EPDM FLASHINGS & ADHESIVES GUIDE

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PART 1 - GENERAL

1.01. Introduction

A. While many roofing projects are likely to have their special problems, the contractor is certain to encounter some common features over and over again, such as curbs, walls, pipes, corners and drains. This guide explains how to address the common roof features quickly and effectively, using the Mule-Hide Products Co., Inc. (Mule-Hide) EPDM Roofing Systems Standard Details. You will be able to execute these details using the various products that Mule-Hide provides to accomplish the various tasks.

B. Our products are only as good as the workmanship with which they are installed. This is the reason that we emphasize good workmanship and attention to detail. By adhering to the Details and Specifications, you will be installing the various components of the roofing system, using time proven details, methods and procedures. This will provide a roofing system that you can be proud of and one that will give its owner years of service.

C. This Flashing/Adhesive Guide is designed to provide a quick reference to the materials, procedures and details that you will most often encounter. It answers many of the common questions that will come to mind as you are installing the roofing system. However, it is not a comprehensive guide to all of our details; it is meant to be used in conjunction with our Standard Detail section and the System Specifications. From time to time a condition may be encountered that may not be covered in the Mule-Hide EPDM Manual. When this occurs, contact the Mule-Hide Technical Department.

D. As you review this guide you will notice a few differences in the details and the use of some of the products. These changes were meant to improve the performance of the roofing system or to simplify and standardize the way things are done. Abide by these changes.

1.02. Scope:

A. Provide a comprehensive guide to the products that are used when flashing, what they are used for, and the proper way to use them.

B. Give a step-by-step account of how to construct the common details according to Mule-Hide Standard Details and Specifications.

PART 2-PRODUCTS

2.01 Product 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. Materials damaged in handling or storage shall not be used.

C. Store all materials in a dry, clean area protected from the elements. All adhesive and caulking shall be stored at temperatures between 60^{o}F and 80^{o}F. Materials exposed to lower temperatures affect the workability and performance of the product. Products shall be restored to room temperature prior to use.

D. 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.

E. All damaged materials are to be replaced.

2.02. Materials Used in Flashing.

A. Mule-Hide non-reinforced EPDM membrane is available for use with a Fully Adhered System in standard widths of 7, 10 and 20 feet, and lengths of 50 and 100 feet. This membrane is used to flash flat surfaces, and is cut to the appropriate size in the field.

B. Mule-Hide Splice Adhesive - a black or white solvent based, synthetic rubber based (butyl) product designed for splicing EPDM roof membranes and uncured EPDM flashing.

C. Aqua Base 120 Bonding Adhesive – A water base adhesive used to bond Mule-Hide EPDM membrane to various vertical substrates and insulation boards. Aqua Base 120 is applied as a two-sided contact adhesive when used with EPDM membranes

D. Mule-Hide Bonding Adhesive (solvent based) - an amber colored synthetic rubber based (neoprene) adhesive designed to bond EPDM membranes to approved insulation boards, metal, concrete, wood and other approved substrates.

E. Mule-Hide Water Base Adhesive - a non-flammable and non-toxic acrylic latex-based adhesive designed to bond EPDM membranes to approved insulation boards, wood, concrete and other approved decking materials. For horizontal surfaces only (not to exceed inclines greater than 2"). Not suitable for vertical surfaces.

F. Mule-Hide In-Seam Tape - a cured butyl rubber tape designed to adhere EPDM membrane seams in conjunction with Mule-Hide's Tape Primer.

G. Mule-Hide Tape Primer - a cleaner specifically formulated to clean and prime EPDM membrane surfaces to be bonded with splice adhesives, In-Seam Tapes or Cured and Uncured EPDM Laminates.

H. Mule-Hide Uncured EPDM Flashing - an uncured EPDM membrane (.060 inches thick) to be used in conjunction with the Mule-Hide EPDM Roofing Systems. Uncured EPDM flashing is easily formed and used to flash pipes, inside and outside corners and various other penetrations that require a moldable product.

I. Mule-Hide Uncured EPDM Flashing Tape - an uncured EPDM membrane laminated to cured butyl tape. Used to flash pipes, inside and outside corners, T-joints and various other penetrations that require a moldable product. Flashing tape is used in conjunction with the Mule-Hide Tape Primer. Mule-Hide Uncured Laminated Flashing Tapes shall not be used for stripping seams, gravel stops, drip aprons or batten bars.

J. Mule-Hide Cured EPDM Cover Tape - a cured EPDM membrane laminated to cured butyl tape, used for stripping seams, batten bar, gravel stop, drip apron and to patch EPDM membrane.

K. Mule-Hide Lap Sealant - a one part, black or white elastomeric caulk designed for sealing the exposed edge of field fabricated membrane laps.

L. Mule-Hide Water Cut-Off - a butyl based, one-component mastic designed specifically for sealing roofing membranes to wood, metal, concrete, plastic and other substrates.

M. Mule-Hide Pourable Sealer - a two-component, liquid (100% solids) polyurethane elastomer used as filler for pitch pockets.

N. Mule-Hide Pipe Boots - an economical premolded EPDM flashing designed for flashing single pipe penetrations.

O. Mule-Hide All Purpose Bar - a specially extruded aluminum bar, .050" thick x 1" wide x 10' long, that may be used as an anchor bar, batten bar or as a termination bar.

P. Mule-Hide RMS Strips - 6 inch wide, cured, reinforced EPDM strips used as a base attachment around curbs and walls to mechanically attach the EPDM field sheet.

Q. Mule-Hide Fasteners - Factory Mutual approved # 14 heavy duty and # 12 drill point fasteners used for fastening insulation, reinforced membrane, Mule-Hide All Purpose Bar and Mule-Hide RMS Strip to roof decks, curbs and walls.

R. Mule-Hide 2.4" Barbed Seam Plates - Factory Mutual approved 2.4" round Galvalume plates with reinforcing ribs used in conjunction with the Mule-Hide HD Fasteners to attach the reinforced membrane and RMS strips.

2.03. Procedures for Adhesive and Sealant Use.

A. Splicing seams with Mule-Hide In-Seam Tapes.

1. Make sure that the top sheet is lapped over the bottom sheet in shingle fashion so that the water will flow over the seam edge and not against it.

2. All surfaces to be spliced shall be clean and dry. Overlap the adjacent membrane a minimum of 4" and fold back the top sheet approximately 12" to allow for cleaning. Remove excess mica by wiping the seam area with clean damp rags. Dispose of all rags as they become dirty.

3. Prepare each surface of the seam by scrubbing the cleaned areas with Mule-Hide Tape Primer using clean cotton rags or Scotch-Brite pads. Additional cleaning may be required along the factory seams that intersect the seam area to remove excess accumulations of mica. Rags and Scotch-Brite pads must be replaced with clean ones as they become dirty.

4. The primed membrane should have a uniform black color when dry. There should be no streaks present. The Mule-Hide Tape Primer shall be thoroughly stirred prior to use.

5. Roll the top sheet back over the bottom sheet and mark the bottom sheet to allow for proper placement of the In-Seam Tape. Mark the bottom sheet along the edge of the top sheet, but away from the sheet, as a guide for the installation of the In-Seam Tape. Do not use a chalk line or any type of marker that will prevent the seam tape from sticking.

6. Fold the top sheet back. Approximately 1/8" to 3/8" of In-Seam Tape should be exposed along the completed seam. Unroll 2 or 3 feet of the In-Seam Tape leaving the release liner in place. Align the In-Seam Tape so that the edge of the release liner is touching the guideline. Do not install the tape over the line. Leaving the release paper in place, install the In-Seam Tape along the marks on the bottom sheet. Roll the tape with a 2" steel roller along the entire length of the seam. The roller must run perpendicular to the tape with overlapping strokes. If more than one piece (roll) of tape is required to complete a seam, the second piece of tape must overlap the first a minimum of 1 inch.

7. Fold the top sheet back onto the tape so that the sheet is lying over the release paper. Peel the release paper off the tape at a 45o angle and parallel with the roof allowing the top sheet to fall freely onto the exposed tape. Press the seam together using hand pressure and wiping toward the splice edge. Immediately roll the seam with a 2 inch wide steel roller, using positive pressure, toward the edge of the seam.

8. Wait a minimum of 2 hours prior to application of the Lap Sealant. The Lap Sealant is only required at intersections with factory seams, where two pieces of tape overlap within the seam and on patches installed over T-joints. A bead of Lap Sealant should be applied along the overlap for 6" in each direction from the center point of the overlap.

B. Splicing seams with Mule-Hide Butyl Splice Adhesive

1. Position the two membrane sheets, allowing for 4" overlap and fold the top sheet back about 12". Make sure that the laps are shingled so that water runs over the splice edge and not against it.

2. All surfaces to be spliced shall be clean and dry. Remove excess mica by wiping the seam area with a clean damp rag. Dispose of rags as they become dirty.

3. Prepare each surface of the seam by scrubbing the cleaned areas with Mule-Hide Tape Primer using clean cotton rags or Scotch-Brite pads. Additional cleaning may be required along the factory seams that intersect the seam area to remove excess accumulations of mica. Rags and Scotch-Brite pads must be replaced with clean ones as they become dirty. The primed membrane should have a uniform black color when dry. There should be no streaks present. The Mule-Hide Tape Primer shall be thoroughly stirred prior to use.

4. Tape Primer and Splice Adhesives must be thoroughly stirred prior to application. Be sure to scrape the sides and bottom of the cans while stirring.

5. Apply the Splice Adhesive to the cleaned surfaces of both sheets. Mule-Hide recommends the use of a solvent resistant, 3" - 4" wide, short bristle paint brush or a solvent resistant 3" wide, " medium nap, paint roller.

6. Apply the adhesive in a uniformly thick even coat. When using a paintbrush do not use a circular motion. Use long, straight strokes applying sufficient adhesive that will achieve a smooth surface without leaving brush marks. When using a roller do not over roll the adhesive. This will cause an uneven application.

7. Do not allow the adhesive to puddle or leave globs, as these areas will not dry properly and may cause excessive swelling of the membrane which will result in fishmouths in the finished seam.

8. Adhesive must be applied to both surfaces of the seam at the same time to allow for uniform drying of the adhesive. The adhesive must fully cover the surface of the splice areas a minimum of 4" wide.

9. Allow the adhesive to dry until tacky to the touch of a dry finger without stringing or sticking to the finger and does not move when pushed forward or the finger is twisted.

   Note: Drying time (also referred to as Flash Off time) will vary from day to day depending on the ambient weather conditions. In colder weather, condensation may form on the surface of the adhesive, which is caused by the solvent flashing off. If this occurs, the application of the Splice Adhesive should be discontinued. The surface must be allowed to dry and a thin coat of adhesive must be applied over the existing adhesive.

10. Roll the top sheet onto the bottom sheet being careful not to stretch or wrinkle the membrane. Apply hand pressure brushing from the inside of the sheet outward to the edge removing air and fishmouths.

11. Using a 2" wide steel roller, apply positive pressure rolling from the inside of the seam working out over the edge of the sheet perpendicular to the direction of the seam. The entire seam must be rolled in this manner.

12. All "T-joint" laps in the field membrane shall be reinforced with a 6" piece of uncured EPDM membrane (uncured flashing tape may also be used) centered over the intersection of the edges of the seams. All T-joint patches shall be caulked with Lap Sealant.

13. Field seams and flashing should be allowed to set for several hours prior to the application of Lap Sealant. Lap Sealant should be applied to all seam edges by the end of the workday and before any moisture has a chance to form on the membrane.

14. Just prior to applying the Lap Sealant, the seam and flashing edges shall be cleaned with a clean rag or cloth using the Mule-Hide Seam Cleaner to remove any dirt or mica that may remain along the seam edge. Be sure that all edges of the splice have been covered with a continuous bead of Lap Sealant. It is not necessary to trowel (screed) the caulk. The Lap Sealant shall be applied at a maximum rate of 20 linear feet per tube.

C. Regardless of the method used to splice the seams, all seams must be thoroughly inspected for fishmouths, bubbles, blisters and wrinkles and repaired as necessary.

1. If fishmouths or wrinkles occur through the seam, they must be cut out and patched with cured membrane (cured cover tape may be used).

2. Patch with cured EPDM membrane or Cured Cover Tape (do not use uncured flashing or flashing tape) that is at least 3 inches larger in all directions than the area that has been cut out. Round the corners of the patch.

3. Center the patch over the area to be repaired. Follow the splicing procedures for the appropriate material used.

2.04. Mechanical Attachment Procedures and Options.

A. Mule-Hide All Purpose Bar may be installed either as a batten bar or a termination bar, depending on the placement in the system.

1. When used as a batten bar its purpose is to secure the field membrane. It is fastened either to the wall or curb through the field membrane, or to the roof deck through any insulation being used as an overlayment. The fastening is accomplished using the proper Mule-Hide fastener for the material to which the membrane shall be anchored.

   a. The batten bars are positioned 1/2" to 1" apart, and held back approximately 6" to 9" from inside and outside corners.
   b. The batten bar is fastened a maximum of 12"o.c.
   c. The batten bar must have a fastener within 1-1/2" from each end.
   d. The batten bar is positioned and fastened by either starting in the middle of each bar and installing fasteners consecutively toward each end, or by starting the fasteners at one end and consecutively fastening toward the

other end. Do not fasten at both ends and then install the interior fasteners, as this will cause the bar to buckle between the fasteners and not lay flat.

e. The fasteners should be snug, but do not over tighten, causing the bar to deform.

2. When the Mule-Hide All Purpose Bar is used as a termination bar; it is turned over so as to form a caulk edge. Refer to the termination bar Standard Detail.

   a. The All Purpose Bar is positioned on the membrane so that the fasteners will be compressing the membrane into the bead of water cut off between the membrane and the substrate.
   b. The termination bar will be fastened, using the Mule-Hide fastener suited to the substrate, at a maximum of 6" o.c., with the required fastener at all bar ends.
   c. Follow the same fastening order as for batten bar.
   d. Term bar may be installed horizontally or vertically.

C. The Mule-Hide 6" RMS strip is available with a pre-applied seam tape for easy installation.

1. Lay the RMS strip along the wall or curb to be flashed with the marked 'X's toward the exterior of the roof and release tape facing upward.

2. Cut the RMS strip to the proper length, and position it where it will be fastened.

3. Fasten the RMS strip either horizontally to the roof deck, or vertically into the wall or curb, using the 2.4" barbed seam plates and appropriate Mule-Hide Fasteners spaced a maximum of 12" on center. Fasteners must be installed within 1-1/2" of each end of the RMS strip.

4. The field sheet is then seamed to the RMS using tape primer and the pre-applied tape. Apply tape primer to the underside of the field membrane where it will make contact with the seam tape.

5. Fold the field sheet back onto the tape so that the sheet is lying over the release paper. Peel the release paper off the tape at a 45o angle and parallel with the roof allowing the top sheet to fall freely onto the exposed tape. Press the seam together using hand pressure and wiping toward the splice edge. Immediately roll the seam with a 2 inch wide steel roller, using positive pressure, toward the edge of the seam.

PART 3-EXECUTION

3.01 Flashing Vertical Surfaces.

A. The field membrane must be mechanically attached at the base of the wall. This can be accomplished with either the All Purpose Bar or the RMS strips (see 2.04 above). If you are installing a Reinforced EPDM field membrane, 2.4" barbed seam plates may be substituted for the All Purpose Bar.

Note: Use of the RMS strip at the base of vertical surfaces allows the field membrane to be used as a continuous field and flashing sheet. The field sheet is adhered to the RMS strip and then adhered to the vertical surface, running to the point of termination. The field sheet should extend up the vertical surface a minimum of 8 inches where possible.

B. Cut the cured flashing sheet to the size needed, but limit the area to be flashed so that the sheet size is manageable.

C. Position the flashing sheet along the wall or curb to be flashed with the edge to be spliced to the field sheet along the outside edge of where the splice will occur. This should be a minimum of 3" out from the edge of the plate or bar.

D. Prepare the flashing sheet and the field membrane for splicing as in section 2.03. Prepare both sheets at the same time, especially applying the adhesive at the base of the flashing sheet, so that when it flashes off, a hinge is formed. The edge of the sheet is hinged to the field sheet by the adhesive.

E. Apply the bonding adhesive to the curb or wall and to the remaining surface of the flashing sheet.

F. After all of the adhesives have flashed off, roll the flashing sheet into the splice area taking care not to let the sheet bond to the wall until the splice is mated and worked up tight to the wall. Care must be taken to make this splice so that there are no wrinkles in the splice.

G. When the splice is completed up to the wall, mate the flashing sheet to the vertical surface. Work the sheet up the surface, starting at the middle of the sheet and working up and out to the ends. Do not force or stretch the membrane as wrinkles may occur. Carefully roll all surfaces with a 2" steel roller to ensure positive contact of the membrane to the horizontal and vertical surfaces.

H. Terminate the flashing sheet at the top using one of the Standard Details. When using Mule-Hides All Purpose Bar, a bead of Water Cut-Off must be installed between the membrane and the substrate at the point where the bar is to be fastened. Do not flatten the bead of Water Cut-Off with a roller. The termination bar must compress the membrane into the water cut-off to create a proper seal. Trim excess membrane with a utility knife prior to applying the final bead of sealant along the top edge of the All Purpose Bar.

3.02. Fabricating an Outside Corner Using Uncured EPDM

A. Cut two pieces of the uncured EPDM Flashing Tape to the proper size keeping in mind that the flashing must extend up the vertical and the flange must extend out onto the horizontal a minimum of 3". Each piece of the flashing must extend around the corner a minimum of 2" in one direction and 4" in the other. Round the corners.

B. Prepare the uncured corner pieces and the membrane to which they will be applied the same as for a splice.(2.03.)

C. When the adhesives have flashed off, take the first piece of Uncured EPDM and fold the 3" flange up. Mate the corner piece to the vertical surface as follows:

1. Starting at a minimum 2" from the corner, position the corner piece so that the flange edge is down flush with the horizontal surface and mate it to the vertical surface. Wrap the corner piece around the corner a minimum of 4", pressing it into place and allowing no wrinkles.

2. Now form the flange out onto the horizontal surface by starting at each end of the corner piece and working it out without stretching it. Once the ends of the flange have been started without stretching, form the flange by working it out and forming it to the horizontal surface.

3. Roll the corner piece with a 2" steel or silicone roller.

D. Install the second corner piece following the procedures in C. above, only do it in the opposite direction. The pieces overlap to form a double thickness at the base of the corner.

E. At the end of the day, apply Lap Sealant to all of the splice edges. It is not necessary to trowel (screed) the bead of Lap Sealant as it is self-leveling.

Note: This detail may also be done using Uncured EPDM Flashing Membrane and Splice Adhesive.

F. Refer to Mule-Hide Detail # MHE-183 for reference.

3.03. Fabricating an Inside Corner Using Uncured EPDM

A. Cut a 12"x 12" piece of Uncured EPDM Flashing Tape and round the corners.

B. Prepare the surfaces as for splicing as in section 2.03..

C. When the adhesives have flashed off, fold the piece back in half and position it in the corner so that the midpoint is at the base of the corner and press half of the folded piece onto the horizontal flange area and the other half onto the vertical surface.

D. To complete the installation of this piece, work the folded material up the wall and into the corner. When this is done correctly there is a triangular flap sticking out called a pig's ear. Splice the pig's ear to the vertical surface.

E. Roll the fabricated corner with a 2" steel or silicone roller.

F. With a second piece of Uncured EPDM Flashing Tape cover the pig's ear using the splicing method described in section 2.03..

G. Apply a bead of Lap Sealant over the splice edges at the end of the day.

Note: This detail may also be done using Uncured EPDM Flashing Membrane and Splice Adhesive.

H. Refer to Mule-Hide Detail # MHE-184 for reference.

3.04. Flashing a Roof Drain

A. Remove the strainer and the drain clamp ring from the drain, saving the parts for later use. If it is a reroof situation, the existing flashing material must be removed, and the drain bowl flange and the clamping ring must be clean of all foreign debris. Remove any lead flashing and properly dispose of it.

B. Make sure that there is a smooth transition down to the drain bowl flange. This might require that the insulation be tapered in order to provide the smooth transition.

C. Position the field membrane over the drain and press it down onto the drain bowl flange and mark the spot in the center of the drain pipe where the hole in the membrane will be cut.

D. Cut a smooth round hole in the membrane, centered on the marked spot, that is larger than the drainpipe, but smaller than the drain clamp ring.

E. Install a heavy bead of Water Cut-off under the membrane and on top of the drain bowl flange, so that the drain bowl clamping ring rests over the bead of Water Cut-off.

F. Install the clamping ring and the clamping ring nuts and bolts, tightening the clamping ring securely and forming a compression seal between the membrane and the drain bowl flange. Any clamp bolts that have been broken off or are missing must be replaced.

G. Install the strainer on the drain.

Note: It is not acceptable for a splice to run through a drain. If this condition occurs, a 4'x 4' target of field sheet must be installed, centered over the drain.

H. Refer to Mule-Hide Details # MHE-130 to MHE-133

3.05. Installing a Prefabricated Pipe Boot

A. Prefabricated Pipe Boots are manufactured so that they will work on pipes ranging in size from 1" to 6", depending on where they are cut. Cut off the top of the boot so that it fits the pipe that is to be flashed.

B. Place the boot over the pipe so that the flange rests flat on the roof surface, and mark the pipe at the top of the boot.

C. Remove the boot and run a heavy bead of Water Cut-off around the pipe just under the mark on the pipe.

D. Clean the membrane around the pipe and the bottom side of the boot flange with Mule-Hide Seam Cleaner following the splice procedure in section 2.03. Carefully roll the boot flange with a 2" steel roller to ensure positive contact.

E. Install a stainless steel clamp at the top of the boot, compressing the boot onto the pipe and bead of Water Cut-off.

F. At the end of the day, apply a bead of Lap Sealant around the outside edge of the flange and at the top of the boot above the clamping ring.

G. Refer to Mule-Hide Detail # MHE-140 A and MHE-140 C.

3.06. Field Fabricated Pipe Flashing

A. Remove any lead or flashing of any type from the pipe to be flashed and clean the pipe.

B. Cut a one-piece target out of field sheet that is large enough to allow a minimum 6" flange around the pipe (i.e. a 6" pipe would require a minimum 18" target). Round the corners or make the target round.

C. Mark the center of the target and cut a smooth round hole, centered on the mark, that is half the size of the pipe.

D. Force the target over the pipe, forming a 3/4" to 1" flange running up the pipe.

E. Splice the target to the field sheet following the splicing procedure in section 2.03.

F. Cut a piece of uncured EPDM a minimum of 6" wide and long enough to wrap around the pipe and overlap itself by a minimum of 2".

G. Prepare the target for 3" around the pipe and the uncured strip for splicing as described in section 2.03., and apply adhesive to the pipe.

H. When the adhesives have flashed off, fold back about 1-1/2" of the uncured strip which will be the flange onto the horizontal. Position the folded strip at the base of the pipe and wrap it around the pipe until it almost meets itself. It should be stretched a little during this procedure to obtain a tight, wrinkle free installation.

I. Before completing the wrap, start to form the flange. Start at the beginning of the wrap and work the folded portion out onto the horizontal portion of the target, taking care not to over stretch the uncured EPDM for the first inch or two. After the flange is started, continue to form it, stretching it out onto the horizontal, for about half way around the pipe.

J. Make the splice at the 2" overlap, taking care not to stretch the flashing during the initial forming of the flange going back in the other direction.

K. Complete the forming of the flange, and then roll the wrap and the flange completely with a 2" steel or silicone roller.

L. At the end of the day apply a bead of Lap Sealant to all of the splice edges and around the top of the wrap.

M. Refer to Mule-Hide Detail # MHE-141.