	Various Shapes	Vapor Pressure:	N/A
Boiling Point:	N/A	Vapor Density:	N/A
Melting Point:	>1400 Degrees F	Evaporation Rate:	N/A
PH:	N/A	% Volatile by Vol.:	N/A
Odor:	None	Solubility in Water:	N/A

FIRE AND EXPLOSION HAZARD DATA

Not Applicable

REACTIVITY DATA

Stability:	Stable
Incompatibilities (Material to Avoid):	Strong Mineral Acids, Alkali or Oxidizers
Polymerization:	Will Not Occur
Hazardous Decomposition Products:	CO2 and /or CO

HEALTH HAZARD DATA

Health Effects/Signs & Symptoms:	N/A
Usual Route of Entry:	Sharp Metal Fastener May Cut Skin
Medical Conditions Possibly Aggravated:	None Known
Carcinogen Information:	None Known
Eye Contact:	None Known
Skin Contact:	None Known
Ingestion:	None Known
Inhalation:	None Known

OCCUPATIONAL EXPOSURE CONTROL MEASURES

Eye Protection:	Safety Glasses Recommended
Skin Protection:	Gloves Recommended
Ingestion:	Do not place in mouth.

SPILL, LEAK AND DISPOSAL INFORMATION

Waste Disposal Method(s):	Wastes are not hazardous as defined by the Resource Conservation and Recovery. Comply with state and local regulations for disposal of solid wastes. If you are unsure of the regulations, contact your local Public Health Department, or the local offices of the Environmental Protection Agency (EPA).
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As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable Federal and State laws. However, no warranty or representation with respect to such information is intended or given.

Material Safety Data Sheet

Date of Preparation: August 2011

MSDS 10-6210

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Mule-Hide Poly ISO 1, Mule-Hide Poly ISO 1-HD
Chemical Family: Polyisocyanurate
CAS Number: N/A Other Designations: Polyiso
Supplier: Mule-Hide Products Co., Inc. 1195 Prince Hall Dr, Beloit, WI 53511, Phone: 800-786-1492
Manufacturer: Hunter Panels LLC, 15 Franklin Street, Portland, ME 04101
Emergency Phone Number: CHEMTREC (USA) 800-424-9300
NFPA Hazard Rating: Health 1, Flammability 1, Reactivity 0
HMIS Hazard Rating: Health 1, Flammability 1, Reactivity 0

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS #	% wt	OSHA PEL (ppm)	TWA (ppm)
Polyisocyanurate	None	> 35	None Established	None Established
Proprietary additives	Proprietary	< 5	None Established	Non Established
n-Pentane	109-60-0	< 8	1000	600
Iso-Pentane	78-78-4	< 2	1000	600
Fibrous glass	65997-17-3	< 10	TLV 1 f/cc(Respirable)	TLV 5 mg/m ³ (Inhalable)
Calcium Carbonate	471-34-1	< 40	PEL 15 mg/m ³ (Total)	PEL 5 mg/m ³ (Respirable)

Section 3 - Hazards Identification

Potential Health Effects

Primary Entry Routes: Inhalation, skin contact
Target Organs:
Acute Effects
Inhalation: irritation.
Eye: irritation
Skin: irritation
Ingestion:
Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.
Medical Conditions Aggravated by Long-Term Exposure:
Chronic Effects: Possible allergic reaction of respiratory system (sensitization)

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.
Eye Contact: Flush with water for 15 minutes or until irritation ceases.
Skin Contact: Wash with soap and water.
Ingestion:
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians:
Special Precautions/Procedures: Persons who develop symptoms of allergy, irritation, respiratory problems, or puffiness around the eyes should be examined by a physician as soon as possible.

Section 5 - Fire-Fighting Measures

Flash Point: N/A
Flash Point Method: N/A
Burning Rate:
Autoignition Temperature: Not available.
LEL: N/A
UEL: N/A
Flammability Classification: Division 4
Extinguishing Media: In case of fire, use dry chemicals, carbon dioxide, foam, or water fog,

Unusual Fire or Explosion Hazards: None known.
Hazardous Combustion Products: Carbon monoxide, carbon dioxide.
Fire-Fighting Instructions: Fire-fighters should wear self-contained breathing apparatus.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Normal housekeeping.
Small Spills: N/A
Large Spills: N/A
Containment: N/A
Cleanup: N/A
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: No special equipment required.
Storage Requirements: Protect from moisture.
Regulatory Requirements: N/A

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Sufficient ventilation (when cutting) to keep exposure to nuisance dust below 5 mg/m³.
Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
Administrative Controls:
Respiratory Protection: OSHA approved respirator or dust mask when cutting.
Protective Clothing/Equipment: Protective gloves. Safety glasses or goggles, especially when cutting. Protective clothing and footwear.
Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.
Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Solid	Water Solubility: Not soluble.
Appearance and Odor: Tan core foam with cellulose glass fiber facings-no odor.	Other Solubilities:
Odor Threshold: N/A	Boiling Point: N/A
Vapor Pressure: N/A	Freezing/Melting Point: N/A
Vapor Density (Air=1): N/A	Viscosity: N/A
Formula Weight:	Refractive Index: N/A
Specific Gravity (H₂O=1, at 4 °C): Unknown	Surface Tension: N/A
pH: N/A	% Volatile: N/A
	Evaporation Rate: N/A

Section 10 - Stability and Reactivity

Stability: Stable.
Polymerization: Will not occur.
Chemical Incompatibilities: Acetone, MEK, THF, chlorine, chloroform, hydrogen peroxide, ethylene dichloride, dimethyl sulfoxide, and dimethyl formamide.
Conditions to Avoid: Open flame. Will burn if exposed to fire of sufficient heat and intensity.
Hazardous Decomposition Products: Toxic Smoke or vapors, such as carbon monoxide or carbon dioxide, may be released in a fire.

Section 11- Toxicological Information

Acute Toxicity

A: General Product Information

Dust from this product is a mechanical irritant, which means that it may cause temporary irritation or scratchiness of the throat, and/or itching of the eyes and skin.

n-pentane may be released at very low concentrations (well below their lower flammability limits) from these products when they are cut or crushed. These pentanes are nontoxic at levels below their lower flammability limits.

B: Component Analysis – LD50/LC50

n-pentane (109-60-0)

Oral LD50 Mouse: 12800 mg/kg

Carcinogenicity

A: General Product Information

The Occupational Safety and Health Administration (OSHA), National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), and American Conference of Governmental Industrial Hygienists (ACGIH) have not classified this product as a carcinogen.

B: Component Carcinogenicity

Continuous filament glass fibers (65997-17-3)

ACGIH: A4 – Not classifiable as a Human Carcinogen

IARC: Group 3 – Not classifiable (IARC Monograph 81 [2002] (listed under Man-made mineral fibres), Monograph 43 [1988])

Chronic Toxicity

Polyisocyanurate Foam: There is no evidence that dust from this material causes disease in man. There are no known animal studies of the chronic health effects of breathing dust from polyisocyanurate foam. However, a subchronic inhalation study showed no adverse respiratory effects in rats as a result of breathing 9 mg/m³ of dust from a similar foam (polyurethane foam) for 3 months (Thyssen et al., 1978). In, 1987, IARC designated polyurethane as Group 3, not classifiable as to carcinogenicity to humans (Monograph 19).

Continuous Filament Glass Fiber: No chronic health effects are known to be associated with exposure to continuous filament fiber glass. Long-term epidemiologic studies do not show any increases in respiratory cancer or other disease among employees who manufacture this product. In 1987, the International Agency for Research on Cancer (IARC) classified continuous filament fiber glass as a Group 3 substance, “not classifiable as to its carcinogenicity to humans.” In 2001, IARC re-affirmed this designation. Because of the large diameter of continuous filament fibers, these fibers are not considered respirable.

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information

No additional information available

B: Component Analysis – Ecotoxicity – Aquatic Toxicity

n-pentane (109-60-0)

Material Name: Polyisocyanurate Foam Insulation

48 Hr EC50 Daphnia magna: 10.5 mg/L

Isopentane (78-78-4)

48 Hr EC50 Daphnia magna: 2.3 mg/L

Section 13 - Disposal Considerations

US EPA Waste Number & Descriptions

A: General Product Information

This product, as supplied, is not regulated as a hazardous waste by the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) regulations. Comply with state and local regulations for disposal. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the EPA.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: SecurShield,
SecurShield HD Coverboard,
Composite

Shipping Symbols: N/A

Hazard Class: N/A

ID No.: N/A

Packing Group: N/A

Label: N/A

Special Provisions (172.102):
N/A

Packaging Authorizations

a) Exceptions: N/A

b) Non-bulk Packaging: N/A

c) Bulk Packaging: N/A

Quantity Limitations

a) Passenger, Aircraft, or Railcar:

b) Cargo Aircraft Only: N/A

Vessel Storage Requirements

a) Vessel Stowage: N/A

b) Other: N/A

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number: Not listed (40 CFR 261.33)

RCRA Hazardous Waste Classification (40 CFR 261): Not classified

CERCLA Hazardous Substance (40 CFR 302.4) listed/unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112

CERCLA Reportable Quantity (RQ), N/A

SARA 311/312 Codes:

SARA Toxic Chemical (40 CFR 372.65): Not listed

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ)

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

OSHA Specifically Regulated Substance not listed

State Regulations:

N/A

Section 16 - Other Information

Prepared By: Research & Development

Revision Notes:

Additional Hazard Rating Systems:

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle Construction Materials Incorporated by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

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SAFETY DATA SHEET (SDS)

HCFC-Free

SECTION 1: Identification

PRODUCT(S) IDENTIFICATION:

Mule- Hide Poly ISO 2

Article Name: Rigid polyisocyanurate foam panels
CAS Number: None Assigned
Common Name: Rigid Foam Insulation



PRODUCT DESCRIPTION AND USE:

Rigid foam insulation panels for installation as delivered over roof decks. AC Foam®-II consists of a flat or tapered closed-cell polyisocyanurate foam core bonded on both sides to a dark gray glass fiber reinforced felt facer. The thickness of the foam ranges from 0.5 to 4.5 inches. Intended to be covered by hot asphalt or coal tar BUR, modified bitumen, and single ply membrane system roof coverings.

MANUFACTURER: Atlas Roofing Corporation
2000 River Edge Parkway, Suite 800
Atlanta, Georgia 30328
Phone: 770-952-1442

SUPPLIER: Mule-Hide Products Co, Inc.
1195 Prince Hall Dr.
Beloit, WI 53511
Phone: 800-786-1492

MANUFACTURER HEALTH AND TECHNICAL CONTACTS:

From 8:00 AM to 5:00 PM (respective time zone); call one of the following numbers for the location closest to you:

Camp Hill, Pennsylvania	800-688-1476	LaGrange, Georgia
800-955-1476		
East Moline, Illinois	800-677-1476	Phoenix, Arizona
800-477-1476		
Northglenn, Colorado	800-288-1476	Diboll, Texas
800-766-1476		
Etobicoke, Ontario, Canada	888-647-1476	Delta, British Columbia, Canada 855-267-1476

In the event of a chemical emergency after 5:00 PM and on weekends call CHEMTREC at 800-424-9300 or in Canada call CANUTEC at 613-996-6666.

SECTION 2: Hazard(s) Identification



EMERGENCY OVERVIEW:

	<u>Health</u>	<u>Fire</u>	<u>Reactivity</u>	<u>Degree of Hazard</u>
HMIS Rating	1	1	0	0 - Minimal (insignificant)
NFPA Rating	1	1	0	1 - Slight 2 - Moderate 3 - Serious (high) 4 - Severe (extreme) 5 - Chronic Health Effort(s)

No unusual conditions are expected from this product. Freshly expanded or heated foam may off-gas some pentane-blowing agent, which is heavier than air and may accumulate to ignitable concentrations if stored inside a

sealed container or within confined areas. Ignitable atmospheres have concentrations that exceed inhalation exposure limits for workers, further reinforcing the need for ventilation when foam is freshly expanded.

With the exception of the blowing agent, this product does not present an inhalation, ingestion, or contact health hazard unless subjected to operations such as sawing, sanding, or machining that result in the generation of airborne particulates (dusts). Exposure to high dust levels may irritate the skin, eyes, nose, throat, or upper respiratory tract. Inhalation of high amounts of dust over long periods may overload lung clearance mechanisms and make lungs more vulnerable to respiratory disease. [See Section 3 of this SDS for other exposure limit standards for the product ingredients.]

Canadian users: LD50 and LC50 data are listed below for the constituent(s) that are available.

	LC50	LD50	Hodge & Sterner classes	
	mg/(m ³ air)	mg/(kg body wgt)	(inhalation)	(oral)
Pentane	364,000 (rat, inh, 4hr)	446 (mouse, i.v.)	relatively harmless	insufficient data
Formaldehyde	400 (mouse, inh, 2hr)	42 (mouse, oral) 100 (rat, oral)	moderately toxic	moderately toxic

POTENTIAL HEALTH EFFECTS:

Primary Means of Exposure: Inhalation of particulates
Secondary Means of Exposure: Eye and skin contact with particulates and inhalation of vapors

INHALATION HEALTH HAZARDS:

For polyiso foam (generated dust and residual vapor) and for organics in facers (generated dusts)

- Acute: Dust may cause transient mechanical irritation of the upper respiratory tract. Workplace exposures to residual pentane vapors from this product are expected to be below levels of any health risk. Overexposure to high concentrations of pentane can cause narcotic effects. Signs and symptoms of overexposure to pentane include headache, nausea, dizziness, difficulty walking, or sleepiness. Studies have shown that short-term (10-minute) exposures to pentane concentrations as high as 5,000 ppm (11,750 mg/m³) produced no symptoms. Workplace exposure limits for pentane and other organic components are provided in table below.
- Chronic: There is no evidence that dusts generated from these products cause disease in humans. Facer dusts containing carbon black pigment are not analogous to the raw carbon black powders for which human carcinogenicity is suspected. No chronic effects are known for exposures to pentane vapor.

For continuous filament glass fibers in facers (generated dust)

- Acute: Airborne fragments of glass fibers may cause mechanical irritation of the upper respiratory tract, particularly mouth, nose and throat; glass dust may cause transient irritation of the upper respiratory tract. Workplace exposure limits are provided in table below.
- Chronic: No chronic health effects are known to be associated with exposure to glass fibers. Results from epidemiological studies have not shown any increase in respiratory disease or cancer. The International Agency for Research on Cancer has classified continuous filament fiberglass "Not Classifiable as to Carcinogenicity to Humans" (Group 3).

EYE CONTACT HEALTH HAZARDS:

- Acute: Mechanical irritation, redness, tearing, and blurred vision can occur if dusts generated from these products come into contact with eyes.
- Chronic: None known.

SKIN CONTACT HEALTH HAZARDS:

- Acute: Direct contact with rough-cut foam or felt facers can cause mechanical abrasion cuts or puncture to fingers, hands or exposed skin.
- Chronic: None known.

SIGNS AND SYMPTOMS OF EXPOSURE:

Irritation of the upper respiratory tract, eyes, and/or skin.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:

Any condition generally aggravated by mechanical irritants in the air or on the skin. Specific data are not available which address medical conditions that are generally recognized as being aggravated by exposure to this product.

CARCINOGENICITY:

Ingredient:	Textile Fibrous Glass
NTP:	Not Listed
IARC:	Not Classifiable – Group 3
OSHA:	Not Listed
Mutagenicity:	None
Teratogenicity:	None
Reproductive Toxicity:	None
California Proposition 65:	Known to the State of California to Cause Cancer. This warning is provided in accordance with the California Safe Drinking Water and Toxic Enforcement Act of 1986.

SECTION 3: Composition and Ingredient Information

COMMON NAME	CHEMICAL NAME	WEIGHT % IN ARTICLE†	CAS NUMBER
Polyiso foam, containing: Residual blowing agent	isocyanurate homopolymer	78	None
	normal pentane	< 4.7	109-66-0
Felt facer (composite of wood pulp and glass fibers), containing: Fiberglass Pigment		22	None
	continuous filament glass fibers	5	65997-17-3
	carbon black	1	1333-86-4

†Weight % based on 1-inch foam thickness.

AIRBORNE EXPOSURE LIMITS:

Constituent or Category	OSHA PEL	ACGIH TLV	NIOSH REL
	(mg/m ³)	(mg/m ³)	(mg/m ³)
Nuisance dusts NOS containing no asbestos and <1% crystalline silica	15 TWA total 5 TWA respirable	10 TWA	Not applicable
Fiberglass dust	see nuisance dusts	5 TWA	Not applicable
Carbon black	3.5 TWA	3.5 TWA	3.5 TWA 1750 IDLH
n-Pentane	2950 TWA	1410 TWA	350 TWA 1800 Ceiling 3525 IDLH
Formaldehyde	0.9 TWA 2.5 STEL	0.4 TWA	0.02 TWA 0.12 STEL 25 IDLH

SECTION 4: First Aid Measures

FIRST AID PROCEDURES:

Inhalation:	Remove to fresh air. Drink water to clear throat and blow nose to remove dust.
Skin:	Wash with soap and cool running water.

Eyes: Flush eyes with running water for at least 15 minutes. Do not rub or wipe eyes. If irritation persists, consult a medical professional.

Ingestion: Product is not intended to be ingested or eaten. If product is ingested, irritation of the gastrointestinal tract may occur, and should be treated symptomatically. Do not induce vomiting. Rinse mouth with water to remove particles, and drink plenty of water to help reduce the irritation. [No chronic effects are expected following ingestion.]

Note to Physician: This product is a mechanical irritant. It is not expected to produce any chronic health effects from acute exposures. Treatment should be directed toward removing the source of irritation with symptomatic treatment as necessary.

SECTION 5: Fire Fighting Measures

The product is a solid article that will burn if exposed to an ignition source of sufficient heat and intensity, or open flame, such as a welder's torch. It should be installed with a 15-minute thermal barrier between it and the structure's interior. Under certain fire conditions, combustible gases can be generated, creating rapidly spreading, high-intensity flames and dense, black smoke. Burning of this product can produce irritating and potentially toxic fumes and gases, including carbon monoxide and carbon dioxide; other undetermined hydrocarbon fractions could be released in small quantities.

Flashpoint: Not applicable (product is not a liquid).

Auto-ignition temperature: Not determined

Extinguishing media: Water spray/fog, CO₂, dry chemical (consider media appropriate for surrounding materials).

Respirator for fire-fighting: Self-contained breathing apparatus (SCBA).

Pentane vapors may be emitted from freshly produced foam or when product is heated. Pentane concentrations between the lower and upper explosive limits (LEL and UEL) may accumulate under unique circumstances inside a sealed container or within confined areas. If such concentrations are provided a source of ignition, there may be a very high rate of flame propagation.

Pentane:	Flashpoint	≤ -37°C	Vapor pressure	= 514 mm Hg at 25°C
	Boiling point	= 28 to 49°C	LEL	= 1.5% (35,000 mg/m ³)
			UEL	= 7.8%
	Vapor density	= 2.49		

SECTION 6: Accidental Release Measures

Do not discard residues into sewers, storm sewers, or surface waters. If accidentally released to a water body, material will float and disperse with wind and current; contain the material with booms and remove either manually or with a vacuum truck.

If accidentally released to land, scoop up material and put into suitable container for disposal.

Chemicals in this material are not expected to cause harm to aquatic or terrestrial plants or animals; however, fish or other animals may eat the product, which could obstruct their digestive tracts.

Be a good steward of the environment and clean up residues (some components of the product are not biodegradable).

SECTION 7: Handling and Storage

Storage: Store in a dry, well-ventilated area. Assure storage containers or areas and shipping containers are adequately ventilated. No Smoking—No Matches—No Lighters—No Welding rules should be enforced. Install according to manufacturer's recommendations.

Installation Procedure: Cutting of product should be done in a manner to reduce or control generation of airborne dusts. Avoid unnecessary dust exposures when cutting or abrading by using adequate local or general ventilation. Avoid dust contact with ignition sources. Handle product using good industrial hygiene and safety practices.

SECTION 8: Exposure Control - Personal Protection

Respiratory Protection: If a respiratory tract irritation occurs or if any dust exposure limit is exceeded, use a respirator such as 3M Model 8271 or Model 8210, or equivalent for protection against nuisance dusts. When normal ventilation is provided to work area, no respiratory protection is needed for pentane vapor.

Protective Clothing: To avoid skin irritation from excessive dust generated during cutting operations, wear long-sleeved, loose fitting clothing, long pants, and gloves.

Eye Protection: Goggles or safety glasses with side shields are recommended.

Work Area Cleanup: Pick up large pieces; do not wash down drain. Sweep or vacuum smaller pieces into a waste container for disposal. If needed, use water spray to wet down and minimize dust generation. Do not dry sweep dust accumulation or use compressed air for cleanup.

Hygienic Practices: Exposed skin areas should be washed with soap and cool water after working with product. Clothing should be laundered separately from other clothes.

SECTION 9: Physical/Chemical Characteristics

The following applies to the product (article), not to pure forms of individual constituents of the product:

Appearance: White or cream-colored foam solid with a dark gray glass fiber reinforced felt facing on both sides.

PROPERTY	PROPERTY
Boiling Point (°F): NA	Specific Gravity: <1
Melting Point (°F): >250	Solubility (Water): Insoluble
Vapor Pressure: NA	Vapor Density (Air=1): NA
Percent Volatile By Volume: <1	Evaporative Rate: NA
pH: NA	Odor: Negligible
NA=not applicable	

SECTION 10: Stability and Reactivity

Stability: Stable. Service temperature range: -100 to 250°F. To prevent structural deterioration, avoid contact with acetone, methyl ethyl ketone, tetrahydrofuran, chlorine, chloroform, hydrogen peroxide, ethylene dichloride, dimethyl sulfoxide, and dimethyl formamide.

Hazardous Decomposition Products: None identified.

Hazardous Polymerization: Will not occur.

SECTION 11: Toxicological Information

Extensive medical-scientific research has been conducted regarding the health aspects of fiber glass over the past 50 years. The International Agency for Research on Cancer (IARC), and agency of the World Health Organization (WHO), at a meeting in June 1987, reviewed all of the significant research on the health effects attributed to fiber glass.

IARC determined that the data from both human and animal studies was inadequate to classify continuous filament glass fibers such as used in fiber glass reinforcement products, as carcinogenic to humans.

No chronic health effects are known to be associated with exposure to glass fibers. Results from epidemiological studies have not shown any increase in respiratory disease or cancer. The International Agency for Research on Cancer has classified continuous filament fiberglass "Not Classifiable as to Carcinogenicity to Humans" (Group 3).

SECTION 12: Ecological Information

Chemicals in this material are not expected to cause harm to aquatic or terrestrial plants or animals; however, fish or other animals may eat the product, which could obstruct their digestive tracts.
Be a good steward of the environment and clean up residues (some components of the product are not biodegradable).

This product is not manufactured with, nor does it contain any Class 1 Ozone depleting chemicals as defined by EPA in Title VI of the Clean Air Act Amendments of 1990 40 CFR Part 82, Protection of Stratospheric Ozone.

SECTION 13: Disposal Considerations

This product, if discarded as supplied, is not considered a hazardous waste under RCRA (40 CFR 261) and may be placed directly into receptacles that will transport the waste to a municipal waste, industrial waste, or demolition waste landfill. If contact with a contaminating substance alters the material, it is the user's responsibility to determine at the time of disposal whether it meets RCRA criteria for hazardous waste. Dispose in accordance with federal, state and local regulations.

SECTION 14: Transportation Information

Transportation Regulations: This product is not regulated as a hazardous material in transportation.

National Motor Freight Classification (NMFC): 157320, Class 150

SECTION 15: Regulatory Information

TSCA: All chemicals in this product are listed on the TSCA Inventory. TSCA 12(b) export notification requirements do not apply to this product.

SARA TITLE III: There is no Section 302 extremely hazardous substance in this product. Reporting requirements under Sections 311, 312, or 313 do not apply. [Diisocyanate precursors do not remain in the polymer foam of this product.]

All chemicals and component categories found on state lists are addressed in this SDS.

This product has been classified in accordance with the hazard criteria of Canada's *Controlled Products Regulations* and the SDS contains all of the information required by said regulations. All chemical components are on Canada's Domestic Substances List (DSL). Pentane and carbon black are the only constituents on Canada's Ingredients Disclosure List (IDL) that exceed threshold concentrations.

SECTION 16: Other Information

Safety Data Sheet (SDS) prepared by: Atlas Roofing Corporation
2000 River Edge Parkway, Suite 800
Atlanta, Georgia 30328
Phone: 770-952-1442

Original Prepared: January 2002
Revision Date: July 2013
Expiration Date: July 2016
Revision: Conversion to SDS format

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	Glass Mat-Faced Gypsum Panels
Product use	Patented water and mold resistant boards.
Product list	See Product List found in Section 16
Manufacturer information	Georgia-Pacific Gypsum LLC 133 Peachtree Street, NE Atlanta, GA 30303 MSDS Request 404.652.5119 Technical Information 800.225.6119 Chemtrec - Emergency 800.424.9300

2. Hazards Identification

Emergency overview	CAUTION! Cutting, sanding, or otherwise working with this product may generate large amounts of dust. Dust can be irritating to the eyes, skin, and respiratory system.
Potential health effects	
Eyes	Dust may cause eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with possible redness and swelling.
Skin	Dust and glass fibers may produce itching, rash, and redness. Handling can cause dry skin.
Inhalation	Dusts of this product may cause irritation to the nose, throat, or respiratory tract.
Ingestion	Not applicable under normal conditions of use. May result in obstruction or temporary irritation of the digestive tract.

3. Composition / Information on Ingredients

Components	CAS #	Percent
GYPSUM (CALCIUM SULFATE)	10101-41-4	60 - 100
CONTINUOUS FILAMENT GLASS FIBER	65997-17-3	1 - 5
CRYSTALLINE SILICA (QUARTZ)*	14808-60-7	0.1 - 1

Composition comments	Gypsum (calcium sulfate) contains naturally occurring silica crystalline (quartz), which is listed as a lung carcinogen. See Section 8 for exposure information. *The weight percent for crystalline silica represents total crystalline silica and not the respirable fraction. Testing conducted by Georgia-Pacific did not detect respirable crystalline silica during activities associated with the normal use of this product; however, jobsite air monitoring should be conducted to determine actual exposure when permissible exposure limits may be exceeded.
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4. First Aid Measures

First aid procedures	
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.
Skin contact	For skin contact, wash immediately with soap and water. Get medical attention if irritation develops or persists.
Inhalation	Remove to fresh air. If symptoms persist, obtain medical attention.
Ingestion	May result in obstruction and irritation if ingested. Get medical attention.

5. Fire Fighting Measures

Flammable properties	Not flammable by OSHA/WHMIS criteria.
Extinguishing media	
Suitable extinguishing media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Fire fighting equipment/instructions	Firefighters should wear full protective clothing including self contained breathing apparatus.
Explosion data	
Sensitivity to static discharge	Not applicable.
Sensitivity to mechanical impact	Not applicable.
Hazardous combustion products	May include, and are not limited to: calcium oxide and sulfur dioxide.

6. Accidental Release Measures

Personal precautions	Use personal protection recommended in Section 8. Keep unnecessary personnel away from the release.
Environmental precautions	Keep out of drains, sewers, ditches, and waterways.
Methods for containment	Pick up large pieces, then place in a suitable container. Minimize dust generation.
Methods for cleaning up	Scoop up material and place in a disposal container. Utilize wet methods, if appropriate, to minimize dust.

7. Handling and Storage

Handling	Avoid contact with skin and eyes. Do not breathe dust. Use only in well-ventilated areas. Handle and open container with care. Wear appropriate NIOSH approved dust mask or filtering facepiece if dust is generated. Do not eat or drink while using the product. Wash hands before eating, drinking, or smoking.
Storage	Store level and keep dry. Dewpoint or other conditions causing the presence of moisture can damage the product during storage.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	Type	Value	Form
CRYSTALLINE SILICA (QUARTZ)* (14808-60-7)	TWA	0.025 mg/m3	(Respirable fraction)
GYPSUM (CALCIUM SULFATE) (10101-41-4)	TWA	10 mg/m3	Inhalable fraction.

U.S. - OSHA

Components	Type	Value	Form
CRYSTALLINE SILICA (QUARTZ)* (14808-60-7)	TWA	10 mg/m3	Total dust.
GYPSUM (CALCIUM SULFATE) (10101-41-4)	TWA	3.3 mg/m3 15 mg/m3	Respirable fraction. Total dust.
		5 mg/m3	Respirable fraction.

Exposure guidelines	The US OSHA exposure limits for CRYSTALLINE SILICA (QUARTZ) are calculated from the following equations: $30/(\%SiO_2+2)$ mg/m3 for total dust; and $10/(\%SiO_2+2)$ mg/m3 for the respirable fraction.
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*The weight percent for crystalline silica represents total crystalline silica and not the respirable fraction. Testing conducted by Georgia-Pacific did not detect respirable crystalline silica during activities associated with the normal use of this product; however, jobsite air monitoring should be conducted to determine actual exposure when permissible exposure limits may be exceeded.

Engineering controls	Score and snap method recommended. When using product, provide local and general exhaust ventilation to keep airborne dust concentrations below exposure limits. Use wet methods, if appropriate, to reduce the generation of dust.
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Personal protective equipment

Eye / face protection	Safety glasses or goggles are recommended when using this product. Ensure compliance with OSHA's PPE standards (29 CFR 1910.132 (general) and 133 (eye and face protection)). Safety shower/eye wash fountain is recommended in the workplace area (29 CFR 1910.151(c)).
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Skin protection	Impervious protective clothing and gloves recommended to prevent drying or irritation of skin. Ensure compliance with OSHA's PPE standards (29 CFR 1910.132 (general) and 138 (hand protection)). Safety shower/eye wash fountain is recommended in the workplace area (29 CFR 1910.151 (c)).
Respiratory protection	A NIOSH approved dust mask or filtering facepiece is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded. Respirators should be selected by and used under the direction of a trained health and safety professional following requirements found in OSHA's respirator standard (29 CFR 1910.134) and ANSI's standard for respiratory protection (Z88.2).

9. Physical & Chemical Properties

Appearance	Gypsum boards
Color	Facing color varies
Form	Solid
Odor	Odorless.
Odor threshold	Not available
pH	6 - 8
Freezing point	Not applicable
Boiling point	Not applicable
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability	Not flammable
Flammability limits in air, upper, % by volume	Not applicable
Flammability limits in air, lower, % by volume	Not applicable
Vapor pressure	0 hPa estimated Not applicable
Vapor density	Not applicable
Specific gravity	2.2 - 2.4
Partition coefficient (n-octanol/water)	Not available
Solubility (water)	0.2 % @ 22°C
Auto-ignition temperature	Not applicable

10. Chemical Stability & Reactivity Information

Chemical stability	Stable at normal conditions.
Conditions of reactivity	Contact with strong acids produces carbon dioxide.
Incompatible materials	None known.
Hazardous decomposition products	May include and are not limited to: calcium oxide and sulfur dioxide.

11. Toxicological Information

Toxicological information	No toxicological data available for this product. Toxicological information for components of this product is listed below.
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Toxicological information (Ingredients)

GYPSUM (CALCIUM SULFATE) (CAS # 10101-41-4)

Toxicology Data - Selected LD50s and LC50s

Oral LD50 Mouse: 5824 mg/kg
Oral LD50 Rat: 3000 mg/kg

Routes of exposure	Skin contact. Eye contact. Inhalation.
Sensitization	Not expected to be hazardous by OSHA/WHMIS criteria.
Chronic effects	Hazardous by OSHA/WHMIS criteria.

In 1987, IARC classified continuous filament glass fibers as a Group 3 substance, "not classifiable as to its carcinogenicity to humans." In 2001, IARC reaffirmed this designation. Continuous filament glass fibers are not considered respirable due to their large diameter.

Carcinogenicity Not expected to be hazardous by OSHA/WHMIS criteria.

Exposure to respirable crystalline silica in the form of quartz or cristobalite from occupational sources is listed by IARC and NTP as a lung carcinogen. Prolonged exposure to respirable crystalline silica has been known to cause silicosis, a lung disease, which may be disabling. While there may be a factor of individual susceptibility to a given exposure to a respirable silica dust, the risk of contracting silicosis and the severity of the disease is clearly related to the amount of respirable crystalline silica exposure and the length of time (usually years) of exposure.

ACGIH Carcinogens

CRYSTALLINE SILICA (QUARTZ)* (CAS 14808-60-7) US ACGIH Threshold Limit Values: A2 carcinogen

IARC Monographs Overall Evaluation of Carcinogenicity

CRYSTALLINE SILICA (QUARTZ)* (CAS 14808-60-7) 1 Volume 68, Volume 100C

Mutagenicity Not expected to be hazardous by OSHA/WHMIS criteria.

Reproductive effects Not expected to be hazardous by OSHA/WHMIS criteria.

Teratogenicity Not expected to be hazardous by OSHA/WHMIS criteria.

Synergistic materials Not available.

12. Ecological Information

Ecotoxicity Not considered to be harmful to aquatic life.

Components

Test Results

GYPSUM (CALCIUM SULFATE) (10101-41-4) LC50 Fish: 2980 96.00 Hours

13. Disposal Considerations

Disposal instructions This product, if discarded, is not considered a hazardous waste under Federal Hazardous Waste Regulations 40 CFR 261. If processing, use, or contamination alters the material, the waste must be tested using methods described in 40 CFR 261 to determine if it meets applicable definitions of hazardous wastes.

14. Transport Information

DOT

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance No

Section 311 hazardous chemical No

Section 313 hazardous chemical No

Canadian regulations This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Canada WHMIS Ingredient Disclosure: Threshold limits

CRYSTALLINE SILICA (QUARTZ)* (CAS 14808-60-7) 1 %

WHMIS status Non-controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Product list

DensArmor®
 DensArmor® FIREGUARD® C
 DensArmor Plus® Abuse-Resistant Interior Panel
 DensArmor Plus® Impact-Resistant Interior Panel
 DensArmor Plus® High-Performance Interior Panel
 DensArmor Plus® FIREGUARD® Interior Panel
 DensArmor Plus® FIREGUARD® C
 DensDeck DuraGuard® Roof Board
 DensDeck® Roof Board
 DensDeck® FIREGUARD® Exterior Sheathing
 DensDeck Prime® Roof Board
 DensGlass™ Exterior Sheathing
 DensGlass™ FIREGUARD® Exterior Sheathing
 DensGlass® Shaffliner
 DensShield® FIREGUARD® Tile Backer
 DensShield® Tile Backer
 DensGuard® Tile Backer

HMIS® ratings

Health: 1
 Flammability: 0
 Physical hazard: 0

NFPA ratings

Health: 1
 Flammability: 0
 Instability: 0

Disclaimer

The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product in compliance with applicable federal, state and local laws and regulations. Georgia-Pacific and its subsidiaries make no warranty of any kind, expressed or implied, concerning the accuracy or completeness of the information and data herein. The implied warranties of merchantability and fitness for a particular purpose are specifically excluded. Georgia-Pacific and its subsidiaries will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading.

Effective Date

18-Sep-2012

Prepared by

Georgia-Pacific LLC
 404.652.5119

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MATERIAL SAFETY DATA SHEET

SECUROCK® Gypsum-Fiber Roof Board

MSDS #54-066-002

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SECTION 1 CHEMICAL PRODUCT AND IDENTIFICATION

United States Gypsum Company
550 West Adams Street
Chicago, Illinois 60661-3637
A Subsidiary of USG Corporation

Product Safety: 1 (800) 507-8899
www.usg.com
Version Date: January 1, 2011
Version: 5

PRODUCT(S) SECUROCK® Gypsum-Fiber Roof Board

**CHEMICAL FAMILY /
GENERAL CATEGORY** Roof Board

SYNONYMS Fiber-Reinforced Gypsum Panels Product

SECTION 2 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

ΔWARNING!

This product is not expected to produce any unusual hazards during normal use. Exposure to high dust levels may irritate the skin, eyes, nose, throat, or upper respiratory tract. This product does not present an inhalation, ingestion, or contact health hazard unless subjected to operations such as sawing, sanding or machining which result in the generation of airborne particulate. This product contains quartz (crystalline silica) as a naturally occurring contaminant.

POTENTIAL HEALTH EFFECTS (See Section 11 for more information)

ACUTE :

Inhalation	Exposure to dust generated during the handling or use of the product may cause temporary irritation to eyes, skin, nose, throat, and upper respiratory tract. Persons subjected to large amounts of this dust will be forced to leave area because of nuisance conditions such as coughing, sneezing and nasal irritation. Labored breathing may occur after excessive inhalation. If respiratory symptoms persist, consult physician.
Eyes	Dust can cause temporary mechanical irritation of eyes. If burning, redness, itching, pain or other symptoms persist or develop, consult physician.
Skin	None known.
Ingestion	None known.

CHRONIC:

Inhalation	<p>The concentration of respirable crystalline silica measured in bulk samples of USG gypsum was less than 0.1 Wt.%. Industrial hygiene testing, following the NIOSH Method 7500, did not detect respirable crystalline silica in dust created during the cutting of USG gypsum wallboard panels by both the recommended score and snap technique and with the use of a power saw in a 10ft by 10ft room.</p> <p>Panels do not release respirable dust in their installed state and therefore do not present any known health hazards when installed and properly maintained. Exposures to respirable crystalline silica are not expected during the normal use of this product; however, actual levels must be determined by workplace hygiene testing. Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease (i.e., silicosis) and/or lung cancer. The development of silicosis may increase the risks of additional health effects. The risk of developing silicosis is dependent upon the exposure intensity and duration.</p>
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Eyes	None known.
Skin	None known.
Ingestion	None known.

TARGET ORGANS: Eyes, skin and respiratory system.**PRIMARY ROUTES OF ENTRY:** Inhalation, eyes and skin contact.

CARCINOGENICITY CLASSIFICATION OF INGREDIENT(S) All substances listed are associated with the nature of the raw materials used in the manufacture of this product and are not independent components of the product formulation. All substances, if present, are at levels well below regulatory limits. See Section 11: Toxicology Information for detailed information.

MATERIAL	IARC	NTP	ACGIH	CAL- 65
Crystalline silica	1	1	A2	Listed
Glass Fiber	3	2	A3	Not Listed

IARC - International Agency for Research on Cancer: 1- Carcinogenic to humans; 2A – Probably carcinogenic to humans; 2B – Possibly carcinogenic to humans; 3 - Not classifiable as a carcinogen; 4 – Probably not a carcinogen

NTP – National Toxicology Program (Health and Human Services Dept., Public Health Service, NIH/NIEHS): 1- Known to be carcinogen; 2- Anticipated to be carcinogens

ACGIH – American Conference of Governmental Industrial Hygienists: A1 – Confirmed human carcinogen; A2 – Suspected human carcinogen; A3 – Animal carcinogen; A4 - Not classifiable as a carcinogen; A5 – Not suspected as a human carcinogen

CAL-65 – California Proposition 65 “Chemicals known to the State of California to Cause Cancer”

Respirable crystalline silica: IARC: Group 1 carcinogen, NTP: Known human carcinogen. The weight percent of crystalline silica given represents total quartz and not the respirable fraction. The weight percent of respirable silica has not been measured in this product.

POTENTIAL ENVIRONMENTAL EFFECTS: Toxicity studies of gypsum performed with fish, aquatic invertebrates and aquatic plants showed no toxic effect. (See Section 12 for more information.)

SECTION 3

COMPOSITION, INFORMATION ON INGREDIENTS

MATERIAL	WT%	CAS #
Gypsum or Calcium Sulfate Dihydrate (CaSO ₄ •2H ₂ O)	>78	13397-24-5/10101-41-4
Cellulose	<10	9004-34-6
Polyhydrogenmethoxysiloxane	<1	63148-57-2
Crystalline Silica	<5	14808-60-7^
May Contain:		[]
Glass Fiber	<5	65997-17-3

All ingredients of this product are included in the U.S. Environmental Protection Agency's Toxic Substances Control Act Chemical Substance Inventory and the Canadian Domestic Substances List (DSL).

^The weight percent for silica represents total quartz and not the respirable fraction.

SECTION 4

FIRST AID MEASURES



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FIRST AID PROCEDURES

Inhalation	Remove to fresh air. Leave the area of exposure and remain away until coughing and other symptoms subside. Other measures are usually not necessary, however if conditions warrant, contact physician.
Eyes	In case of contact, do not rub or scratch your eyes. To prevent mechanical irritation, flush thoroughly with water for 15 minutes. If irritation persists, consult physician.
Skin	Wash with mild soap and water. If irritation persists, consult physician.
Ingestion	This product is not intended to be ingested or eaten. If gastric disturbance occurs, call physician.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED: Pre-existing upper respiratory and lung diseases such as, but not limited to, bronchitis, emphysema and asthma. Pre-existing skin diseases such as, but not limited to, rashes and dermatitis.

NOTES TO PHYSICIAN: Treatment should be directed at the control of symptoms and the clinical condition.

SECTION 5 FIRE FIGHTING MEASURES

General Fire Hazards		None known	
Extinguishing Media		Water or use extinguishing media appropriate for surrounding fire.	
Special Fire Fighting Procedures		Wear appropriate personal protective equipment. See section 8.	
Unusual Fire/ Explosion Hazards		None known	
Hazardous Combustion Products		None known	
Flash Point	Not Determined	Auto Ignition	Not Applicable
Method Used	Not Applicable	Flammability Classification	Not Applicable
Upper Flammable Limit (UFL)	Not Determined	Rate of Burning	Not Applicable
Lower Flammable Limit (LFL)	Not Determined		

SECTION 6 ACCIDENTAL RELEASE MEASURES

CONTAINMENT: Collect panels from spillage and if not damaged or contaminated by foreign material, panels may be reclaimed.	
CLEAN-UP: Use normal clean up procedures. No special precautions.	
DISPOSAL: Follow all local, state, provincial and federal regulations. Never discharge large releases directly into sewers or surface waters.	

SECTION 7 HANDLING AND STORAGE

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HANDLING: Avoid dust contact with eyes and skin. Wear the appropriate eye and skin protection against dust (See Section 8). Minimize dust generation and accumulation. Avoid breathing dust. Wear the appropriate respiratory protection against dust in poorly ventilated areas and if TLV is exceeded (see Sections 2 and 8). Use good safety and industrial hygiene practices. When moving board with a forklift or similar equipment, it is essential that the equipment be rated capable of handling the loads. The forks should always be long enough to extend completely through the width of the load. Fork spacing between supports should be one half the length of the panels or base being handled so that a maximum of 4' extends beyond the supports on either end.

Follow traditional building practices; such as management of water away from the interior of the structure to avoid the growth of mold, mildew and fungus. Remove any building products suspected of being exposed to sustained moisture and considered conducive to mold growth from the jobsite.

Gypsum panels are very heavy awkward loads posing the risk of severe back injury. Use proper lifting techniques.

STORAGE: Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities (see Section 10). Protect product from physical damage.

Protect from weather and prevent exposure to sustained moisture.

Gypsum Association literature recommends storing board flat to avoid damaging edges, warping the board and the potential safety hazards of the board falling over. However, in other situations, storing the board flat may cause a tripping hazard or exceed floor limit loads. If stacking board vertically, leave at least 4 inches from the wall to decrease the risk of falling board and no more than 6 inches to avoid too much lateral weight against the wall.

SECTION 8

EXPOSURE CONTROLS/PERSONAL PROTECTION

MATERIAL	WT%	TLV (mg/m ³)	PEL (mg/m ³)
Gypsum or Calcium Sulfate Dihydrate (CaSO ₄ •2H ₂ O)	>78	10	15 (T) / 5 (R)
Cellulose	<10	10	15 (T) / 5 (R)
Polyhydrogenmethoxysiloxane	<1	(NE)	(NE)
Crystalline Silica	<5	0.025 (R)	0.1 (R)
May Contain:		[]
Glass Fiber	<5	1 f/cc (R)	15 (T) / 5 (R)

(T)—Total; (R)—Respirable; (NE)—Not Established; (C)—Ceiling; (STEL)—Short-term exposure limit

(F)—Fume; (Du)—Dust; (M)—Mist

ppm—part per million; f/cc—fiber per cubic centimeter; mppcf—million particles per cubic foot

ENGINEERING CONTROLS: Provide ventilation sufficient to control airborne dust levels. If user operations generate airborne dust, use ventilation to keep dust concentrations below permissible exposure limits. Where general ventilation is inadequate, use process enclosures, local exhaust ventilation, or other engineering controls to control dust levels below permissible exposure limits.

RESPIRATORY PROTECTION: Wear a NIOSH/MSHA-approved respirator equipped with particulate cartridges when dusty in poorly ventilated areas, and if TLV is exceeded. A respiratory program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use. If engineering controls are not possible, wear a properly fitted NIOSH/MSHA-approved particulate respirator.

OTHER PERSONAL PROTECTIVE EQUIPMENT:

Eye/Face	Wear eye protection, safety glasses or goggles, to avoid possible eye contact.
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Skin	Wear gloves and protective clothing to prevent repeated or prolonged skin contact.
General	Selection of Personal Protective Equipment will depend on environmental working conditions and operations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Paper with gray to off white core	Vapor Density (Air = 1)	Not Applicable
Odor	Low to no odor	Specific Gravity (H ₂ O = 1)	2.32 – 2.96
Odor Threshold	Not Determined	Solubility in water (g/100g)	0.26/100g
Physical State	Solid	Partition Coefficient	Not Applicable
pH @ 25 ° C	~ 7	Auto-ignition Temp	Not Determined
Melting Point	Not Applicable	Decomposition Temp	2650°F/1450°C
Freezing Point	Not Applicable	Viscosity	Not Applicable
Boiling Point	Not Applicable	Particle Size	Varies
Flash Point	Not Determined	Bulk Density	~ 55 lb/ft3
Evaporation Rate (BuAc = 1)	Not Applicable	Molecular Weight	~ 172
Upper Flammable Limit (UFL)	Not Determined	VOC Content	Zero g/L
Lower Flammable Limit (LFL)	Not Determined	Percent Volatile	Zero
Vapor Pressure (mm Hg)	Not Applicable		

SECTION 10 CHEMICAL STABILITY AND REACTIVITY

STABILITY	Stable.
CONDITIONS TO AVOID	Contact with incompatibles (see below).
INCOMPATIBILITY	None known.
HAZARDOUS POLYMERIZATION	None known.
HAZARDOUS DECOMPOSITION	None known.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE EFFECTS: The acute oral toxicity study [OECD TG 420] of calcium sulfate dihydrate showed that this chemical did not cause any changes even at 2,000 mg/kg b.w. Therefore, the oral LD50 value was more than 2,000-mg/kg b.w. for female rats. Gypsum paste applied experimentally to the eyes of rabbits was not an irritant. Gypsum dust particulate has shown an irritant action on mucous membranes of the respiratory tract and eyes. The sulfate ion has caused gastro-intestinal disturbance in humans following large oral doses. Limited studies involving the repeated inhalation of an (unspecified) calcium sulfate failed to identify any particular target organs in monkeys, rats and hamsters. No evidence of mutagenicity was found in Ames bacterial tests.



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CHRONIC EFFECTS / CARCINOGENICITY: Panels do not release respirable dust in their installed state and therefore do not present any known health hazards when installed and properly maintained.

Crystalline Silica: Exposures to respirable crystalline silica are not expected during the normal use of this product; however, actual levels must be determined by workplace hygiene testing. The weight percent of respirable crystalline silica may not have been measured in this product. Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease (i.e., silicosis) and/or lung cancer. The development of silicosis may increase the risks of additional health effects. Smoking in combination with silica exposures increases the risk of cancer. The risk of developing silicosis is dependent upon the exposure intensity and duration.

In June, 1997, IARC classified crystalline silica (quartz and cristobalite) as a human carcinogen. In making the overall evaluation, the IARC Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs.

IARC states that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).

SECTION 12 ECOLOGICAL INFORMATION

ENVIRONMENTAL TOXICITY: This product has no known adverse effect on ecology. Toxicity studies of gypsum performed with fish, aquatic invertebrates and aquatic plants showed no toxic effect.

Ecotoxicity value	Not determined.
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SECTION 13 DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of material in accordance with federal, state, and local regulations. Never discharge directly into sewers or surface waters. Consult with environmental regulatory agencies for guidance on acceptable disposal practices.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT INFORMATION: Not a hazardous material per DOT shipping requirements. Not classified or regulated.

Shipping Name	Same as product name.
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Hazard Class	Not classified.
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UN/NA #	None. Not classified.
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Packing Group	None.
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Label (s) Required	Not applicable.
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GGVSec/MDG-Code	Not classified.
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ICAO/IATA-DGR	Not applicable.
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RID/ADR	None.
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ADNR	None.
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SECTION 15 REGULATORY INFORMATION

UNITED STATES REGULATIONS

All ingredients of this product are included in the U.S. Environmental Protection Agency's Toxic Substances Control Act Chemical Substance Inventory.

MATERIAL	WT%	3 0 2	3 0 4	3 1 3	CERCLA	CAA Sec. 112	RCRA Code
Gypsum or Calcium Sulfate Dihydrate (CaSO ₄ •2H ₂ O)	>78	NL	NL	NL	NL	NL	NL
Cellulose	<10	NL	NL	NL	NL	NL	NL
Polyhydrogenmethysiloxane	<1	NL	NL	NL	NL	NL	NL
Crystalline Silica	<5	NL	NL	NL	NL	NL	NL
May Contain:		[]
Glass Fiber	<5	NL	NL	NL	NL	NL	NL

Key: NL = Not Listed

SARA Title III Section 302 (EPCRA) Extremely Hazardous Substances: Threshold Planning Quantity (TPQ)

SARA Title III Section 304 (EPCRA) Extremely Hazardous Substances: Reportable Quantity (RQ)

SARA Title III Section 313 (EPCRA) Toxic Chemicals: X= Subject to reporting under section 313

CERCLA Hazardous Substances: Reportable Quantity (RQ)

CAA Section 112 (r) Regulated Chemicals for Accidental Release Prevention: Threshold Quantities(TQ)

RCRA Hazardous Waste: RCRA hazardous waste code

CANADIAN REGULATIONS

This product has been classified in accordance with the hazard criteria of Controlled Product regulations and the MSDS contains all the information required by the Controlled Products Regulations. All ingredients of this product are included in the Canadian Domestic Substances List (DSL).

MATERIAL	WT%	IDL Item #	WHMIS Classification
Gypsum or Calcium Sulfate Dihydrate (CaSO ₄ •2H ₂ O)	>78	Not Listed	Not Listed
Cellulose	<10	Not Listed	Not Listed
Polyhydrogenmethysiloxane	<1	Not Listed	Not Listed
Crystalline Silica	<5	1406	D2A
May Contain:		[]
Glass Fiber	<5	Not Listed	Not Listed

IDL Item#: Canadian Hazardous Products Act – Ingredient Disclosure List Item #

WHMIS Classification: Workplace Hazardous Material Information System

Risk and Safety Phrases defined by European Union Directive 67/548/EEC (Annex III and IV)

R-Phrase(s): R36/37/38

S-Phrase(s): S51 S38 S39



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SECTION 16 OTHER INFORMATION

Label Information

Δ WARNING!

Dust can cause irritation to eyes, skin and respiratory tract. Wear eye, skin and respiratory protection as necessary per working conditions. If eye contact occurs flush with water for 15 minutes. Do not ingest. If ingested, call physician. If cutting board with a power tool, use a wet or vacuum saw to reduce the amount of dust generated. Panels are heavy and can fall over, causing serious injury or death. Avoid creating a tripping hazard and do not exceed floor limit loads. Product safety information: 800-507-8899 or usg. com. Customer Service: 800 USG-4-YOU (800 874-4968). KEEP OUT OF REACH OF CHILDREN.

INFORMATION FOR HANDLING AND IDENTIFICATION OF CHEMICAL HAZARDS

NFPA Ratings:			HMIS Ratings:		<table><tr><td>HEALTH</td><td>*</td><td>1</td></tr><tr><td>FLAMMABILITY</td><td></td><td>0</td></tr><tr><td>PHYSICAL HAZARD</td><td></td><td>0</td></tr><tr><td>PERSONAL PROTECTION</td><td></td><td>E</td></tr></table>	HEALTH	*	1	FLAMMABILITY		0	PHYSICAL HAZARD		0	PERSONAL PROTECTION		E	0 = Minimal Hazard
HEALTH	*		1															
FLAMMABILITY			0															
PHYSICAL HAZARD			0															
PERSONAL PROTECTION		E																
Health:	1	Health:	1		1 = Slight Hazard													
Fire:	0	Fire:	0		2 = Moderate Hazard													
Reactivity:	0	Reactivity:	0		3 = Serious Hazard													
					4 = Severe Hazard													

E – Safety glasses, gloves and dust respirator; * - Contains silica

Key/Legend

ANSI	American National Standards Institute
ACGIH	American Conference of Governmental Industrial Hygienists
CAA	Clean Air Act
CAS	Chemical Abstracts Service (Registry Number)
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
DOT	United States Department of Transportation
DSL	Canadian Domestic Substances List
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning & Community Right-to-know Act
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
MSHA	Mine Safety and Health Administration
NDSL	Canadian Non-Domestic Substances List
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Health and Safety Administration
PEL	Permissible Exposure Limit
PPE	Personal Protection Equipment
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act



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UN/NA#	United Nations/North America number
WHMIS	Workplace Hazardous Material Information System
Prepared by: Product Safety USG Corporation 550 West Adams Street Chicago, IL 60661-3637	
The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for his/her own particular use.	
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