

Mule-Hide Products Co., Inc.
Design Guide
Mule-Hide EPDM Roofing Systems

1.01 System Selection Guide

Mule-Hide EPDM Roofing Systems may be selected for many commercial and industrial roofing applications. The choice of system is left up to the specifier, however, there are certain guidelines that should be followed in order to assure that the system chosen is appropriate. The following list of systems and their applicability is meant to be a guide in the proper system selection.

- A. Mule-Hide Ballasted Systems are meant to be used where the slope of the deck will not exceed a 2:12 pitch. They may be installed up to a height of 60 ft. in FM Zones 1 or 2. See FM Loss Prevention Data Sheet 1-28. CAUTION! The specifier must ensure that the deck is capable of withstanding the weight of this system.
- B. Mule-Hide Fully Adhered Systems are not limited by slope. They may be installed up to a height of 100 ft. in FM Zones 1 or 2. See FM Loss Prevention Data Sheet 1-28. A minimum fastener pullout of 360 lbs. is required.
- C. Mule-Hide Mechanically Attached Systems are limited to decks where the slope will not exceed 18:12 pitch. They may be installed up to a height of 60 ft. in FM Zones 1 or 2. See FM Loss Prevention Data Sheet 1-28. A minimum fastener pullout of 360 lbs. is required.

NOTE: Should any of the building parameters fall outside of those listed above, contact Mule-Hide's Technical Department for special consideration.

1.02 System Limitations

- A. Should any of the following conditions exist, Mule-Hide EPDM Systems are not recommended and should not be used. The systems are not warrantable under the following conditions.
 - 1. The structure is unable to support the completed roofing system and other anticipated loads identified by the owner's engineer or architect.
 - 2. The roofing surface will be used for something other than normal commercial roofing conditions, such as plaza decks, waterproofing, or other non-roofing uses or activities.
- B. To ensure that the minimum requirements are met for a Mule-Hide Warranty, Mule-Hide Roofing Systems should not be installed without first consulting Mule-Hide's Technical Department for special consideration if any of the following conditions exist:
 - 1. For Mechanically Attached and Ballasted Systems, the building height exceeds 60 ft.
 - 2. For an Adhered System, the building height exceeds 100 ft.
 - 3. Building is located within 1500 ft. of a coastline or large body of water.
 - 4. Roof is within an area classified as Zone 3 by FM Loss Prevention Sheet 1-28.
 - 5. Roof will be subject to discharge of chemicals or industrial contaminants.
 - 6. Roof will be subject to positive pressure from air infiltration of the deck from

canopies, overhangs, or positive interior pressure from air handlers.

7. Buildings have large openings (in excess of 10% of wall area of any side) in the wall, which could cause positive pressure to occur if they were left open to strong wind, such as aircraft hangers warehouses, loading terminals and large maintenance facilities.
8. Building will be refrigerated, a freezer or have a high interior humidity such as swimming pool or produce storage area.
9. The Roofing System must have specific code approvals or meet specific regulations. These might be UL or FM approvals and State and Local building codes.

1.03 Roof Deck/Substrate Criteria

- A. Providing a suitable surface to receive the Mule-Hide Roofing Systems is the responsibility of the General Contractor or building owner. Prior to installation of the Roofing System the Roofing Contractor must accept the surface. Do not proceed with the roofing if there is any doubt as to the acceptability of the substrate. Contact Mule-Hide's Technical Department for recommendations.
- B. Thermal barriers may be necessary to meet local building code requirements.
- C. The following is a table of substrate requirements for Mule-Hide Products Co., Inc. Roofing Systems:

Table of Substrates

Substrate Type	Ballasted System	Adhered System	Mechanically Attached System
Steel (Min. 22 Ga.)	Insulation Required	Insulation Required	Insulation Required
Structural Concrete (Min. 3000 psi)	Insulation Required	Insulation Required (7)	Insulation Required (1)
Wood Plank (3/4" Min. thickness) (2)	Insulation Required	Insulation Required	Insulation Required
Plywood (Min. 15/16" APA grade CDX) (2)	Insulation Required	Insulation Required (4)	Insulation Required
Oriented Strand board (Min. 7/16") (2)	Insulation Required	Insulation Required (3) (4)	Insulation Required
Gypsum	Insulation required	Insulation Required	Insulation Required
Cementitious Wood Fiber	Insulation Required	Insulation Required	Insulation Required
Lightweight Concrete	Insulation Required	Insulation Required	Insulation Required

Existing Smooth Surface Built-up Roofs	Insulation Required	Insulation Required	Insulation Required
Coal Tar Pitch or Gravel Surface BUR (5)	Insulation Required	Insulation Required	Insulation Required
Sprayed-in-Place Urethane	Tear-off Required	Tear-off Required	Tear-off Required
Removed Existing Roof to Deck (6)	Insulation Required	Insulation Required	Insulation Required

Notes:

1. A protective mat acceptable to Mule-Hide Products Co., Inc. may be used in lieu of rigid insulation, provided that prior written approval is obtained from Mule-Hide's Technical Department.
2. Fire Treated material may be used, provided that it has not been treated with ammonium phosphates.
3. Oriented Strand Board (OSB) must be an APA rated OSB, non-veneer that utilizes a phenolic resin binder.
4. A .060" EPDM membrane may be adhered directly over this product provided that it is clean, smooth, dry and free of sharp edges, fins, splinters, or contaminants such as oil and grease that may damage the membrane. The decking must be properly fastened with an acceptable screw or rink shank flooring nail.
5. Loose gravel must be removed to prevent moisture entrapment.
6. Follow all laws, regulations and procedures to identify and properly remove and dispose of asbestos materials, which are to be torn off.
7. If the concrete is trowel finished and free of rough or sharp ridges, and the surface is clean, clear of all debris and contaminants that may harm the membrane or cause loss of adhesion of the Mule-Hide Bonding Adhesive, a .060-inch thick EPDM membrane may be fully adhered directly to the poured structural concrete. New concrete must cure a minimum of 28 days. Only the Mule-Hide Bonding Adhesive (solvent based) may be used.

1.04 Roof Drainage

- A. Positive drainage of minimum 1/4" per ft. is recommended by Mule-Hide Products Co., Inc. to provide adequate drainage. Adequate drainage will assure the long-term performance of the roofing system and eliminate the ponding of water, which might cause the dynamic design load to be exceeded. Ponding water is defined as water that remains on the roof in excess of 48 hours after a precipitation.

1.05 Roof Expansion Joints

- A. Expansion joints shall be located where necessary to accommodate structural and thermal movement.

- B. The need and placement of expansion joints should be determined by an Architect or Engineer. Expansion joints should be considered whenever the following circumstances exist:
1. There is a construction joint in the structure.
 2. Movement between the roof and the wall is anticipated.
 3. Structural framing elements change direction (joists, purlins, deck).
 4. An addition is connected to an existing building.
 5. Different types of decking abut each other, such as concrete and steel.

1.06 Wood Nailers and Blocking

- A. Where wood blocking is required, Mule-Hide Products Co., Inc. recommends the use of lumber that has been pressure treated (i.e. Wolmanized or Osmostose K-33) and kiln dried.
- B. Wood nailers and blocking shall be fastened to withstand a minimum force of 200 lbs. per linear foot in any direction. Refer to current FM Loss Prevention Bulletin 1-49.
- C. Wood nailers must match the insulation height and are required at the following locations:
1. At all roof edges.
 2. At sheet metal attachment points (sheet metal shall be totally supported by wood blocking).
 3. Beneath metal equipment curbs, unless they are fastened directly to the deck.
 4. At pitch pockets that are in excess of 12" square.

NOTE: Wood nailers are not required at the base of parapet walls or other walls, unless they are needed for the attachment of sheet metal.

1.07 Vapor Retarders

- A. Specific climate and humidity conditions may require the use of a vapor retarder. It is the sole responsibility of the design professional to determine the need for a vapor retarder, its type and location in the roofing system.
- B. The need for a vapor retarder should be investigated whenever the following circumstances exist:
1. The average January outside air temperature is below 40 degrees and the average inside winter humidity will be 45% or greater.
 2. The building usage will be such that there is a high interior humidity (swimming pools, food processing and other wet process plant operations).

3. Construction products will be used that will release moisture after the roof has been installed (e. interior concrete and plaster, poured in place roof decks and fills, fuel burning heaters etc.).
- C. Consult the NRCA Roofing and Waterproofing Manual for recommendations when considering the inclusion of a vapor barrier in the roofing system.

1.08 Insulation

- A. There are certain minimum insulation requirements and product limitations for the different types of insulations that must be considered when specifying a roofing system. Consult the Insulation Guideline section of this manual as a guide to making the proper choices for each Mule-Hide Roofing System.

1.09 Fasteners and Insulation Attachment

- A. The type of Mule-Hide fastener and the proper fastening pattern that is appropriate for each roof is dependant on the type of deck, pullout values, wind zone area, building height and ground roughness. Consult the Insulation Guideline section and the Fastener Guideline section of this manual as a guide to selecting the proper fasteners and fastener patterns.

1.10 Non Fastener Insulation Attachment

- A. Adhering insulation to certain substrates with Type III or IV asphalt or other types of adhesives specifically designed for this use may be accepted on a job to job basis, providing that prior written approval is obtained from Mule-Hide Products Technical Department. The Technical Department may require documentation from the various manufacturers stating the proper procedures and suitability of their products for the intended use.
- B. Mule-Hide does not manufacturer or supply asphalt for the purpose of adhering insulation to concrete decks and has no control over the quality of the product used. Mule-Hide does not warrant the attachment of the insulation when adhered to the substrate with asphalt.

1.11 Walkways

- A. Walkways should be provided in areas where routine rooftop maintenance occurs and in areas where regular rooftop traffic is expected. This should include but is not limited to all roof access points such as doors, hatches and ladders and around rooftop mechanical equipment.
- B. Mule-Hide recommends the use of rubber walk pads as they may be adhered directly to the roof surface. Do not install walk pads over field seams or flashings.
- C. When using masonry paver blocks as walkways, a protection membrane must be installed prior to the pavers. EPDM membrane or a polyester slipsheet are acceptable for use as a protection membrane.

1.12 Warranties

- A. Mule-Hide Products Co., Inc. offers several warranties for commercial roofing systems. Refer to the Warranty Information section of this manual see the different warranties

available, and any special requirements for their issuance.

- B. Only Mule-Hide Warranty Eligible Contractors may apply for Mule-Hide Standard and Premium warranties.

End Of Section