

System Specifications

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FULLY ADHERED EPDM SYSTEM

07 53 00/MUL

Revision Date: June 2019

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FULLY ADHERED EPDM SYSTEM SPECIFICATION

PART 1 – GENERAL

Revision Date: June 2019

1.01 Description

A. Scope:

1. Furnish and install a Fully Adhered EPDM Roofing Membrane with flashings and accessories necessary to comprise a roofing system. The Mule-Hide EPDM products and accessories shall be installed in strict compliance with current specifications and drawings as published by Mule-Hide products Co., Inc. ("Mule-Hide").
2. The Mule-Hide Fully Adhered EPDM (Ethylene Propylene Diene Monomer) Membrane Roofing System utilizes a .060 inch thick non-reinforced (Black or White-on-Black) EPDM sheet. Optional sheets that may be approved for use in the fully adhered system are .045 inch thick black non-reinforced and .045 inch thick or .060 inch thick polyester reinforced sheets. The EPDM membrane is fully adhered to an acceptable substrate. Adjoining sheets are overlapped a minimum of 3 inches and spliced with Mule-Hide Butyl Splice Adhesive or with Mule-Hide In-Seam Tapes.

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

Note: Mule-Hide recommends adherence to industry standards (SMACNA) for the installation of any metalwork.

C. General Design Considerations

1. It is the responsibility of the specifier to review local, state and regional codes to determine their impact on the specified Mule-Hide Roofing System.
2. It is the responsibility of the building owner or his/her designated representative to verify structural load limitation. In addition, a core cut may be taken to verify weight of existing components when the roofing system is to be specified on an existing facility.
3. On new construction projects, especially in cold climate regions, moisture generated due to the construction process could adversely impact various components within the roofing assembly if not addressed. Refer to SPRI Advisory Bulletin included in the Design Reference DR-03-11 "Construction Generated Moisture".
4. Drainage must be evaluated by the specifier in accordance with all applicable codes. Slopes may be provided by tapering the structure or through the use of tapered insulation; a sufficient number of roof drains should also be specified and properly located to allow for positive drainage. Significant ponding that could remain after 48 hours should be eliminated with the addition of auxiliary drains in low areas where ponding is anticipated.
5. Mule-Hide specifically disclaims responsibility for the design and selection of an adequate drainage

system and drain accessories. Selection must be made by the building owner or the owner's design professional.

6. Small incidental areas of ponded water will not impact the performance of this roofing system; however, in accordance with industry standards, the roofing assembly should be designed to prevent ponding of water on the roof for prolonged periods (longer than 48 hours). Good roofing practice dictates proper drainage to prevent possible excessive live load and, in the event of a roof leak, to minimize potential interior damage to the roofing assembly and to the interior of the building.
7. The removal of existing wet insulation and membrane must be specified. The specifier shall select an appropriate and compatible material as filler for voids created by removal of old insulation or membrane.
8. Regardless of the type of membrane or assembly selected, any loose flashings at the perimeter, roof drains and roof penetrations must be removed.

1.02 Quality Assurance

- A. The Mule-Hide Fully Adhered EPDM Membrane Roofing System shall be installed by an independent roofing contractor eligible (Warranty Eligible) to apply for Mule-Hide "System Warranties" when system warranties are requested.
- B. There shall be no deviations from this specification or Mule-Hide's standard details without prior written approval from Mule-Hide's Technical Department.
- C. Upon completion of the installation according to the terms and conditions stated in this specification and in accordance to the information given 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 shall perform an on-site inspection of the roof (commercial projects only) to verify that all installation and material requirements have been met.

Note: Inspections are only conducted on projects where a "System Warranty" is requested. Inspections are not conducted on projects not requiring a Mule-Hide Warranty or when only a "Roofing Membrane Limited Warranty" is requested. The sole purpose of an inspection by a Mule-Hide Representative is not to be a final inspection for the benefit of the Building Owner/Owner's Representative. It is for the benefit of Mule-Hide to determine if a System Warranty may be offered for the project.

- D. Mule-Hide reserves the right to reject any roof system and refuse to issue any warranty on roofs which do not comply with Mule-Hide's specifications or current policies.

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 Sheets.
 2. Samples of each material to be used in the roof system.
 3. Specimen copy of Mule-Hide Products Co., Inc. 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

Note: It is the building owner/owner's representative's responsibility to determine what submittals are required for the project.

- B. Submit to Mule-Hide, prior to the job start, an EPDM System Warranty Application to be reviewed by the Mule-Hide Technical Department to determine the acceptability of the project based on the information provided.
 - 1. The EPDM System Warranty Application ("Warranty Application") must be completely filled out and should be accompanied with a copy of the written roof specification provided by the building owner/designer (if available). Also included should be any requests for deviations to Mule-Hide's standard published specification and details.
 - 2. A roof drawing shall be submitted with the Warranty Application indicating all dimensions and locations of all penetrations.

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. Materials exposed to lower temperatures affect the workability and performance of the product. Products shall be restored to the above temperature prior to use.
- 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 as being damaged (confirmed by Mule-Hide) due to improper storage on the job site are to be replaced with new materials.

1.05 Job Conditions

- A. This specification shall not be considered applicable without the appropriate additional specifications approved by Mule-Hide if it should be determined that any of the following conditions exist:
 - 1. The installation of any Mule-Hide Roof System is in a coastal area or high wind zone.
 - 2. If the Mule-Hide Roof System should exceed the structural load conditions as determined by an architect or engineer.
 - 3. When chemical or hazardous materials are discharged onto the Mule-Hide Roof System.
- B. Mule-Hide EPDM roofing materials may be installed in temperatures below 40°F but only after consultation with the Mule-Hide Technical Department as special precautions or procedures may be necessary. The performance of the materials, installation costs and production rates may be affected.
- C. The General Contractor or the building owner shall be responsible for providing adequate surfaces and structures to receive the insulation, Mule-Hide Roof System and related sheet metal necessary for the successful completion of the project.

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- D. Only as much new roofing as can be made watertight shall be installed each day. This includes all flashing work.
- E. All substrates to receive new insulation, membrane or flashing shall be thoroughly dry. Should surface moisture occur, the contractor shall provide adequate equipment to dry the substrate prior to application of new material.
- F. Prior to and during application, all dirt, debris and dust shall be removed from surfaces to be roofed for both new and reroofing substrates.
- G. On all projects where the Fully Adhered EPDM System is specified, it is the responsibility of the independent roofing contractor to have the owner or owner's representative verify the condition of the deck or substrate and to confirm the roof deck can withstand the additional load.
- H. Precautions shall be taken to prevent wind blow-off or wind damage during the course of the roofing application. This may necessitate additional securing of temporary construction, materials and equipment.
- I. 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 Technical Department in writing.
- J. 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.
- K. Do not install the Mule-Hide EPDM Roofing Membrane in direct contact with any product containing coal tar pitch, creosote or penta-based materials. Consult the Mule-Hide Technical Department for special installation requirements.
- L. 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 EPDM Roofing Membrane. Contact the Mule-Hide Technical Department for recommendations if such conditions exist.
- M. The contractor shall follow and comply with all safety regulations as recommended by OSHA.
- N. 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.
- O. 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. All damaged materials shall be replaced with new materials.
- P. 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. All damaged materials shall be replaced with new materials.
- Q. Any unusual or concealed condition discovered during the course of the work is to be reported immediately in writing to the owner and Mule-Hide's Technical Department. Work is to be halted until the owner has responded with a solution to the problems.
- R. Vapor Retarders

1. Mule-Hide does not require a vapor retarder for the protection of the membrane; however, it should be considered by the specifier for the protection of the roofing assembly (i.e. primarily insulation, underlayment and adhesives). The following criteria should be considered by the specifier:
 - a. Use of a vapor retarder to protect insulation and reduce moisture accumulation within an insulated roofing assembly, should be investigated by the specifier. Consult latest publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.), NRCA (National Roofing Contractors Association), local building and energy codes for specific information.
 - b. In the generally temperate climate of the United States, during the winter months, water vapor flows upward from a heated, more humid interior toward a colder, drier exterior. Vapor retarders are more commonly required in northern climates than in southern regions, where downward vapor pressure may be expected and the roofing membrane itself becomes the vapor retarder.
 - c. On cold storage/freezer facilities, the perimeter and penetration details must be selected to provide an air seal and prevent outside air from infiltrating and condensing within the roofing assembly.
2. When a vapor retarder is specified, Mule-Hide F5 Air & Vapor Barrier may be used. Refer to the F5 Air & Vapor Barrier Product Data Sheet for product installation.
- S. On structural concrete decks, when a vapor retarder is not used, gaps in the deck along the perimeter and around penetrations must be sealed. If tilt-up panels are present, vertical joints between panels must be sealed as well. Sealing these areas will help prevent infiltration of hot humid air and possible moisture contamination resulting from condensation. This is specifically important when adhesive is used to attach the roof insulation.
- T. All local building codes, energy codes and requirements should 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.
- U. 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.
- V. Certain project conditions may require modifications to this specification. Contact the Mule-Hide Technical Department if any of the following conditions exist:
 1. Roof heights greater than 100 feet.
 2. Geographical location in a 100 mph or greater wind zone, per the ANSI 100 year mean recurrence interval wind isotach.
 3. Location with Exposure D as determined in ANSI A58.1.
- W. Consideration should be given in the project design to problems that can precipitate from the smooth surface characteristic of the Mule-Hide EPDM membrane.

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 For Commercial Projects

Mule-Hide offers a 10, 15 or 20-year Roofing Membrane Limited Warranty ("Warranty") for a charge. The Warranty covers only the Mule-Hide EPDM membrane (or portion thereof) determined by Mule-Hide to be

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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.

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 not supplied by Mule-Hide 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.

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 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.

Warranty Table I

| Warranty Term | Adhered Membrane System Warranty Options ² | | | | | | |
|----------------------|---|----------------|----------------|----------------|--|------------------------------|--------------|
| | Extended Wind Speed Coverages Available | | | | Minimum Mule-Hide EPDM Membrane Type and Thickness | Additional Membrane Coverage | |
| | 55 mph | 72 or 80 mph | 90 to 100 mph | 110 to 120 mph | | Additional Puncture | Hail |
| 10 or 15 year | √ | √ | √ | √ | 45-mil Standard Reinforced | Yes ⁴ | N/A |
| 10 or 15 year | √ | N/A | N/A | N/A | 45-mil Standard or White On Black | N/A | N/A |
| 20 year ³ | √ | √ | √ | √ | 60-mil Standard Reinforced | Yes ⁴ | See Table II |
| 20 year ³ | √ | √ | √ | √ | 60-mil Standard or White On Black | Yes ⁴ | See Table II |
| 25 year ³ | √ ¹ | √ ¹ | √ ¹ | √ ¹ | 75-mil Standard Reinforced | Yes ⁴ | See Table II |
| 25 year ³ | √ ¹ | √ ¹ | √ ¹ | N/A | 90-mil Standard or White On Black | N/A | See Table II |
| 30 year ³ | √ ¹ | √ ¹ | √ ¹ | √ ¹ | 75-mil Standard Reinforced | Yes ⁴ | See Table II |
| 30 year ³ | √ ¹ | √ ¹ | √ ¹ | N/A | 90-mil Standard or White On Black | N/A | See Table II |

Notes: N/A = Not Acceptable √ = Acceptable

- Bonding Adhesive or EPDM x-23 Low-VOC Bonding Adhesive must be utilized.
- Refer to additional tables for substrate and other requirements to qualify for coverages.
- Refer to Mule-Hide Design Enhancements for warranties of more than 15-year term.
- See Warranty Table II for requirements.

Warranty Table II

| | |
|-----------------------|---|
| Hail Coverage options | 1" Diameter Hail Coverage requires membrane adhered to adhered cover board ¹ |
| | 2" Diameter Hail Coverage requires membrane adhered to adhered cover board ¹ |
| Puncture Coverage | Contact Mule-Hide Technical Department for specific requirements and available coverage |

- Cover board options: Poly ISO 1-HD, DensDeck Prime, or Securock – Adhered in place only

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Warranty Table III

| Insulation/Cover Board & Required Attachment for Assemblies Up to 20 YR Warranty Term | | | | | |
|--|--|---|--|-----------------------|---|
| Peak Gust Wind Speed Warranty ⁹ | Minimum Membrane Underlayment (Mule- Hide Supplied Only) ⁹ | Insulation/Underlayment Attachment ⁹ | | | Metal Edging |
| | | # of Fasteners per 4' x 8' board size ¹ | Adhesive Ribbon Spacing for 4' x 4' size board | | |
| | | | Field | Perimeter /Corner | |
| 55 MPH | 1" (20 psi) Poly ISO 1 or 2 | 16, 24, 32 | 12" ^{4,5} | 6" ⁴ | Mule-Hide Gravel Stop, Skirted Drip Edge, 2-Piece Snap-On Compression, 1-3/4" Fascia Cover ³ |
| | 1-1/2" (20-psi) Poly ISO 1 or 2 | 12, 18, 24 | 12" ^{4,5} | 6" ⁴ | |
| | 2" (20 -psi) Poly ISO 1 or 2 | 8, 12, 16 | 12" ^{4,5} | 6" ⁴ | |
| 72 OR 80 MPH | 1/4" Dens-Deck ² | 12, 18, 24 | 12" ^{4,6} | 6" ^{4,6} | Mule-Hide Gravel Stop ³ , Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ EclipsEdge ³ |
| | 1/4" Securock ² | | | | |
| | 1/2" STRUCTODEK ² | 16, 24, 32 | 6" ^{4,6} | 6" ^{4,6} | |
| | 1/2" Poly ISO 1 or 2-HD ² | | | | |
| | 1-1/2" (20-psi) Poly ISO 1 or 2 | | | | |
| 2" (20 -psi) Poly ISO 1 or 2 | 8, 12, 16 | 6" ^{4,5,6} | 6" ^{4,5,6} | | |
| 90 MPH (10) | 1/2" Dens-Deck (2) | 12, 18, 24 | 6" ^{6,7,8} | 6" ^{6,7,8} | Mule-Hide Gravel Stop ³ , Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ EclipsEdge ³ |
| | 1/2" Securock (2) | | | | |
| | 1/2" Poly ISO 1 or 2-HD (2) | 24, 32, 32 | 6" ^{6,7,8} | 6" ^{6,7,8} | |
| | 1-1/2" Hunter CGF Poly ISO (20 psi) | 16, 24, 32 | 6" ^{5,6,7,8} | 6" ^{5,6,7,8} | |
| | 2" Hunter CGF Poly ISO (20 psi) | 8, 12, 16 | 6" ^{5,6,7,8} | 6" ^{5,6,7,8} | |
| 100 MPH (10) | 5/8" Dens Deck (2) | 16, 24, 32 | 4" | 4" | , Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ EclipsEdge ³ |
| | 5/8" Securock (2) | | | | |
| | 2" Hunter CGF Poly ISO (20 psi) | | | | |
| 110 MPH (10) | 5/8" Dens Deck (2) | 16, 24, 32 | 4" | 4" | Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ EclipsEdge ³ |
| | 5/8" Securock (2) | | | | |
| 120 MPH (10) | 5/8" Dens Deck (2) | 24, 32, 32 | 4" | 4" | Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ EclipsEdge ³ |
| | 5/8" Securock (2) | | | | |

- Order of fasteners required are field, perimeter and corners.
- Cover boards must be installed over a min. 1" thick approved Mule-Hide Insulation.
- Mule-Hide HDP (#14) or EHD (#15) fasteners are required for attachment to perimeter wood nailers.
- Gravel Surface BUR - Field @ 6" OC / Perimeter @ 4" OC
- Steel Decks - Field & Perimeter @ 6" OC Must adhere to top of deck flutes
- Cementitious Wood Fiber - Field @ 6" OC / Perimeter @ 4" OC
- Smooth BUR - Field @ 6" OC / Perimeter @ 4" OC
- Gravel Surface BUR – 4" OC
- See Design Enhancements for term specific requirements.
- Requires use of HDP (#14) or EHD (#15) as insulation fasteners

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Warranty Table IV

| Insulation/Cover Board & Required Attachment for Assemblies with 25 or 30-Year Warranty Term | | | | | |
|---|---|--|--|----------------------|--|
| Peak Gust Wind Speed Warranty | Minimum Membrane Underlayment | Insulation Attachment | | | Metal Edging |
| | | # of Fasteners per 4' x 8' board size (6, 7) | Adhesive Ribbon Spacing for 4' x 4' size board | | |
| | | | Field | Perimeter/ Corner | |
| 55 MPH | 1-1/2" to 2-1/2" (25-psi) Poly ISO 1 or 2 | 16, 24, 32 | 6" ^{2,4} | 6" ^{2,4} | Mule-Hide Gravel Stop, Skirted Drip Edge, 2-Piece Snap-On Compression, 1-3/4" Fascia Cover ³ |
| | 1/2" STRUCTODEK ¹ | | | | |
| | 1/4" Dens-Deck ¹ | | | | |
| | 1/4" Securock ¹ | | | | |
| 72 or 80 MPH | 1-1/2" to 2-1/2" Hunter CGF Poly ISO (25 psi) | 16,24, 32 | 6" ^{2,4,5} | 6" ^{4,5} | Mule-Hide Gravel Stop ³ , Skirted Drip Edge ³ , 2-Piece Snap-On Compression ³ , 1-3/4" Fascia Cover ³ , EclipsEdge ³ |
| | 1/2" Dens-Deck ¹ | | | | |
| | 1/2" Securock ¹ | | | | |
| 90 or 100 MPH | 1/2" Poly ISO (1 or 2)-HD ¹ | 16, 24, 32 | 4" | 4" | EclipsEdge ³ |
| | 5/8" Dens Deck ¹ | | | | |
| | 5/8" Securock ¹ | | | | |

1. Hail coverage offered with substrate.
 2. Structural Concrete - Field @ 12" OC / Perimeter @ 6" OC
 3. Mule-Hide #14HD or #15EHD fasteners are required for attachment to perimeter wood nailers.
 4. Cementitious Wood Fiber & Wood – 4" OC
 5. 80-mph over Gypsum Decks – 4" OC
 6. Order of fasteners required are field, perimeter and corners.
 7. Requires use of HDP (#14) or EDH (#15) as insulation fasteners
- D. Mule-Hide is under no obligation to issue warranties on projects completed prior to submittal of a properly completed Warranty Application to the Mule-Hide Technical Department.
- E. Metal flashing products supplied by Mule-Hide (Mule-Hide Metal Accessories) and installed by a Mule-Hide Warranty Eligible Applicator will be covered under a Standard or Premium System warranty. The finish on the Mule-Hide labeled metal components are covered for a maximum warranty period for up to 25 years independent of the terms of the issued warranty (see the Mule-Hide 25 years Limited Metal Warranty for specific warranty coverage).
- F. Standard and Premium System warranties are not available for residential projects.
- G. EPDM tie-ins are not covered by Mule-Hide warranties.
- H. Contact Mule-Hide Technical Department for other extended warranties that may be available.
- I. 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 EPDM Membrane Roof System are to be products manufactured or supplied by Mule-Hide Products Co., Inc.

- B. Components other than those supplied or manufactured by Mule-Hide may be submitted for review and acceptance by Mule-Hide's Technical Department. Mule-Hide's acceptance of any other product is based solely on chemical compatibility and published performance data provided by the component manufacturer. Other components may be considered on a job-by-job basis and must be approved in writing by Mule-Hide's Technical Department. Mule-Hide offers no warranty or guarantee for the performance or suitability of any component not supplied or manufactured by Mule-Hide.

2.02 Roofing Membrane

- A. The Mule-Hide Standard Black EPDM Membrane is available in 45 mils (.045 inch), 60 mils (.060 inch), or 90 mils (.090 inch) thick. The EPDM membranes are manufactured in accordance with the guidelines established by the RMA (Rubber Manufacturers Association) and meet or exceed the ASTM Standard Specification D4637, Type I. Mule-Hide Standard Black EPDM membranes are Fire Retardant (FR) membranes specially formulated to inhibit spread of flame and meet or exceed code body testing criteria for fire retardant roofing membranes. Mule-Hide Standard Black EPDM membranes are available with in-seam tape that is pre-applied to the sheet. Refer to the Product Data Sheets for physical properties and additional information.
- B. The Mule-Hide Standard Reinforced EPDM Membrane is available in 45 mils (.045 inch), 60 mils (.060 inch), or 75 mils (.075 inch) thick. The Standard Black Reinforced EPDM membrane is polyester reinforced that stands up to tearing, impacts, punctures and normal roof traffic. The membrane is manufactured in accordance with the guidelines established by the RMA (Rubber Manufacturers Association) and meets or exceeds the ASTM Standard Specification D 4637, Type II. Fire retardant (FR) membranes are specially formulated to inhibit spread of flame and meet or exceed code body testing criteria for fire retardant roofing membranes. Mule-Hide reinforced EPDM membranes are available with in-seam tape that is pre-applied to the sheet. Refer to the Product Data Sheets for physical properties and additional information.
- C. Mule-Hide White-on-Black EPDM membranes is available in 60 mils (.060 inch) and 90 mils (.090 inch) thick. The White-on-Black EPDM membranes are manufactured in accordance with the guidelines established by the RMA (Rubber Manufacturers Association) and meet or exceed ASTM Standard Specification D4637, Type I. Mule-Hide White-on-Black EPDM membrane is available with pre-applied in-seam tape. Refer to the Product Data Sheets for physical properties and additional information.

2.03 Accessory Materials

The following Mule-Hide materials must be used to install Mule-Hide Roof Systems. Mule-Hide will not warrant any application where another manufacturer's product is substituted for a Mule-Hide product. **All products listed below are physically and chemically compatible with each other.**

- A. Helix® Max Low-Rise Adhesive, Helix® Max Low-Rise Adhesive 5-Gallon Jug, Helix® Max Low-Rise Adhesive Dual Tank, and Helix® Max Low-Rise Adhesive Dual Cartridge (Helix® Max Low-Rise Adhesive) are a two-component, low-rise, construction grade, polyurethane foam adhesive designed to adhere approved roof insulations, thermal barriers, cover boards and fleece backed single-ply membranes to acceptable substrates. This VOC, CFC, HCFC and solvent free adhesive is quickly and easily applied.
 - 1. Depending on the packaging and delivery option selected, these products can be installed in continuous beads, full spray, or splatter applications. Not all products have the same options so review of the product data sheets is required to ensure proper use.
- B. Helix® Low-Rise Adhesive is a two-component, low-rise, construction grade, polyurethane foam adhesive designed to adhere approved roof insulations, thermal barriers, or cover boards to acceptable substrates, and is available in multiple packaging options; 15 and 50 gallon drums, Dual Tanks, and Dual Cartridges.
- C. Mule-Hide Splice Adhesive – A black or white solvent based, synthetic rubber based (butyl) product designed for splicing EPDM roof membranes and uncured EPDM Flashings. (Maximum warranty term is 10-Years)

- 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 decking materials. Formulated for application with a 1/2" medium nap roller.
- E. Mule-Hide Low-VOC Bonding Adhesive – A high strength solvent-based contact adhesive that allows bonding of EPDM and TPO membrane to various porous and non-porous substrates. It is specially formulated using a blend of VOC exempt and non-exempt solvents to be meet the < 250 gpl VOC content requirements of the OTC Model Rule for Single Ply Roofing Adhesives. Low-VOC Bonding Adhesive is easily applied with a 9" medium nap roller to create a strong bond between the membrane and approved substrate.
- F. Mule-Hide Low-VOC Bonding Adhesive 1168 – A high strength solvent-based contact adhesive that allows bonding of EPDM and TPO membranes to various porous and non-porous substrates. It is specially formulated using a blend of VOC exempt and non-exempt solvents to be meet the < 250 g/l VOC content requirements of the OTC Model Rule for Single Ply Roofing Adhesives.
- G. Mule-Hide Acrylic Water Base Bonding 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"). The product is white in color when wet and is clear when dry. The solids content is approximately 60%, and the overall texture is similar to latex paint.
- H. Aqua Base 120 Bonding Adhesive – A semi pressure-sensitive water-based bonding adhesive that can be used with Mule-Hide EPDM membranes when applied as a two-sided contact adhesive. Aqua Base 120 offers high peel strength with low-VOCs and no strong odors.
- I. AeroWeb Low-VOC Aerosol Contact Adhesive/Primer – A low VOC contact adhesive used to adhere membranes to various substrates, and prime surfaces prior to the application of F5 Air & Vapor Barrier. It features a quick dry time and ease of application from the self-contained pressurized cylinder.
- J. Mule-Hide In-Seam Tape – A black or white, butyl rubber-based adhesive in tape form. The product has been formulated to provide high green strength in both shear and peel. Mule-Hide's In-Seam Tape has a clear, durable poly release film for ease of use.
- K. Mule-Hide Tape Primer – A solvent-based product designed for one-step cleaning and priming of EPDM surfaces to be bonded with In-Seam Tapes, Uncured Flashing Tapes, Cured Cover Tapes, and Pre-Taped membranes.
- L. Mule-Hide Low VOC Primer – A solvent-based product designed for one-step cleaning and priming of EPDM and TPO surfaces to be bonded with In-Seam Tapes, Uncured Flashing Tapes, Cured Cover Tapes, and Pre-Taped membranes. It is a Low VOC product that is ideal for use where environmental concerns are an issue.
- M. Mule-Hide Uncured EPDM Flashing Membrane – A 60-mil thick, self-curing membrane used for flashings in a Mule-Hide EPDM roofing system. Uncured EPDM Flashing Membrane is adhered using Tape Primer and either Splice Adhesive or In-Seam Tape
- N. 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.
- O. Mule-Hide RMS Strips – Available in 6" and 9" widths. The 6" RMS is typically used secure the field membrane at the base of parapets and curbs, eliminating the need for a field seam. The 9" strip is used in the field of the roof for membrane securement on mechanically attached systems.
- P. Mule-Hide Cured EPDM Cover Tape – A nominal 60-mil, cured EPDM membrane strip laminated to

nominal 30-mil cured butyl rubber tape and rolled onto a release liner, for a total nominal thickness of 90-mil. Mule-Hide's Cured Cover Tapes may be used in conjunction with the Mule-Hide Tape Primer to strip gravel stops, drip aprons, seams or batten bars, and can be used to make repairs to cut membrane.

- Q. Mule-Hide Lap Sealant – A one part, black or white elastomeric caulk designed for sealing the exposed edge of field fabricated membrane laps.
- R. Mule-Hide Water Cut-Off -- 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.
- S. Mule-Hide Black One-Part Pourable Sealer - 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.
- T. Mule-Hide Premolded EPDM Pipe Boot – An economical, pre-fabricated flashing designed for single pipe penetrations on single-ply EPDM roofing systems. The premolded pipe boots have a butyl tape ring laminated to the bottom side of the three (3) inch base flange.
- U. Mule-Hide Premolded EPDM T-Joint Patches – 40 mil thick uncured EPDM flashing material laminated to cured butyl rubber tape and rolled onto a poly release liner for a total thickness of 70 mils. Mule-Hide EPDM T-Joint Patches are used to seal field splice joints or a horizontal to vertical transitions of field seams on Mule-Hide EPDM roofing systems.
- V. Mule-Hide Pre-Cut Inside/Outside Corners – 7" x 9" .060 inch thick uncured EPDM flashing material laminated to cured butyl rubber tape and rolled onto a poly release liner providing .090 mils of total thickness. Pre-Cut Inside/Outside Corners are ideal for installing inside and outside corners on Mule-Hide EPDM roofing systems.
- W. Mule-Hide Pre-Taped Walkway Pads - Designed to protect the membrane in areas exposed to repetitive foot traffic. Mule-Hide requires walkways to be installed at all traffic concentration points, such as roof hatches, access door, rooftop ladders, etc. regardless of traffic frequency. Walkways are also required if regular maintenance (once a month or more) is necessary to service rooftop equipment.
- X. Mule-Hide All-Purpose Bar ("A-P Bar") – An extruded aluminum bar, 50 mils (.050") thick, used to terminate adhered reinforced membrane vertical flashings in certain constructions. Mule-Hide A-P Bar may also be used to anchor the field sheet at the base of vertical angle changes.
- W. Mule-Hide Weathered Membrane Cleaner – Used to clean aged EPDM membrane prior to the seaming process. This cleaner helps to loosen and remove dirt and other contaminants from the surface of the EPDM membranes and leaves a suitable surface for application of Tape Primer.
- X. Membrane Fasteners and Plates – Mule-Hide offers a variety of membrane fasteners and plates to meet specific job conditions and substrates.
- Y. Mule-Hide Insulation – Mule-Hide Poly ISO 1 and Poly ISO 2 polyisocyanurate insulation (flat or tapered) is a closed-cell polyisocyanurate foam core laminated to heavy, black (non-asphaltic) glass fiber reinforced felt facers.
- Z. F5 Air & Vapor Barrier – A 40-mil thick composite consisting of 35-mil self-adhering rubberized asphalt membrane laminated to a 5-mil UV resistant poly film with an anti-skid surface which is fully compatible with Helix® Max Adhesive. A white poly film is available for summer time exposure and a black poly film is available for winter time exposure. F5 Air & Vapor Retarder can also function as a temporary roof for up to 120 days. Available in rolls 39" wide by 75' long (244 square feet).

2.04 Related Materials By Others

- A. Wood Nailers

1. Nailers shall be #2 or better lumber. Creosote and asphaltic preservatives are not acceptable. Pressure treated lumber is not required on new construction unless specified by the architect.
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. 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 EPDM membranes, Mule-Hide adhesives, Mule-Hide EPDM flashings and other Mule-Hide accessories.
3. The following insulation boards are acceptable for use with a fully adhered roofing system when a standard warranty is requested:
 - a. Polyisocyanurate insulations having non-asphaltic facers (foil facers are not acceptable) meeting the physical property requirements of Fed. Spec HH-I-1972 and having a minimum compressive resistance of 18 psi. Thickness minimum is 1.0" or greater as required by insulation manufacturer to span steel deck flutes.
 - b. High Density Wood Fiberboard - may be used as an overlay over other insulations. 1/2" thick is the minimum requirement when used as an overlay. Mule-Hide requires a minimum 1-inch thick board when installing directly over steel decks. Wood and concrete decks require a minimum 1/2" thick board. Minimum thicknesses and attachment rates will vary with wind requirements and deck types.
 - c. Poly ISO 1-HD is 1/2" thick, 100 psi 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
 - d. Expanded Polystyrene (EPS). Density of boards must be 1.0 PCF certified minimum and meeting ASTM C578, Type II physical properties. Minimum thickness shall be 1.0 inch. When installing directly over a steel deck the minimum thickness shall be as required by insulation manufacturer to span flutes. An overlay of a minimum 1/2" thick High Density Wood Fiberboard, minimum 1" polyisocyanurate insulation, minimum 1/4" DensDeck, or minimum 1/4" Securock is required. Check local building codes as a layer of gypsum board may be required under the EPS insulation (on steel decks).
 - e. Extruded polystyrene meeting ASTM C578, Types IV, VI or VII physical properties. Minimum thickness shall be 1.0 inch. When installing directly over a steel deck the minimum thickness shall be as required by insulation manufacturer to span flutes. An overlay of a minimum 1/2" thick High Density Wood Fiberboard, minimum 1" polyisocyanurate insulation, minimum 1/4" DensDeck, or minimum 1/4" Securock is required. Check local building codes as a layer of gypsum board may be required under the extruded insulation (on steel decks).
 - f. Perlite Insulation – Perlite is **not** an acceptable top layer insulation. Perlite may only be used as a fill insulation under an approved insulation. The EPDM membrane cannot be adhered directly to perlite insulation.
 - g. DensDeck Prime or Securock - A minimum 1/4" thick layer of Dens Deck Prime or Securock may be used as an overlay over an approved insulation or as a thermal barrier over a combustible deck.

4. State and local building codes should be reviewed regarding the installation of expanded or extruded polystyrene insulation directly over a steel deck.
 5. Insulation manufacturer shall provide its recommendations for use and attachment to the owner with a copy sent to Mule-Hide's Warranty Department. In addition, the insulation manufacturer shall provide a copy of their specific warranty conditions.
 6. Mule-Hide Premium Warranties require the use of the Mule-Hide labeled insulation or insulation by an approved Mule-Hide manufacturer. Use of other insulations may disqualify the project for consideration of the issuance of a Premium Warranty. Contact the Mule-Hide Technical Department for specific requirements.
- C. UL and FM Approved Assemblies
1. Contact Mule-Hide Technical Department for proper insulated assemblies when projects require compliance with UL or FM requirements. The components may change with the slope, deck type and classification requested.
- D. Sheet Metal
1. Metal flashing products supplied by Mule-Hide (Mule-Hide Metal Accessories) and installed by a Mule-Hide Warranty Eligible Contractor will be covered under a Standard or Premium System Warranty.
 2. Metal components such as gravel stops, drip aprons, counterflashings, copings, etc., should be fabricated and installed in accordance ES-1 recommendations and requirements.
 3. Sheet metal components supplied by others are not covered by the Mule-Hide warranties. Contact Mule-Hide's Technical Department for specific requirement.

2.05 Precautions

- A. Consult Material Safety Data Sheets and container labels for specific safety instructions prior to use.
- B. Avoid breathing vapors of solvents, cleaners, primers, sealants and adhesives. Use with adequate ventilation. Avoid prolonged contact of solvents, sealants, cleaners, primers and adhesives with skin. Solvent resistant rubber gloves should always be worn during use.
- C. Do not use Mule-Hide EPDM roofing products near fire or flame. Do not use open flames for drying of surfaces, sealants or adhesives. **Do not smoke near flammable products.**
- D. Do not use oil-based paint on EPDM membranes. Contact Mule-Hide's Technical Department for recommendations for compatible color coatings.
- E. Do not allow muriatic acid (masonry cleaner) to come in direct contact with the Mule-Hide EPDM membranes, flashings or accessories.
- F. Do not allow Mule-Hide EPDM membranes or accessories to come into direct contact with steam or vents that produce temperatures in excess of 180°F.
- G. The Mule-Hide EPDM Roof System may be installed in cold weather provided the adhesives are stored at room temperature until just prior to use and used within 2 hours. Adhesives left in the cold must be returned to room temperature prior to use.
- H. Cover Tapes, Flashing Tapes and In-Seam Tapes may loose tack when exposed to extended temperatures below 40°F for extended periods of time. A heat gun may be used to warm the product. Only apply heat to the EPDM side or the release liner side of In-Seam Tapes. Be careful not to overheat. Hot boxes are the preferred method to warm all tape products.

- I. In cold temperatures when the ambient temperature is near the dew point, condensation may form on the seam cleaner, tape primer and adhesive as the solvents flash off. If condensation occurs, discontinue the application and allow the surface to dry. **Do not attempt to dry the surface with heat guns or torches.** When weather permits apply a new coat of product.

PART 3 - EXECUTION

3.01 General

- A. When installing a Fully Adhered Mule-Hide EPDM Membrane Roofing System in cooler weather, it is recommended that liquids such as solvents, sealants, etc. be stored at warmer temperatures (60°F or more but not exceeding 80°F) until just prior to use in order to facilitate the installation.
- B. When using Acrylic Water Base Bonding Adhesive or Aqua Base 120 Bonding Adhesive, the adhesive must be installed in temperatures of 40°F and rising for 48 consecutive hours to prevent the Acrylic Water Base Bonding Adhesive or Aqua Base 120 from freezing before it fully cures.
- C. Application of the Helix® Max Low-Rise Adhesive shall not proceed during periods of inclement weather. Follow Mule-Hide requirements for application temperatures and humidity levels.
- D. Do not apply Helix® Max Adhesive when surface and/or ambient temperatures are below 25°F.

3.02 Substrate Conditions

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

- 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 the responsibility of the roofing contractor to perform test cuts at each roof area prior to reroofing. The condition of the substrate must be suitable to receive a Fully Adhered Mule-Hide EPDM Roofing System. Wet insulation must be removed and replaced. See Single-Ply Roofing Institute's guidelines for determining wet insulation.
- C. Contact the material manufacturer when the substrate is exposed to excessively high humidity and/or a corrosive environment. Special fasteners (e.g. stainless steel) or details may be required.
- D. A determination must be made regarding the presence or absence of coal tar pitch within the existing roof assembly when considering a recover of the old roof system. The presence of coal tar pitch requires the use of a 6-mil poly slipsheet under the new insulation unless the coal tar pitch is 10 years or older and is separated from the Mule-Hide EPDM membrane by a layer of insulation a minimum of 1-1/2" thick having a minimum "R" value of 5.0. All joints must be butted tightly together or have joints completely taped to prevent volatiles from damaging roof membrane.
- E. It is acceptable to install a Fully Adhered Mule-Hide EPDM Membrane Roofing System over the following deck substrates provided that an acceptable insulation is installed over the substrate as required:
 1. Structural Metal Deck (22-gauge minimum) shall conform to recommendations outlined in Factory Mutual's Loss Prevention Data Sheet 1-28 (requires insulation). Contact Mule-Hide's Warranty Department for attachment requirements for decks less than 22-gauge in thickness. All FM testing is based on attachment to a 22-gauge steel deck.
 2. Structural concrete and pre-cast, pre-stressed concrete (2,500 psi minimum) shall be cured and dry to industry standards and surface shall be smooth and free of moisture or frost. All sharp ridges or

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other projections above the surface shall be removed before roofing. An approved insulation board is recommended. Minimum deck thickness shall be 2 inches with 3 inches preferred due to possible spalling damage that may occur to the underside of the deck when using fasteners for insulation and membrane attachment. Insulation may be attached with Type III or IV hot asphalt, approved adhesive or approved fasteners. The membrane may be adhered directly to structural concrete decks that have been trowel finished and are completely cured (28 day minimum). Gaps in the deck along the perimeter and around penetrations must be sealed along with vertical joints between tilt-up panels, if present, to prevent infiltration of hot humid air and possible moisture contamination resulting from condensation.

3. Lightweight Insulating Concrete Fill and Metal Form Work (minimum 24-gauge) – 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 EPDM Membrane Roofing System after pullout tests have been completed and appropriate fasteners have been selected. Attachment must be through the insulating concrete into the steel or concrete deck. Insulation board is required. Vapor barriers may be required when installing insulation over new decks.
4. Wood Plank (1" minimum) shall conform to Factory Mutual's requirements for Class 1 impregnated decks (insulation is required). FM approved wood decks are a minimum, nominal 2-inch thick, tongue and groove planks.
5. Plywood (15/32" minimum) shall be exterior grade (minimum CDX grade). A layer of an approved insulation is required for reroof applications. On new construction, while insulation board is recommended, adhering directly to the plywood or Oriented Strand Board ("OSB") deck is acceptable if the decking is secured with screws or back-out resistant fasteners. Decks attached with common or cement coated nails or staples shall be covered with an approved insulation. Check with local building code requirements as adhering an EPDM membrane direct to a wood deck may not meet local fire codes.
6. Cementitious Wood Fiber Decks – Certain cementitious wood fiber decks may be acceptable to receive a Fully Adhered Mule-Hide EPDM Membrane Roofing System after pullout tests have been completed and appropriate fasteners have been selected. This deck type requires an acceptable insulation.
7. Gypsum Deck – Shall be cured and dry to manufacturers' and/or industry standards. The surface of the deck shall be smooth and free from ridges and depressions. Certain gypsum concrete decks may be acceptable to receive a Fully Adhered Mule-Hide EPDM Membrane Roofing System after pullout tests have been completed and appropriate attachment methods have been selected. This deck type typically requires an acceptable insulation.
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.

| Helix® Max Substrate Compatibility | | | | | |
|------------------------------------|------------------|--------------------------|-------------------|----------------------------|------------------|
| Insulation/Underlayments | | Roof Decks | | Existing Roofing Materials | |
| Poly ISO 1 & 2 | Yes | Concrete | Yes | Smooth BUR | Yes |
| StructuDek® High Density | Yes | Cellular Lt.Wt. Concrete | Yes ¹⁰ | Gravel BUR | Yes ⁵ |
| Expanded Polystyrene (EPS) | Yes ¹ | NVS Lt.Wt. Concrete | Yes ¹⁰ | Mineral Cap Sheet | Yes |
| Extruded Polystyrene (XPS) | Yes ² | Gypsum | Yes | Granular Modified-Bitumen | Yes |
| New Sprayed Foam | No ⁶ | Cementitious Wood Fiber | Yes | Smooth Modified-Bitumen | Yes |

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FULLY ADHERED EPDM

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| | | | | | |
|-----------------------|-----------------|------------------|------------------|----------------------------|------------------|
| Scarified SPF | No ⁸ | Plywood/OSB | Yes | Coal Tar Pitch | Yes ⁶ |
| DensDeck [®] | Yes | Painted Steel | Yes | Aluminum-Coated BUR | No ⁷ |
| Securock [®] | Yes | Galvanized Steel | Yes ³ | Acrylic-Coated SPF | No ⁸ |
| Oriented Strand Board | Yes | Acoustical Steel | Yes ⁴ | Silicone-Coated SPF | No ⁸ |
| Poly ISO 1HD | Yes | Wood Plank | Yes | Unoxidized (Shiny) Asphalt | Yes ⁹ |

1. Standard EPDM (Non Fleece Back) membrane cannot be installed directly over EPS and requires a suitable overlayment or cover board.
 2. For insulation attachment only, contact Mule-Hide Technical Department for options.
 3. For new galvanized steel decks, power-washing is necessary to remove finishing oil residue if present.
 4. For acoustical steel decks, fill the flutes with fiberglass or other suitable fill insulation and tack in place with strips of duct tape 3' OC, or other adhesive, prior to spraying the deck with Helix[®] Max Adhesive.
 5. A minimum of an approved cover board or insulation is required over properly prepared gravel BUR.
 6. An insulation providing the necessary R-value must be specified to prevent the coal tar pitch from softening.
 7. Aluminum coatings must be removed by power-washing or by physical abrasion prior to the application of Helix[®] Max Adhesive. Adhesion tests are required to confirm sufficient preparation of the substrate.
 8. SPF roofing assemblies may be considered on a job by job basis, contact Mule Hide Technical Department prior to bidding.
 9. Requires AeroWeb for all applications.
 10. Cellular or air-entrained lightweight substrates are acceptable. Lightweight concrete containing expanded aggregate such as perlite or vermiculite is not acceptable. New lightweight concrete must be confirmed by the contractor to be thoroughly dry. Existing substrates will require adhesion tests.
- F. For reroofing projects having plywood decks, a minimum of one layer of an approved insulation is required after the tear-off has been completed.
- G. Mule-Hide recommends that all roof surfaces have a positive slope to provide adequate drainage. There should not be any ponding water 48 hours after a rainfall

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 EPDM 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 EPDM Membrane Roofing System application.
2. Do not permit voids greater than 1/4" wide 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.
3. Specifier or roofing contractor shall determine the condition of the existing roof deck and roofing system. Areas with deteriorated decking, wet insulation or other failed materials shall have those affected materials removed and replaced. Make sure all decking is securely fastened. The roofing contractor has the final responsibility to ensure an acceptable deck is provided to receive the new roof system.
4. Large blisters shall be cut and patched to provide a reasonably level surface.
5. On recover projects, tear off all existing base flashings, cant strips and projection flashings down to the substrate. The flashing substrate shall be dry and free of oil, dirt, grease, sharp edges and debris.
6. Gravel over existing nailers must be totally removed prior to installing new nailers and flashings. Verify that the existing nailers are in good condition and securely anchored to the roof decks.
7. When an additional thickness of insulation is being added, new nailers must be added over existing nailers to match the height of the new insulation. Nailers must be securely anchored to the roof deck

per Section 3.05 of this specification.

8. All roof surfaces shall be free of ponded water, ice, or snow. Significant ponding that remains after a period of 48 hours should be eliminated by either installing tapered insulation to create positive drainage of the roof surface or by installing new drains in the low areas where the ponding remains. Positive drainage shall also eliminate the possibility of excessive live loads caused by ponding water that could cause structural damage or failure.
9. When removing an existing roof during reroofing, remove only that amount of roofing and flashing that can be made watertight with new Mule-Hide EPDM materials in a one-day period or prior to the onset of inclement weather.
10. Recovering over a gravel surfaced BUR system requires the installation of an acceptable insulation. Loose gravel must be removed prior to mechanically attaching a new layer of insulation. All lead pipe and drain flashings shall be removed. As an alternative to mechanical attachment, Helix® Max Low-Rise Adhesive may be used to adhere approved insulations to properly prepared gravel surfaced BUR. Contact Mule-Hide Technical Department for specific information regarding the use of the Helix® Max Low-Rise Adhesive.
11. Recovering over a smooth surfaced BUR and smooth Modified Bitumen roofing systems shall require the installation of an acceptable insulation. All lead pipe and drain flashings shall be removed. Single-ply membranes such as EPDM, Hypalon, PVC or CPA must have all existing flashings removed, the field sheet must be cut up into sections no larger than 10' by 10' and an acceptable layer of insulation shall be mechanically attached over the existing field membrane. As an alternative to mechanical attachment, Helix® Max Low-Rise Adhesive may be used to adhere approved insulations to properly prepared smooth surfaced existing roof surfaces. Contact Mule-Hide Technical Department for specific information regarding the use of the Helix® Max Low-Rise Adhesive over specific roof types.
12. Polyurethane Foam roofing systems ("PUF") are not acceptable for recover applications. The PUF system must be completely removed and new insulation installed prior to the installation of the new EPDM Roofing System.
13. If a Mule-Hide Premium System Warranty is requested, the existing roof system **must be removed to the deck** prior to the installation of the new roofing system or a moisture survey by an independent third party must be taken, all wet areas removed and a copy of the survey submitted to Mule-Hide with the warranty application. In no event shall the Mule-Hide Premium System Warranty cover the existing roof system or problems created by the existing roof system.

3.04 Vapor Retarder (where specified)

- A. 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 (which may be required by local building or energy codes) 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. Vapor retarders 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.
- B. The National Roofing Contractors 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.
- C. Install a vapor retarder over a suitable substrate with all side and end laps and all penetrations sealed in accordance with the manufacturer's instructions. The vapor retarder may be loosely laid or adhered with the manufacturer's recommended adhesive.
- D. In reroofing where the existing built-up roof is to remain, the built-up roof may be an adequate vapor retarder as long as all splits or tears are repaired in order to provide a total barrier to vapor penetration.

- E. Projects utilizing Mule-Hide's F5 Air & Vapor Barrier must follow Mule-Hide's installation instructions and details for the F5 Air & Vapor Barrier.

3.05 Wood Nailers

- A. Wood nailers are required at all roof perimeter edges where metal edging and gutter systems are specified or where indicated in Mule-Hide's published Standard EPDM Details.
- B. Nailers shall be firmly anchored to the decks at a maximum 2'-0" OC 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. The width of the wood nailer shall extend beyond the metal flange to prevent damage to the 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.
- E. Wood nailers with creosote and asphaltic preservatives are not acceptable. Pressure treated lumber is not required on new construction unless specified by the architect.

3.06 Insulation Installation

- A. General
 - 1. Mule-Hide accepted roof insulations shall be installed in accordance with Mule-Hide specifications.
 - 2. Mule-Hide accepted roof insulations shall be secured to the roof deck in accordance with Mule-Hide's requirements.
 - 3. All roof insulation shall be neatly cut to fit around all penetrations and projections with a maximum allowable gap of 1/4-inch.
 - 4. Open joints shall be repaired with like insulation material.
 - 5. Insulation shall be feathered or tapered to provide a minimum sump area of 36" x 36" where possible at all drains. Crickets and saddles may be installed beneath the specified insulation where possible. Crickets and saddles made from non-compatible insulations materials must be overlaid with an acceptable insulation or underlayment.
 - 6. Install no more roof insulation in one day than can be covered with the Mule-Hide EPDM 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 traffic.
 - 8. When installing insulation, the end joints of each row of insulation shall be offset against the previous row. 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 offset.
 - 9. When a Mule-Hide Premium System Warranty is requested, only Mule-Hide labeled insulation may be used unless written approval is obtained, prior to job bid, for an alternative insulation.
 - 10. Insulation other than Mule-Hide labeled insulation must be an FM approved insulation and approved by Mule-Hide for use under the Mule-Hide Fully Adhered EPDM Roofing System. Refer to the

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insulation manufacturers guidelines for the appropriate type, size and thickness of the insulation needed for use over the respective substrate and under the Mule-Hide EPDM Roofing System. Contact Mule-Hide Technical Department prior to bidding the project to determine approved insulations and assemblies.

B. Mechanical Attachment

1. Insulation fastening density will vary based on insulation type, thickness, and required warranty
2. For code compliance, increased fastening density may be required depending upon project wind speed and wind uplift requirement.
3. Mule-Hide's minimum attachment rates shall be as follows:

| Insulation Type or Overlay | Fasteners per 4' x 8' board | | |
|---|-----------------------------|-----------|--------|
| | Field | Perimeter | Corner |
| Approved Polyisocyanurate - Min 2" thick (top layer) | 8 | 12 | 16 |
| Approved Polyisocyanurate - Min 1.5" up to 2" thick | 12 | 18 | 24 |
| Approved Polyisocyanurate - Min 1.0" up to 1.5" thick | 16 | 24 | 32 |
| 1/2" HD Poly-ISO - Installed over Approved Insulation | 16 | 24 | 32 |
| HD Fiberboard - Min 1/2" thick- Installed over Approved Insulation | 16 | 24 | 32 |
| Dens Deck Prime or Securock - Min 1/4" thick - Installed over Approved Insulation | 12 | 18 | 24 |
| OSB - Min 7/16" thick - Installed over Approved Insulation | 17 | 25 | 32 |
| Approved OSB/Polyisocyanurate Composite - Min 2" thick | 17 | 25 | 32 |

Contact Mule-Hide's Technical Department for FM approvals and required attachment rates that are determined by deck type, insulation brand, type and thickness. When using multiple layers of insulation or more than one type of insulation, the number of fasteners required per board is determined by the top layer of insulation.

4. 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:

- a. The minimum width of the perimeter and corner areas shall not be less than eight (8) feet.
- b. See Details MHT-UN-108A and MHT-UN-108B.
- c. **Perimeters** – insulation attachment to be increased 50% over the field attachment requirements with a maximum of one (1) fastener every one (1) square feet.
- d. **Corners** – insulation attachment to be increased 100% over the field attachment requirements with a maximum of one (1) fastener every one (1) square feet.
- e. For Factory Mutual projects, the width of the roof perimeter and corner areas is defined as the smaller of 0.1 times the building lesser plan dimension or 0.4 times the eave height (mean roof height for slopes greater than 2"/12" slope), except for heights greater than 60 feet. The minimum width of the perimeter and corner areas shall not be less than three (3) feet. Contact Mule-Hide Technical Department for Factory Mutual projects exceeding 60 foot heights.

C. Adhesive Attachment

Adhesive attachment substrate preparation

1. The surface to which adhesive is to be applied shall be dry, clean and free of fins, protrusions, sharp edges, loose and foreign materials, oil and grease. Depressions greater than 1/4" (6 mm) shall be filled with Helix® Max Adhesive or other approved patching material. All sharp projections shall be removed. Previously unexposed (shiny) asphalt must be primed with AeroWeb.
2. Seal gaps between the wall/penetration and concrete deck with Mule-Hide F5 Air & Vapor Barrier, FROTH-PAK, or other suitable material, to avoid condensation issues and positive pressure from air infiltration.
3. Apply Helix Max Adhesive when the substrate and ambient temperatures are 25°F or above when spraying or extruding with heated or non-heated equipment. Dispense the adhesive between 300-800 psi depending on the equipment used. Consult Mule-Hide Technical Department for more details.

Adhesive installation

1. Apply Helix Max Adhesive to the substrate.
 - a. For fully adhered applications, spray adhesive to obtain full coverage (approx. 1/8" to 1/4" thick after foaming).
 - b. For bead applications, apply adhesive at 4", 6", or 12" on center with a **minimum 1/2" wide wet bead**. For steel decks, bead attachment of Helix Max Adhesive must run parallel with and be on top of the steel deck flutes.

| Bead Spacing Requirements* | | | | |
|----------------------------|--|--------------|-----------|--------|
| Building Height | Perimeter Width | Bead Spacing | | |
| | | Field | Perimeter | Corner |
| 0-25' | 4 Feet | 12" OC | 6" OC | 6" OC |
| 26'-49' | 8 Feet | 12" OC | 6" OC | 6" OC |
| 50'-74' | 12 Feet | 12" OC | 6" OC | 6" OC |
| 75'-100' | 16 Feet | 12" OC | 6" OC | 6" OC |
| 101' or greater | Contact Mule-Hide Technical Department | | | |

*Spacing parameters are for 10, or 15-year 55-mph warranties: (Contact the Mule-Hide Technical Department for bead spacing on higher mph warranties or 20 and 30-year warranty projects).

2. Factory Mutual bead spacing guidelines in the perimeter and corner may differ from the table above. Beads at 12" OC are not acceptable at perimeters and corners.
3. Allow adhesive to rise and develop "string/body" (approx. 1.5-2 min.). String time will vary based on environmental conditions like temperature and humidity. Do not allow the adhesive to over-cure (lose tack) prior to setting insulation boards.
4. Place insulation boards (maximum 4' x 4'), or cover boards (DensDeck Prime or Securock may be 4' x 8') into adhesive after allowing it to rise and develop "string/body".
5. Designate one person to walk boards into place and then roll the boards between 5-7 minutes from the initial adhesive application. Boards may be temporarily weighted or relief-cut where necessary to keep the boards in constant contact with the adhesive until the adhesive cures.
6. At the beginning of the insulation attachment process and periodically throughout the day, check the adhesion of boards to ensure a tight bond is created and maximum contact is achieved.

CAUTION: Gaps between horizontal and vertical surfaces of the roof area as well as gaps around penetrations must be sealed to prevent interior warm air from infiltrating and condensing within the roofing

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assembly. Condensing moisture could weaken bottom insulation facer and eventually result in dislodgement or loose boards when adhesive is used.

NOTE: Projects utilizing Mule-Hide's F5 Air & Vapor Barrier must comply with Mule-Hide's installation requirements and published details.

3.07 Membrane Installation

A. General

1. Mule-Hide strongly recommends the .060 inch thick EPDM membrane 10' wide and 100' long be used with the Mule-Hide Fully Adhered Roofing System. Sheets wider than 10' will have factory folds that may not relax and lay flat during cold weather that may cause problems while seaming the sheets together. The .045 inch thick EPDM may exhibit wrinkles due to swelling caused by the solvent in the adhesive.
2. Unroll the Mule-Hide EPDM Membrane and position without stretching. Large sheets may be moved into final position by encapsulating air under the membrane and floating it into place. Allow the membrane to relax at least 30 minutes prior to installation. Inspect and remove any damaged membrane. Lap sheets a minimum of 4" for 3" Inseam Tape or 7" for 6" Inseam Tape to allow for a proper field splice. Membrane overlaps shall be shingled with the flow of water. Membrane should run perpendicular to the direction of steel deck flutes and orientation of wood decks where possible.
3. Perimeter - When installing the Mule-Hide Fully Adhered EPDM Roofing membrane system, it is not necessary to install half sheets parallel with the perimeter. Full size sheets should be used everywhere practical to minimize the number of field seams. In place of half sheets, additional fasteners are installed in the insulation in the perimeter areas as defined in 3.06.B Perimeter Enhancements. Perimeter areas shall be determined by one of the following methods:
 - a. Mule-Hide defines the minimum perimeter area as 8' in from the roof edge along all exterior roof edges.
 - b. For Factory Mutual insured buildings, follow guidelines in FM's Loss Prevention Data Sheet 1-29. Contact Mule-Hide Warranty Department for fastener spacing for compliance with FM 1-60 and 1-90 requirements.

3.08 Field Sheet Attachment

Adhesive Options for EPDM Adhered Systems

| Adhesive* | Single Sided (Wet Lay) | Double Sided (Contact) |
|---|------------------------|------------------------|
| Bonding Adhesive | No | Yes |
| Low-VOC Bonding Adhesive | No | Yes |
| Low-VOC Bonding Adhesive 1168 | No | Yes |
| Acrylic Water Based | Yes | No |
| Aqua Base 120 | No | Yes |
| AeroWeb Low-VOC Aerosol Contact Adhesive | No | Yes |
| *Refer to Product Data Sheets for specific installation instructions related to each adhesive option. | | |

A. General

1. Unroll the Mule-Hide EPDM Membrane and position without stretching. Large sheets may be moved into final position by encapsulating air under the membrane and floating it into place. Allow the membrane to relax at least 30 minutes prior to installation. Inspect and remove any damaged membrane. Lap sheets a minimum of 4" for 3" Inseam Tape or 7" for 6" Inseam Tape to allow for a proper field splice. **CAUTION:** Keep the protective packaging of the Mule-Hide Heat-Weld Membrane intact until ready to use

- B. Bonding Adhesive, Low VOC Bonding Adhesive, and Low VOC Bonding Adhesive - 1168 (solvent base), Aqua Base 120
1. After carefully positioning several sheets of the EPDM membrane, one half of the first sheet's length shall be pulled back to expose the bottom side of the sheet. Mule-Hide suggests the fold in the sheet should run parallel with the length of the sheet. Smooth out the sheet to remove any wrinkles.
 2. Mix adhesive scraping the sides and bottom of the can (minimum of 5 minutes is required) until adhesive is uniform in color. Consult Product Data Sheet for adhesive instructions.
 - a. Low VOC Bonding Adhesive and Low VOC Bonding Adhesive 1168 require mechanical stirring (electric drill), both initially and periodically during application.
 3. Using a plastic core, medium nap roller, apply a smooth even coat of Bonding Adhesive to back side of membrane and substrate (no globs or puddles). A nine inch roller will easily fit into a 5-gallon adhesive container. **Do not apply adhesive in area of seam laps.**
 4. Coverage rates for Bonding Adhesive, Low VOC Bonding Adhesive, and 1168 are approximately:

120 square feet per gallon for one surface (membrane or substrate only) \ or
60 square feet per gallon per finished surface (membrane & substrate)
 5. Coverage rate for Aqua Base 120 is approximately:

100-120 square feet per gallon per finished surface (membrane & substrate)
 6. 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 is tacky but does not string when knuckle is lifted. (Aqua base 120 will take a longer time to dry).
 7. Care must be taken to ensure proper drying. Avoid thin areas of adhesive which can result in over drying and improper adhesion.
 7. Wrinkles that transmit through the seams must be cut out and patched using cured sheet.
 8. All seams shall be spliced following the procedures in Section 3.09 of this specification.
 9. The roof membrane shall extend up the vertical surface a minimum of 1" and shall turn down over the edge of the roof a minimum of 2" or as required by the Mule-Hide details.
- B. AeroWeb
1. Connect spray gun to hose and connect hose to cylinder. Use lithium grease or petroleum jelly on all fittings and be careful to avoid cross- threading. Open valve on cylinder to check fittings for leaks. Keep cylinder valve open to maintain pressure in the hose/spray gun when not in use.
 2. AeroWeb can be applied at ambient temperature of 25°F and above. Propellant in cylinders must be kept above 70°F for the product to spray properly. Utilize power-heated blanket, and hot boxes when necessary. Substrate shall be clean, dry, and free of debris and contaminants.
 3. Application shall be continuous and uniform, avoiding globs or puddles.
 4. Spray substrate and back of the membrane with enough overlap to ensure 100% coverage (2"-3" of overlap).
 5. Do not apply adhesive to splice areas.

6. 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.

C. Mule-Hide Acrylic Water Base Bonding Adhesive

1. The Mule-Hide Water Base Bonding Adhesive is an acrylic latex-based adhesive that is white in color and becomes clear when dry. The Water Base Bonding Adhesive is only used for adhering the EPDM membrane to horizontal surfaces. **The Acrylic Water Base Bonding Adhesive may not be used on slopes exceeding 2" per foot and is not acceptable for vertical applications.**
2. The Acrylic Water Base Bonding Adhesive may be used as a single-side adhesive when applying over **porous** surfaces such as high density wood fiberboard, plywood, oriented strand board, wood plank, Dens-Deck or moisture-resistant gypsum board.
3. The single-side application is when the adhesive is only applied to the substrate and the membrane is immediately rolled in place into the white, wet adhesive. Mule-Hide does not recommend applying the adhesive to the membrane in a single-side application as the quantity may not be sufficient to properly bond to the substrate.
4. The recommended minimum application rate is 7 to 10 wet mils in thickness.
5. Unroll the Mule-Hide EPDM Membrane and position without stretching. Large sheets may be moved into final position by encapsulating air under the membrane and floating it into place. Allow the membrane to relax at least 30 minutes prior to installation. Inspect and remove any damaged membrane. Lap sheets a minimum of 4" to allow for a proper field splice. Membrane overlaps shall be shingled with the flow of water. Membrane should run perpendicular to the direction of steel deck flutes and orientation of wood decks where possible.
6. After carefully positioning several sheets of the EPDM membrane, one half of the first sheet's length shall be pulled back to expose the bottom side of the sheet. Smooth out the sheet to remove any wrinkles.
7. A smooth, even coating of Mule-Hide Acrylic Water Base Bonding Adhesive shall be applied to the substrate that will be covered by the first sheet. As the adhesive is being applied to the substrate, the membrane should immediately be rolled into the adhesive while the adhesive is still wet. The coverage rate is approximately 125 to 160 square feet per gallon. The coverage rate will vary with the degree of porosity of the surface being covered.
8. It is recommended that the adhesive be applied to the substrate using a 9" paint roller with a minimum ½" nap solvent-resistant paint roller as it will easily fit into the 5 gallon pails. If the adhesive is sprayed, the adhesive must be rolled with a paint roller immediately after spraying. If the adhesive begins to turn clear, it is too dry and shall require a second coat.
9. Once the sheet has been rolled out, it must be broomed with a large nylon bristled push broom to promote 100% adhesion. Fold back the unadhered half of the sheet and repeat the procedure.
10. Mule-Hide recommends periodically checking the adhesive application rate. Immediately after a sheet has been broomed, gently pull the sheet back 1 to 2 feet and examine the surface of the membrane. A uniform coat of adhesive should be visible on the surface of the membrane. This indicates that a sufficient amount of adhesive was applied and the sheet has been rolled into the adhesive at the right time.

Note: Failure to observe sufficient adhesive on the membrane indicates either a less than sufficient amount of adhesive applied or waiting too long to roll in the membrane. The contractor shall adjust the application accordingly. The porosity of the substrate or climatic conditions may require a heavier coat of adhesive.

11. Install subsequent sheets in the same manner, overlapping the previous sheet a minimum of 3" for the splice area. All sheets must be lapped in shingle fashion.

3.09 Splicing Of Lap Areas

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

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". Mark the bottom sheet with a crayon approximately 1/4" at the edge of the top sheet along the entire splice length as a guide to install the In-Seam Tape. Do not use a chalk line or any type of marker that will prevent the seam tape from sticking.
3. 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.
4. Prepare each surface of the seam by scrubbing the cleaned areas with Mule-Hide Tape Primer using clean Scotch-Brite® pads. Additional cleaning may be required along the factory seams that intersect the seam area to remove excess accumulations of mica. 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. **Do not stir Low-VOC Primer.**

Note: The use of excessive amounts of Mule-Hide Tape Primer will not significantly enhance the adhesion of the Pre-Taped or Taped Product to the EPDM membrane. Use only the amount necessary to obtain 100% coverage of the area where the tape or adhesive will be applied.

5. Allow the Mule-Hide Tape Primer to dry until it does not transfer to a dry finger touch. Prompt installation of the In-Seam Tape or Taped Product as soon as the primer flashes off minimizes potential dust contamination and promotes adhesion in colder weather.
6. Unroll approximately 3' of In-Seam Tape. Align the tape with a marked line and press tape down to bottom sheet using firm, even hand pressure. Continue for the length of the splice. Tape roll ends should be overlapped 1".
7. Allow top sheet to rest on poly backing after application. A minimum of 1/8" to a maximum of 1/2" of tape must extend beyond the splice edge. A continuous piece of In-Seam Tape must be used at all field and factory splice intersections.
8. Peel the poly backing off the tape at a 45 degree 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.
9. 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 Splice Adhesive (Maximum 10-Year warranty)

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. Clean the dry mating surfaces by scrubbing with a clean rag saturated with Weathered Membrane Cleaner to achieve a solid surface color with no dust streaking. Caution: Permeation-resistant gloves (that meet ANSI/ISEA 105-2005) are required. Additional cleaning may be required along the factory seams that intersect the seam area to remove excess accumulations of mica. Rags must be replaced with clean ones as they become dirty. The cleaned membrane should have a uniform black color when dry. There should be no streaks present.
4. Stir Splice Adhesive for five minutes, thoroughly scraping the sides and bottom of the can until a solid, uniform consistency is achieved. No heavier material should be remaining on the bottom or sides of the can. Some lots may contain more thick material on the bottom than other lots. Stirring for five minutes will make the cement smooth and homogenous.
5. Apply Black Splice Adhesive (stirred for 5 minutes) with a ½" medium nap roller to achieve a heavy, smooth and consistent 100% coat without puddles. A small, long-bristle, ½" paint brush must be used in corners and angle changes.
6. 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 3" wide.
7. Check the dryness of the cement before assembly. The Splice Adhesive should be tacky but should not move when pushed with a dry finger (tack and push test). Avoid over-drying! If cement over-dries and is not tacky, recoat with Splice Adhesive.

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 that 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

8. Break the membrane edge free and roll (do not flop) the top sheet onto the mating surface. Use care not to stretch or wrinkle the membrane.
9. Use hand pressure to assemble the splice by wiping toward the splice edge.
10. Roll the seam toward the splice edge with a 2" hand roller.
11. Apply Lap Sealant per current specifications and details.
12. All "T-joint" laps in the field membrane shall be reinforced with a 6" piece of Uncured EPDM Flashing Tape membrane centered over the intersection of the edges of the seams. All "T-joint" patches shall be caulked with Lap Sealant.
13. Field seams and flashings should be allowed to set for 2 hours prior to the application of Lap Sealant. At the latest, Lap Sealant should be applied to all seam edges at 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.

Note: Mule-Hide limits all Standard and Premium system warranties on projects using Splice Adhesive to a maximum of 10-years, regardless of membrane thickness or seam width.

- 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.

3.10 Additional Membrane Securement (Base Attachment)

- A. Additional securement of the EPDM membrane by mechanical attachment must be provided at the perimeter of each roof level, base of walls, curbs, skylights, expansion joints, tie-ins, interior walls, bottom of valleys and any angle changes that exceed inclines of 2:12 (2" rise in 12") and various penetrations as shown in the Mule-Hide Standard Details. All securement must be either horizontally to the roof deck or vertically to the base of the various penetrations as shown in the Mule-Hide Standard Details.
- B. The mechanical attachment of the membrane may be achieved by the following methods:
 - 1. 2.4" Seam Plate and appropriate fasteners through the membrane (**reinforced EPDM membrane only**)
 - a. The 2.4" Seam Plate and appropriate fasteners are placed with the edge of the Seam Plate approximately ½" away from the angle change. Seam Plates may be placed either horizontally or vertically depending on the conditions encountered. Refer to the Mule-Hide EPDM Standard Details for proper placement
 - 2. Mule-Hide All Purpose Bar
 - a. The Mule-Hide All Purpose Bar is a specially extruded aluminum bar that has pre-punched holes 6 inches on center. The bar may be placed either horizontally or vertically depending on the detail followed. Refer to the Mule-Hide Standard Details for the proper placement of the bar.
 - b. The maximum spacing of the fasteners shall not exceed 12 inches on center. Adjoining bars should be spaced approximately ½ inch to 1 inch apart. All bars must be attached at the ends a maximum of 1 inch from the end of each bar. This may require pre-drilling additional holes. All cut bars shall be deburred.
 - c. Under no circumstances shall the All Purpose Bar be stripped with 6 inch uncured flashing or uncured flashing tape. Mule-Hide allows only the use of Cured Cover Tape or cured field sheet to strip over the All Purpose Bar.
 - d. The All Purpose Bar must be installed a minimum of 3 inches to a maximum of 6 inches from inside and outside corners.
 - 3. Mule-Hide RMS (Reinforced Membrane Strip) attachment strip
 - a. The RMS is a 6" wide reinforced strip of EPDM membrane that may be installed at the base of walls and curbs. Mule-Hide 2.4 inch seam plates are used to attach the RMS either horizontally or vertically with appropriate fasteners. Refer to Mule-Hide EPDM Standard Details for appropriate placement of the RMS, plates and fasteners. The RMS is installed prior to the placement of the field sheet.

- b. Follow the standard procedures for cleaning and splicing the RMS and field sheet. Use Mule-Hide Tape Primer to prepare the membrane surface when using the pre-taped RMS.
 - c. Spacing of the fasteners shall not exceed 12 inches on center. Adjoining RMS strips shall be spaced a maximum of 1 inch apart. It is not required to overlap the RMS.
 - d. For vertical attachment, the RMS membrane must extend a minimum of 3 inches onto the horizontal surface (roof substrate). Installation of the plates must be a minimum of 6 inches to a maximum of 9 inches from the inside and outside corners.
 - e. For horizontal attachment, the membrane must be placed a maximum of 1/2 inch from the base of the angle change extending out onto the horizontal surface (roof substrate). The Seam Plates must be placed a minimum of 1/2 inch to a maximum of 1 inch from the exterior edge of the strip. Refer to EPDM Standard Details for proper placement. Installation of the plates must be a minimum of 6 inches to a maximum of 9 inches from the inside and outside corners.
4. Drip Apron and Gravel Stop
- a. For drip aprons and gravel stops, the metal flange shall extend a minimum of 3 inches onto the wood nailer. The wood nailer must be wider than the metal flange. Approved screw fasteners shall be installed a maximum of 6 inches on center and 1/2" to 3/4" from the inside edge of the metal flange. Ring shank nails spaced a maximum 4" on center may also be used.
 - b. All drip aprons and gravel stops shall primed with Tape Primer and stripped with Cured Cover Tape. Cleaning the metal with Weathered Membrane Cleaner to remove oil film may be required prior to installing and priming with the Mule-Hide Tape Primer.
 - c. The edge of the Cured Cover Tape overlapping the metal flange shall be caulked with Lap Sealant. For those areas where water flows over the drip apron, both sides of the Cured Cover Tape must be caulked.

3.11 Flashing Installation

A. EPDM Membrane Flashings

1. All membrane flashings are to be installed concurrently with the roof membrane as the project progresses. Temporary flashings are not allowed without prior written approval from the Mule-Hide Technical 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 surfaces to be fully adhered should be compatible, dry and smooth with no excessive surface roughness.
3. On recover projects, tear off all existing base flashings, cant strips and projection flashings down to the substrate. If deteriorated areas of substrate are uncovered, repairs must be made to provide a suitable substrate for the new EPDM flashings.
4. All walls, parapets, curbs and penetrations shall be flashed with cured EPDM membrane where possible. The use of uncured EPDM flashing or Uncured Flashing Tape shall be limited to those areas such as corners, pipes, scuppers, patches over "T-joints", patches at the base of all vertical field seams (at the angle change) and other shaped penetrations that require the flashing to be molded and cured product is not practical.

B. Adhesive Options for wall flashings

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| Adhesive* | Single Sided (Wet Lay) | Double Sided (Contact) |
|---|---------------------------|---------------------------|
| Bonding Adhesive | No | Yes |
| Low-VOC Bonding Adhesive | No | Yes |
| Low-VOC Bonding Adhesive 1168 | No | Yes |
| Acrylic Water Based Bonding Adhesive | No | No |
| Aqua Base 120 | No | Yes |
| AeroWeb Low-VOC Aerosol Contact Adhesive | No | Yes |
| *Refer to Product Data Sheets for specific installation instructions related to each adhesive option. | | |

Note: Mule-Hide's Water Base Adhesive is not permitted for use on vertical surfaces.

- C. Bonding Adhesive, Low-VOC Bonding Adhesive, and Low VOC Bonding Adhesive 1168 (solvent base)
- Mix adhesive scraping the sides and bottom of the can (minimum 5 minutes is required) until adhesive is uniform in color. Consult product data sheet for adhesive instructions.
 - Low VOC Bonding Adhesive and Low VOC Bonding Adhesive – 1168 require mechanical stirring (electric drill), both initially and periodically during application.
 - Porous surfaces and substrates may require the application of a prime coat and second coat of Low VOC Bonding Adhesive and Low VOC Bonding Adhesive – 1168 to accomplish proper adhesion.
 - Using a plastic core, medium nap roller, apply a smooth even coat of Bonding Adhesive to back side of membrane and substrate (no globs or puddles). A nine inch roller will easily fit into a 5-gallon adhesive container. **Do not apply adhesive in area of seam laps.**
 - 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)
 - 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 is tacky but does not string when knuckle is lifted.
 - Care must be taken to ensure proper drying. Avoid thin layers of adhesive which can result in over drying and improper adhesion.
 - Roll coated membrane onto substrate being careful to not wrinkle the sheet or trap air bubbles. Once membrane is mated 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.
 - Areas of the flashings and membrane to be spliced are not to have Bonding Adhesive applied to them.**
 - 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 solvents.
 - Overlap all adjacent flashing sheets a minimum of 4" for 3" In-Seam Tape or 7" for 6" In-Seam Tape. When RMS is not used, EPDM Membrane Flashings shall extend a minimum of 6 inches onto the field sheet and be adhered securely. There shall be a minimum of 3" or 7" for inches between the front of the fastener plates and the edge of the sheet, depending on the width of the In-Seam Tape being used.
 - All flashings shall be extended a minimum of 8 inches above roof membrane level and be terminated

unless previously accepted by the owner or his representative and the Mule-Hide Technical Department. Refer to Mule-Hide EPDM Standard Details for more information.

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

11. All flashings shall be properly terminated according to Mule-Hide's published Standard Details

D. Refer to Section 3.08 B for AeroWeb application instructions.

E. Aqua Base 120 Bonding Adhesive

1. Mix adhesive scraping the sides and bottom of the can (minimum 5 minutes is required) until adhesive is uniform in color. Consult product data sheet for adhesive instructions.
2. Using a 9" wide, 1/4" or 3/8" nap roller, apply a smooth even coat of Aqua Base 120 adhesive to back side of membrane and substrate (no globs or puddles). A nine inch roller will easily fit into a 5-gallon adhesive container. **Do not apply adhesive in area of seam laps.**
3. Coverage rate to be approximately:

240 square feet per gallon for one surface (membrane or substrate only) or
120 square feet per gallon per finished surface (membrane and substrate)
4. Allow adhesive to dry until it turns translucent and does not transfer to a dry finger or pull away from the substrate. Aqua Base 120 adhesive will take a longer time to dry. Adhesive must remain tacky.
5. 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.
6. **Do not apply adhesive in area to be spliced.**
7. 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.
8. Overlap all adjacent flashing sheets a minimum of 4" for 3" In-Seam Tape or 7" for 6" In-Seam Tape. When RMS is not used, EPDM Membrane Flashings shall extend a minimum of 6 inches onto the field sheet and be adhered securely. There shall be a minimum of 3" or 7" for inches between the front of the fastener plates and the edge of the sheet, depending on the width of the In-Seam Tape being used.
9. All flashings shall be extended a minimum of 8 inches above roof membrane level and be terminated unless previously accepted by the owner or his representative and the Mule-Hide Technical Department. Refer to Mule-Hide EPDM Standard Details for more information.

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

10. All flashings shall be properly terminated according to Mule-Hide's published Standard Details.

3.12 Pipes, Drains, Expansion Joints, Pitch Pans

A. Pipe Flashings.

1. Single pipe penetrations may be flashed with Mule-Hide pre-molded pipe boots where possible. Where a boot cannot be used, Mule-Hide's Uncured Flashing or Uncured Flashing Tape may be

used. Pre-molded pipe boots cannot be cut and patched to wrap around a pipe.

2. For recover applications, existing flashings (including lead) must be removed.
3. Hot pipes exceeding 180 degrees shall require the installation of an insulated cold collar (sleeve) to which the flashings may be adhered. Cold collars require the use of rain hoods to prevent leakage.

B. Roof Drains

1. All existing roofing materials and metal flashings shall be removed.
2. Prepare the surface around each drain to prevent any distortion, tenting, or bridging of the membrane. A smooth transition shall be provided from the roof surface to the surface of the drain bowl/clamping ring.
3. Do not run field seams through drains or sumps. If sheet layout causes a seam to fall in line with a drain, a target patch (minimum 36" x 36") shall be required.
4. Mule-Hide requires the application of one full tube of Water Cut-Off Mastic per drain applied to the drain bowl, under the membrane, where the clamping ring will be seated. This will provide a continuous seal between the membrane and the drain bowl.

C. Expansion Joints

1. Refer to Mule-Hide's published Standard EPDM Details for application methods for flashing expansion joints.

3.13 Walkway Installation

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

A. Pre-Taped Walkway Pad Installation

1. Install EPDM Walkway Rolls over clean, dry surfaces.
2. Layout areas where EPDM Walkway Pads are 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". Do not install walkway pads over seams or flashings.
3. Apply tape primer with a clean Scotch-Brite pad. Scrub the area of the membrane (where the Walkway Pad is to be applied) in a circular motion to achieve a thin, even coating on the membrane. The properly cleaned/primed area will be uniform in color without streaks and free of globs or puddles.
4. Allow the primer to properly flash off until it does not transfer to a dry finger touch. Install the Walkway Pads as soon as the primer flashes off to minimize potential dust contamination and promote adhesion in colder weather.

B. Precast Pavers

1. Install precast paver systems acceptable to Mule-Hide over one layer of 6 oz. HP Protection Mat or other acceptable slip sheet material.
2. A sheet of EPDM membrane may be used as a protection layer under the precast pavers.
3. Set precast pavers so that they do not cover field seams.

3.14 Temporary Night Seals

- 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 EPDM membrane to the deck or existing membrane. Use a heavy application of roof cement at least six inches in width overlaid with an embedded reinforcement on gravel surfaced roofs. Use polyurethane sealant, low rise foam adhesive, or pourable sealer to seal onto single plies, smooth BUR, or modified bitumen roofs. 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.

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 Technical Department or check the Mule-Hide website (www.mulehide.com) for the latest updates regarding changes or modifications to this specification.