



# **SPEC MANUAL**

## B.U.R., MODIFIED & SHINGLE ROOFING SYSTEMS

### **Chapter 1**

### General Requirements

## 1.1 RESPONSIBILITIES

### 1.1.1 MANUFACTURER

Malarkey Roofing Products® responsibility in the construction process is to provide quality materials that perform under anticipated conditions.

The design and construction of buildings are best left to the owner, architect, and building constructor.

Malarkey's long and detailed experience in the production of roofing materials has allowed us to accumulate considerable expertise in the design of roof coverings and systems.

The purpose of this manual is to provide information regarding our products and how they should be applied.

Some of the information contained herein may be inappropriate for your project. If a user is in doubt about the usefulness of some information, its applicability to a specific building, or if unusual sub-systems or configurations are contemplated, contact Malarkey to assist in evaluating particular needs. The services of our Technical Services Department and field representatives are provided without charge.

Any review of plans or specifications is made with the sole intent to assist the designer.

Occupancy usage, tenant improvements, or negligence in either original construction of the building or subsequent usage may render well-intended recommendations and suggestions inappropriate.

Malarkey specifically disclaims any responsibility for the adequacy of building design.

### 1.1.2 ROOFING CONTRACTOR

It is the roofing applicator's responsibility to purchase quality materials and apply them in a professional manner. Any of the Malarkey roofing systems contained in this manual or products manufactured by Malarkey are to be used in strict accordance with the requirements of this manual, adopted building code, and good roofing practice. The contractor must also comply with all regulatory requirements, governmental requirements, and contract documents.

### 1.1.3 ARCHITECTS, SPECIFIERS, CONSULTANTS, DESIGN PROFESSIONALS

The responsibility of design professionals is to provide the vision and services to the owner that will result in an attractive and functional building.

### 1.1.4 GENERAL CONTRACTOR

Organizing and coordinating the construction process is an elemental and indispensable part of building a structure. Selecting and auditing the work of the team

members who provide the various sub-systems to conform to the owner's desire and the designer's concept is a significant responsibility.

## 1.2 GENERAL SPECIFICATION REQUIREMENTS

These general requirements shall be considered a part of the specification for any roof system utilizing Malarkey products. All parties should avail themselves of the information contained within this manual to assist them in the execution of their responsibilities.

## 1.3 GENERAL DESIGN CONSIDERATIONS

### 1.3.1 OCCUPANCY AND INTENDED USES OF THE BUILDING

Materials must be first quality and properly installed to comply with design and these requirements.

Existing materials or surface conditions must be in good repair.

Roofing shall not be applied under adverse environmental or working conditions that prevent the proper application of materials.

Substrates to which roofing systems are applied must be of sufficient strength, rigidity, and integrity to support the weight of the roofing, environmental forces, and transient loads imposed during construction.

Prior to application of roofing materials, the substrate must be dry, free of significant irregularities in plane, and provide sufficient slope to avoid ponding water on the surface of the roof.

For new construction, all of the substrate and supporting components for the area to be roofed must be completed. All roof-mounted equipment should be installed, and all penetrations through the roof completed.

Abandoned equipment and penetrations on existing roofs shall be removed or eliminated.

The amount of above-roof-deck insulation needed or required and the need for, and effectiveness of, a vapor retarder, is part of the designer's responsibility.

Consideration of occupancy and interior processes, as well as geographical location, must be a part of the design process.

## 1.4 ROOF DECK REQUIREMENTS

### 1.4.1 SLOPE AND DRAINAGE: NEW CONSTRUCTION OF LOW SLOPE ROOFS

Roof decking will be designed with a slope (amount of rise to roof span) that allows accumulated water to drain off the roofing membrane surface. The decision on the correct amount of roof slope should take into

consideration the location of drains, rooftop equipment, wall placement, and other factors.

Building designers should consider a slope of a least ¼" in 12" (6 mm in 305 mm) to allow positive drainage of water from the roof surface. This recommendation is the industry standard for low slope roofing systems and is best accomplished during the framing of the roof decking.

Malarkey’s acceptance of a roof deck as satisfactory to receive a built-up roof refers to the condition of the deck surface. Structural acceptance and the integrity of the deck will be the responsibility of the architect or engineer. Malarkey reserves the right to accept or reject decks as suitable for the application of its roofing systems.

Requisite slope can be achieved after the roof decking has been installed by adding a tapered insulated system. Contact Malarkey for information on the types of available products that are approved for use with our various roofing systems.

**1.4.2 LOW SLOPE MEMBRANE INSTALLATIONS WITH SLOPES 1" (25 MM) OR GREATER**

These installations require membranes be installed parallel to roof slope with additional fastening to prevent slippage of the roofing system.

Low slope membrane installations with slopes 1" (25 mm) or greater require the use of ASTM D312 Type IV asphalt. (Membranes on slopes 3" (76 mm) or greater are torch-applied.)

Insulated roof decks (roof decks with above-deck rigid roof insulation) require the installation of pressure treated wood nailers (or insulation stops) a minimum of 3½" (89 mm) wide and the same thickness as the insulation.

Wood nailers/insulation stops are to be fastened into structural members or roof deck to provide adequate holding power to keep the roofing system attached as required by the building designer and adopted building code requirements.

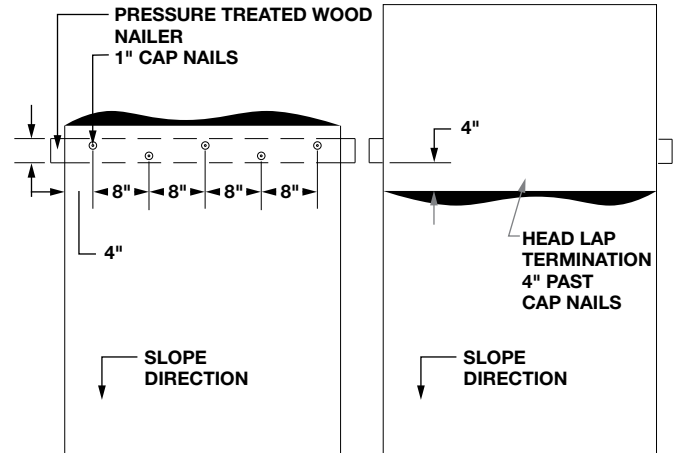
Nailers/insulation stops should be spaced and attached perpendicular to roof slopes. Spacing is as follows; *see Figure 1*.

**FIGURE 1**

ROOF SLOPE	NAILER SPACING
1" - 2"	EVERY 16' - 20'
2" - 3"	EVERY 8'
> 3"	EVERY 4'

Head lap termination of the cap sheet surfacing is shown in *Figure 2* and at all nailers/insulation stops. (*See elsewhere in this manual, Low Slope Roofing Installation Instructions / Low Slope Membrane Installation with Slopes 1" or Greater.*)

**FIGURE 2**



**1.4.2.1 ALTERNATE FASTENING METHOD FOR LOW SLOPE MEMBRANE INSTALLATIONS WITH SLOPES 1" (25 MM) OR GREATER**

Securement of the system may also be achieved by attaching screws and plates in the end lap of the cap sheet as described in the last paragraph of the *Low Slope Roofing Installation Instructions / Low Slope Membrane Installation with Slopes 1" or Greater.*

**1.4.3 ALL OTHER BUILDINGS**

Existing buildings should have a slope (amount of rise to roof span) to allow accumulated water to drain off the roofing surface. Buildings with roofing systems to be recovered, or completely removed and replaced, should be evaluated to determine if roof slope is built into the roof decking or the result of a tapered or sloped insulation system.

**1.5 ROOF DECKS**

**1.5.1 PLYWOOD/OSB (ORIENTED STRAND BOARD)**

Plywood decks are to be composed of panels made of thin wood layers and/or veneers peeled from logs. The layers are laid in right angles to each other and glued together using heat and pressure. The number of cross-laminated layers will vary depending on the thickness of the plywood.

OSB decking consists of panels made from layers compressed, glued wood strands. These strands are oriented at right angles to one another before being glued and formed into panels.

Designers should research and specify the correct thickness of the plywood/OSB deck based upon the amount of roof load (rooftop equipment, weight of roofing materials, and desired performance, etc.) and adopted building code to ensure structural compliance and integrity.

Plywood/OSB panels used to create roof decks (steep and low slope) should be rated for structural use as roof sheathing. Most building codes require labeling assuring the user the panel complies with industry standards. Contact APA (the Engineered Wood Association, formally known as the American Plywood Association) for specifics regarding the use of plywood in construction.

Each panel shall be supported, gapped, and securely nailed to framing members per APA recommendations, and edges between spaced members be supported by cross blocking.

Malarkey does not recommend the use of plywood clips over plywood/OSB roof decks. All edges of the sheathing should be fully supported by blocking.

Existing plywood/OSB decks with plywood clips must be overlaid with a cover board, mechanically attached. Contact Malarkey for approval. This recommendation is based on the need to protect the underside of the new roofing system from wear and/or splitting of the membranes caused by plywood clips.

Plywood/OSB decking should be protected to prevent the accumulation of moisture to its surface prior to installation of the roofing assembly. This is shown to be effective in reducing delaminating, dimensional stability issues, and roofing system problems attributed to plywood panels.

For uninsulated installations, a rosin paper or unsaturated sheathing felt may be required underneath the Malarkey base sheet to prevent inadvertent attachment of the base sheet to the deck. The laps of the rosin paper or unsaturated sheathing felt should be offset approximately 12" (305 mm) from laps of the base sheet.

For uninsulated installations/re-roofing projects over decks with residual asphalt from a previous sprinkle, strip, or spot-mopping attaching the previous roof, a rosin or sheathing felt is required. Contact Malarkey for details.

## 1.5.2 WOOD BOARD DECKS

Wood board decks should be solid-sawn dimensional lumber, be seasoned, kiln dried, or water-based treated lumber, and have boards no wider than 8" (203 mm).

Decks are to be smooth and even, and unaffected by warping, cupping, or bowing. They shall be supported

and securely nailed to framing members.

Remove and replace all split or cracked wood boards. Smaller cracks and knotholes should be covered with sheet metal nailed securely to the deck.

Wood board decking must be protected to prevent the accumulation of moisture on its surface prior to installation of the roofing assembly. *CREOSOTE TREATMENT IS NOT COMPATIBLE WITH ASPHALT SATURATED OR COATED PRODUCTS.*

Malarkey requires sheathing be installed over wood board decks for uninsulated installations.

## 1.5.3 CONCRETE/PRE-CAST CONCRETE DECKS

Cast-in-place structural concrete decks shall consist of Portland cement, water, and aggregate, and have a minimum thickness of 4" (102 mm). Concrete decks must be cast over removable forms or provide for bottom-side drying (vented metal decks). Any other type of deck could lead to entrapped moisture and roof system failure.

Roofing problems over concrete decks due to lack of structural expansion joints or application of roofing materials before the deck has properly cured are not covered by any Malarkey warranty.

The following minimum guidelines are recommended by Malarkey when installing roof systems over concrete decks:

The deck must be dry, smooth, and free from surface moisture or frost.

Sharp edges or irregularities must be leveled prior to application of roofing materials.

Cracks and voids greater than 1/8" (3 mm) must be repaired (filled in), in accordance with the deck manufacturer's recommendations and using approved deck manufacturer's materials.

The deck must be properly cured prior to application of the roofing system. Twenty-eight (28) days is normally required for complete hydration.

Concrete deck surfaces must be primed with asphalt primer at a rate of 1 gallon (3.8 liters) per square to assist adhesion of the roofing materials. Asphalt primer shall dry before installation of roofing materials.

When using insulation adhesives, priming of the deck may not be required. Consult the adhesive manufacturer's application instructions for details on deck preparation.

Curing agents must be checked for compatibility with the roofing materials prior to their application.

Wherever possible, install sumps at the drain and overflow locations when casting the concrete deck.

Malarkey requires all concrete decks receive a minimum of a single layer of insulation attached directly to a vapor retarder or the concrete surface.

Concrete decks installed over buildings exhibiting positive pressure shall have a means of pressure relief incorporated into the roof design. This may include, but is not limited to: perimeter venting, venting base sheet, and pressure relief vents, or sealed in a fashion that prevents positive pressure into the roofing system and the blistering that can result.

Roof membrane assemblies may be applied directly to the primed concrete (uninsulated) only when Malarkey ESHAvent® thermally-adhered base sheet is used. The use of ESHAvent® is preferable to provide more closely-controlled attachment and positive venting. (See **Low Slope Roofing Installation Instructions / Membrane Installation / Base Sheet** sections.)

#### 1.5.4 LIGHTWEIGHT STRUCTURAL CONCRETE DECKS

The high moisture content of lightweight structural concrete decks, together with long drying times and the inability to determine when roofing installation can begin, pose significant risk of roof failure and other performance issues. This risk is significantly increased by the standard practice of installing these decks over a non-removable form deck or other non-permeable substrates. As a result, *Malarkey will not issue NDL warranties for roofing systems installed over these types of decks.*

Moisture related problems include:

- Loss of adhesion of roofing layers
- Curing issues with water-based adhesives
- Metal and fastener corrosion
- Loss of insulation R-value
- Mold potential

ARMA recommends the selection of deck material and its suitability for use is the responsibility of the designer of record, who must make appropriate design accommodations to address high moisture content encountered in lightweight structural concrete decks.

NRCA recommends the decision of when to cover a newly-placed concrete substrate with a new roof system be made by the building's structural engineer, general contractor, concrete supplier and concrete placement contractor, each of whom will have more knowledge than the roofing contractor about the particular concrete's curing and moisture release rates. It also may be useful to consult the building's project manager, roof system designer, and roofing materials manufacturer.

#### 1.5.5 POURED GYPSUM DECKS

Poured gypsum will be dry, smooth, firm, and dust-free.

Poured gypsum decks will be metal-banded and securely anchored in place to the supporting frame. Bearing will be even and full, and the units laid tight. Joints will be grouted and made smooth.

Deformed slabs must be replaced or leveled using lightweight fill materials.

All pre-cast slab decks will be covered with roof insulation. Treated wood nailing strips will be installed at all perimeters, ridges, and penetrations through the roof to facilitate the securing of flashing and roofing felts.

Poured gypsum decks installed over buildings exhibiting positive pressure should have a means of pressure relief incorporated into the roof design. This may include, but is not limited to: perimeter venting, venting base sheet, and pressure relief vents.

All sharp edges or irregularities must be leveled prior to application of roofing materials.

In accordance with the deck manufacturer's recommendations, fill all cracks and voids greater than 1/8" (3 mm) with approved deck manufacturer materials.

#### 1.5.6 INSULATING LIGHTWEIGHT CONCRETE DECKS

Two types of insulating lightweight concrete decks are found in the United States. One uses lightweight insulating aggregates composed of perlite or vermiculite and the second using pre-generated foam (EPS) or other air-entrapping agent to form lightweight cellular concretes.

Poured in place, lightweight concrete decks shall be a minimum thickness of 2" (51 mm) or 2" above pre-generated foam and have a minimum compressive strength of 125 -130 P.S.I.

Venting will be provided for the evaporation of excess water and vapor. The type of form used to support the fill during placement will permit the lightweight concrete to vent from below. Steel decks will be vented galvanized steel.

Venting from above, for pours over monolithic decks, will be accomplished by the use of perimeter venting and/or deck vents, installed at a rate of 1 per 10 squares, or as recommended per deck manufacturer's specifications. Deck vents will be installed directly over 3-inch (76 mm) diameter holes, cut through the lightweight concrete to the structural deck.

If roof insulation is required, a mechanically attached membrane must be installed prior to application of the insulation or the use of an approved insulation adhesive, specifically designed for attachment to lightweight concrete decks. (See **Low Slope Roofing Installation**

**Instructions / Membrane Installation / Base Sheet sections.)**

The manufacturer of the deck system will inspect the deck and issue a written report stating it is sufficiently dry to receive roofing. The report will be issued prior to the start of roof system installation.

Fasteners used to secure membranes to lightweight insulating concrete will be designed to expand by compression of the fill material into shank portion of the fastener as it is driven into the deck fill. Fastener must be pre-approved by Malarkey.

### 1.5.7 STEEL DECKS

Steel decks will be installed, welded, and fastened according to *Steel Deck Institute* recommendations and deck manufacturer's specifications. They will have a shop coat of paint, be galvanized or similarly treated. The side laps must be welded, crimped, or button punched.

Steel decks should be a minimum of 22 gauge. If 22 gauge decking is supported on spans greater than 5 ft. (1.5 m) or decks lighter than 22 gauge are used, Malarkey must pre-authorize the built-up roofing application in writing.

Steel decks will have a layer of mechanically attached roof insulation of proper type and thickness to span and support the roofing system over the ribbed steel panels.

The roof insulation, screws, plates, number, and spacing used to fasten the insulation to the steel deck will comply with applicable codes and uplift requirements.

All metal flanged flashings, except lead, require a wood nailer when installed on roofing systems with insulation and/or cover board or any noncombustible roof deck.

### 1.5.8 STRUCTURAL WOOD FIBER DECKS

Structural wood fiber panels will either have a factory-applied felt surface or be covered with a rosin or sheathing felt below the base ply. Remove wet and deformed decking and replace with new material.

Install panels according to the deck manufacturer's specifications and adopted building codes. All slabs will be anchored against uplift and lateral movement. No more deck shall be laid in one day than can be covered with roofing that same day.

A layer of Malarkey base sheet laid with 4" (102 mm) side and 6" (152 mm) end laps will be mechanically fastened, with fasteners that meet desired pull values for Tectum, Permdeck, Petrical, and similar manufactured wood fiber products. Malarkey recommends pull tests be conducted to satisfy fastener manufacturers' minimum requirements.

Special care is required in driving these fasteners to ensure they are consistently driven vertical. Consult the fastener manufacturer for fastener type and base sheet fastening pattern. Divergent staples are not acceptable for fastening to these decks.

It is recommended, but not required in all cases, that a layer of roof insulation be applied over the base sheet.

## 1.6 RE-COVER / OVERLAY ROOF SYSTEMS

Re-cover systems (installation of a new roofing system over an existing system) requires a complete evaluation of the existing roof system. This evaluation may include, but is not limited to:

- Visual inspection of the deck surface
- Materials used in the existing roof system
- Attachment of the existing roof system to the deck
- Use and type of bitumen
- Use of fasteners and type of fastening pattern
- The type of re-cover roof system and its application
- Physical checks of the asphalt weight per square of the existing system
- Moisture survey of the existing roof system

Re-cover systems are eligible for limited warranties; contact Malarkey for specific terms and limits to warranty coverage for re-cover systems.

The following minimum requirements for re-cover systems are as follows:

- Existing roof must be in good condition, and no more than one roofing system can be currently installed.
- All wet/damaged sections of the roofing system must be removed and repaired prior to installation of new roofing membranes.
- Insulation must be subjected to an appropriate moisture scan and the results submitted with the warranty application. All wet or otherwise deteriorated insulation must be replaced with insulation of sufficient thickness to fill the resultant void and be flush with the surrounding materials.
- Re-covers over single-ply membranes require the underlying membrane be ribbon-cut every 12" (305 mm).
- Install a cover board over the existing roof system to provide a smooth surface to which the re-cover roof can be installed.
- Existing base flashing (curbs, walls, rooftop equipment, etc.) must be cut at the base and removed prior to installation of the re-cover roof system.

- Existing flashings, drains, pitch plans, scuppers, etc. must be divorced from the existing roof before application of the re-cover roof system.
- Malarkey recommends all existing flashings and scuppers be replaced with new, however, existing flashing in good shape can be used as part of the new re-cover system as long as the flashing's expected life will meet the anticipated life of the re-cover system.

Contact Malarkey Technical Services for all overlay projects.

### 1.7 EXPANSION JOINTS

Expansion joints must be installed at all structural joints, changes in deck materials, changes in deck direction, or re-entry corners. Roof insulation and/or built-up roofing must not bridge over any expansion joint.

On all buildings it is the responsibility of the building owner, architect, or specifier to determine the need, type, and location of expansion joints.

Malarkey accepts no responsibility for damage caused by the use or lack of expansion joints.

### 1.8 AREA DIVIDERS

Separations at partial re-roofing or potential stress points require special treatment. Tying a new roofing area directly onto an existing roof is not recommended.

The new roofing should be separated from older roofing assemblies whenever possible. Install wood blocking on both sides of the junction, forming an *area divider*, and secure to the structural deck. The wood blocking should extend vertically at least 8" (203 mm) above the finished surface of the roof membrane to provide adequate flashing height.

Blocking should also be used where there is potential for unusual stress on the membrane, such as a change in the direction of decking, but where structural engineering restrictions prohibit a structural expansion joint.

This detail must not impede runoff from the roof surface and cannot be interrupted by a scupper through the wood dividers.

Should the above-described area divider not be possible due to design and building conditions, contact Malarkey for flashing options.

Malarkey accepts no responsibility for damage caused by the use or lack of area dividers.

### 1.9 METAL FLASHINGS

All metal work should be a minimum of 16 oz. copper, 26 gauge galvanized or 28 gauge stainless steel, .040

inch aluminum or 3 lbs. lead for fabricated flashings. Lesser gauge steel materials may be used for counter-flashing or drip edges with a stretch-out of 5" (127 mm) or less. Metal will not be used as components of base flashing at intersections of the roof and vertical surfaces. Horizontal flanges should be at least 4" (102 mm) wide. Lead drain flashing sheets will be at least 30" (762 mm) square and fabricated from four (4) lbs. of lead. **(See Figure 3)**

**FIGURE 3**

GAUGE	METAL FLASHING TYPE
.26	GALVANIZED STEEL
.28	STAINLESS STEEL
.040	ALUMINUM
3 LBS	LEAD
16 OZ	COPPER

All metal flanged flashings, except lead, require a wood nailer when installed on roofing systems with insulation and/or cover board or any noncombustible roof deck.

### 1.10 GRAVEL AND AGGREGATE SURFACING

Surfacing will be commercial grade, washed, opaque ¼" to ⅝" (6-16 mm) clean, dry gravel. Gravel must conform to ASTM D1863 and should be applied at a rate of 400 lbs. minimum per square. Dolomite, crushed brick, or Haydite should only be used as the top surfacing in a double-gravel application; embed into a second flood coating applied over the initial gravel surfacing. Certain slag may be substituted for gravel; contact Malarkey for details.

### 1.11 REFLECTIVE ROOF COATINGS

*Energy efficiency* is the primary reason building owners choose reflective roof coatings. Their bright colors reflect UV rays from the sun, reduce absorbed heat (which saves on cooling), and prolong the life of the roofing system. Roofing materials including coatings can earn ENERGY STAR certification with the right solar reflectance criteria.

Application of reflective roof coatings must comply with all requirements and recommendations contained on material labels and printed installation instructions. Coverages vary by manufacturer and project specifications so consult the coating manufacturer.

Before application of a reflective roof coating, the roof may need to weather a minimum number of days depending on the system being installed (or as recommended by the product manufacturer). The roof surface must be thoroughly cleaned (pressure washing is

recommended) and allowed to dry. Some substrates may require a primer for optimal adhesion.

**Follow coating manufacturer's installation requirements.** General guidelines include the following:

Ambient air temperature for application should be 50°F (10°C) and rising. Weather *following* application should be clear with low humidity and without precipitation to allow the coatings adequate time to cure. Overcast, humid days can create a skin over the surface while the coating under the skin remains liquid. Moisture from dew, rain, or marine layer will impede curing and cause the roof coating to run.

Apply by spray, roller or brush. Protective equipment should include a fabric suit, impervious gloves, safety glasses, and a NIOSH-approved air respirator if using a sprayer.

Turn off all building air intakes within 100' of spraying. Do not spray over open, energized electrical circuits. Prevent overspray on nearby surfaces, objects, and property surrounding the work.

### 1.11.1 ACRYLIC COATINGS

White, acrylic coatings offer a high degree of solar reflectivity and waterproofing. They require a primer coat and are best applied in several thin coats (1-1½ gallons per square [3.8-5.7 liters]), with the overall application rate ranging from 2 to 3 gallons (7.6-11.4 liters) per square. Do not apply in a single coat.

### 1.11.2 ALUMINUM COATINGS

Aluminum roof coatings are typically solvent-based products so fire can occur from a concentration of petroleum vapors. Precautions should be taken to prevent vapor from entering air intakes or the building through other means.

On metal roofs, aluminum coatings treat rust and keep it from spreading but do not add appreciable mil thickness.

### 1.11.3 SILICONE COATINGS

Silicone coatings are highly reflective, can be applied in one coat, adhere to most substrates without a primer, and resist ponding water for extended periods of time. Certain silicone coatings contain flammable solvents which could create finely atomized particles while spraying. Use only with adequate ventilation.

## 1.12 FLASHING ASSEMBLIES / BASE FLASHING

Assembly/flashing systems must be installed at all roof-to-sidewall transitions, roof plane or direction changes, and flat to pitched roof intersections.

The purpose is to reinforce and protect these critical junctions from damage resulting from water intrusion

and foot traffic.

Base flashings for Malarkey roofing systems consist of base sheets or ply sheets and specified, granule-surfaced membranes.

Malarkey recommends installation of a mechanically attached base sheet over any wood surface used to construct curbs, walls, and equipment sleepers, etc., prior to the installation of stripping plies. In some cases, the direct application of an asphalt-attached base or ply sheet is acceptable in lieu of a mechanically attached base sheet.

On non-nailable vertical surfaces (concrete, masonry block, etc.), installation of stripping plies to the primed surface is acceptable. This attachment may include direct application using hot asphalt, cold adhesive, or heat welding (torch). If the surface is rough or uneven, Malarkey recommends installation of a nailable substrate which will provide a surface to mechanically attach a base sheet and remaining base flashing components.

Installation of base flashing stripping plies should be feathered into the field's finished inter-ply.

When a mineral-surfaced cap sheet is used, the field cap is installed over the feathered base flashing stripping plies. After completion of the field's mineral surfaced cap sheet, finish by installing the specified, granulated base flashing sheet.

Install base flashing surfacing first when liquid-applied surfacing or asphalt flood coat and gravel are used.

Base flashing assemblies will conform to the details in the **Low Slope Roofing Details** section of this manual. All deviations from Malarkey specifications must be pre-approved by Malarkey.

Some regions may require alternate base flashing assemblies to facilitate cold weather or winter installations. The use of alternate base flashing assemblies must be approved by Malarkey's Technical Services Department prior to installation.

Base flashings can be installed in a single piece up to 24" (610 mm) in height. Walls taller than 24" require base flashing and separate wall flashing. See **Low Slope Roofing Details / Flashing** details.

Base flashings installed by the roofing contractor must be sealed to the wall to prevent damage to the Malarkey roofing system when relying on others to install wall coverings or metal terminations.

## 1.13 ADHESIVES

### 1.13.1 ASPHALT (TYPE III AND IV)

Asphalt Bitumen (or flux) is a petroleum-based by-product of oil refining. Its unique ability to adhere reinforcing mats and membranes, and provide



waterproofing and excellent weathering capabilities makes it a great foundation for roofing materials.

Asphalt is typically available to roofers in two types tested to ASTM standards D312 Type III and IV. This typing is used to formulate the softening point and adhesive capabilities of asphalt. (See Figure 4)

**FIGURE 4**

ROOF SLOPE	ASPHALT TYPE
< 1"	ASTM D312 TYPE III OR IV ASTM D6152
≥ 1"	ASTM D312 TYPE IV

Asphalt must be stored, heated, and applied per the asphalt manufacturer's installation instructions.

**1.13.2 SEBS ASPHALT**

Malarkey 950 SEBS Mopping Asphalt is manufactured from a bitumen mixture with heat-resistant SEBS (Styrene-Ethylene-Butylene-Styrene) and packaged in 50-lb. kegs.

The polymer-modified asphalt is manufactured to meet ASTM D6152 performance criteria.

SEBS Asphalt must be stored, heated, and applied per the application instructions in this manual and on the Malarkey Technical Data Sheet. The Technical Data Sheet can be viewed and downloaded off Malarkey's website at WWW.MALARKEYROOFING.COM or a copy obtained by contacting Malarkey.

**1.14 COLD ADHESIVES (MODIFIED)**

**1.14.1 PARAGON® LOW ODOR ADHESIVE**

Paragon® Low Odor Adhesive (SKU 737) is a one-part, solvent-free, moisture cure, polyether/asphalt adhesive.

It is used to fully adhere SBS-modified bitumen membranes (do not use with conventional multi-ply systems) and is designed to cure in a variety of temperatures and humidity conditions. Solvent-free, it is safe for occupied buildings such as schools, hospitals, and food processing plants where hot asphalt kettles and strong vapors are not tolerated.

For more information, see the technical data sheet at WWW.MALARKEYROOFING.COM.

**1.14.2 PARAGON® LOW ODOR ADHESIVE FLASHING GRADE**

Paragon® Low Odor Adhesive Flashing Grade (SKU 738) is a one-part, solvent-free, moisture cure,

polyether/asphalt adhesive used primarily for vertical wall and curb flashings but can also seal side laps, end laps, and fishmouths on SBS-mod bit roofing systems. It is safe for occupied buildings such as schools, hospitals, and food processing plants where solvent vapors are not tolerated. The product contains very low VOCs, is OSHA-compliant, and eliminates chronic exposure hazards common to solvent-based adhesives.

For more information, see the technical data sheet at WWW.MALARKEYROOFING.COM.

**1.15 PARAPET AND WALL COVERINGS**

Parapet and all other walls should be constructed of weatherproof materials at the exposed top and faces.

Cover the exposed top with *coping*, usually metal, that is sloped to shed water in such a way that it does not run down the vertical face of the wall.

**1.16 CRICKETS AND SADDLES**

Any roof structure (skylight, curb, chimney, etc.) that prevents or slows the flow of water off a roof needs to have a *cricket* (sometimes called a *saddle* because of its shape) on the back side that forces water to flow around the obstruction and prevent ponding.

A cricket is required when the roof structure is more than 30" (762 mm) wide as measured perpendicular to the slope.

Crickets may be constructed of insulation boards or wood supports and plywood sheathing. Their height should be equal or greater than roof slope and the slope of the cricket along its ridge or width approximately twice the slope of the main roof deck.

**1.17 ROOFING INSULATION TAPE**

Roof insulation tape shall be laid evenly, smoothly, and embedded in a uniform layer of hot asphalt, applied at a rate not less than 15 lbs. (6.8 kg) per square of tape.

Care shall be taken in the application of the tape, ensuring it is in full contact with the asphalt.

Malarkey recommends the roof tape be a 10" (254 mm) wide strip of base sheet (Malarkey 515 Pano™ Base or 501 Paragon® MOD Base), and applied using the "back-mop and flop" method, or by use of specially designed roof joint taping equipment which applies the asphalt and tape in a continuous operation.

*ROOF TAPE IS MANDATORY FOR ANY INSTALLATION OF MALARKEY ROOFING SYSTEMS OVER EPS (EXPANDED POLYSTYRENE) OR XPS (EXTRUDED POLYSTYRENE). ADDITIONAL PROTECTION OF EPS AND XPS INSULATION MAY INCLUDE INSTALLATION OF ROSIN SHEET OR BASE SHEET BETWEEN THE INSULATION AND COVER BOARD ON MECHANICALLY ATTACHED SYSTEMS ONLY.*

Exercise care when taping joints on composite EPS-type boards because “back mopping” the tape and pressing it into place can potentially melt the EPS.

## 1.18 SHEET METAL FLANGES

Flanges must be primed on both surfaces, set in plastic cement, and nailed 4" (102 mm) O.C. prior to stripping.

All metal flanged flashings, except lead, require a wood nailer when installed on roofing systems with insulation and/or cover board or any non-combustible roof deck.

Refer to the **Low Slope Roofing Details / Flashing** details section of this manual for additional information.

## 1.19 PITCH PANS

Malarkey does not recommend the use of pitch pockets or pitch pans to flash penetrations and will not warrant the pitch pan or the sealant inside the pitch pan.

The watertightness of the pitch pan is the responsibility of the building owner.

Difficult to flash penetrations can have a sheet metal pitch pan with a minimum 4" (102 mm) wide flange and height, installed and flashed per the flashing details section of this manual.

Flanges shall be primed on both surfaces, set in mastic and nailed 4" (102 mm) O.C. prior to stripping.

All metal flanged flashings, except lead, require a wood nailer when installed on roofing systems with insulation and/or cover board or any non-combustible roof deck.

See the **EZ-Seal™** section of this manual for warrantable flashings.

## 1.20 VAPOR RETARDERS / BARRIERS

Some buildings allow significant amounts of moisture to be released into the building. This moisture may migrate through the roof deck and into the roof assembly causing blisters and attachment concerns.

Malarkey recommends the designer or building owner consider the following:

- Exterior and interior temperature and humidity conditions
- Building age and realistic roof life expectancy
- Type of roof deck
- Building code
- Fire rating
- Wind and impact resistance

- Roof slope and drainage
- Equipment needs
- Thermal requirements

The International Code Council defines vapor retarders as Class I, II or III based on their permeability to water vapor. A *perm rating* is the standard measure of water vapor permeability - the lower the number of perms, the less water vapor can pass through the material.

- Class I:  $\leq 0.1$  perms (considered impermeable; a vapor barrier)
- Class II:  $> 0.1$  and  $\leq 1.0$  perms (considered semi-impermeable)
- Class III:  $> 1.0$  and  $\leq 10$  perms (considered semi-permeable)

A perm rating higher than 10 is considered vapor permeable and not a vapor retarder.

Malarkey vapor retarders/barriers installed on a roof deck consist of a combination of base sheets, ply sheets, or self-adhering sheets, or the first layer of insulation/barrier board closest to the roof deck. Vapor barriers are installed on the warm side of the insulation on buildings that have regular January temperatures at or below 40°F (4°C).

Vapor retarders shall be installed up sidewalls above the insulation and cover board.

### 1.20.1 NAILABLE DECKS

Vapor retarders over nailable decks (wood, lightweight insulating concrete, etc.) require a mechanically attached base sheet (Malarkey 515 Pano™ Base or 501 Paragon® MOD Base) or inverted cap sheet, and a solid mopped base (501) or two (2) layers of Malarkey 500 Pano™ Ply 4.

### 1.20.2 NON-NAILABLE DECKS

Vapor retarders installed over a non-nailable deck (concrete, structural lightweight, etc.) require a layer of base sheet (501) or two (2) layers of 500 ply, mopped over a primed deck, or a self-adhering sheet.

### 1.20.3 AIR BARRIERS

Air barriers are very similar to vapor retarders:

- Their shared, primary purpose is to prevent the passage of air (air leakage) and/or water vapor (vapor diffusion) which can cause moisture-related problems within the roofing system. Airflow carries moisture.
- They can both be two-ply built-up membranes or a one-ply modified bitumen sheet; and
- Both are located at the roof deck level under the primary roof insulation, i.e., installed directly on a roof deck.

Low slope roof membranes are air barriers but only one ingredient in a whole building system of materials that control air leakage/convective heat flow through the building enclosure.

Requirements for air barriers are included in some building codes and widely adopted standards such as the International Energy Conservation Code (IECC), 2012 edition, and ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

The International Energy Conservation Code (IECC) is a building code created by the International Code Council in 2000. It is a model code adopted by many states and local governments in the United States for the establishment of minimum design and construction requirements for energy efficiency.

ASHRAE Standard 90.1 provides the minimum energy-efficient requirements for design and construction of new buildings and their systems, new portions of buildings and their systems, and new systems and equipment in existing buildings, as well as criteria for determining compliance with these requirements.

Contact Malarkey Technical Services for more details regarding vapor retarders and air barriers.

### 1.21 COLD WEATHER PRECAUTIONS

The application of asphalt-applied, low slope roofing systems in cold weather presents unique challenges to the roofing contractor, and there are many precautions to consider and provide for in a successful installation. Ambient temperature is one factor, but wind, wind chill, sun and cloud cover, and humidity can also affect the quality of the work.

It is critical for installers to acknowledge when weather conditions are prohibitive and suspend roofing work until more favorable conditions exist.

Malarkey Technical Services will closely review any warranted project applied-for during suspected cold weather times of the year. Malarkey reserves the right to decline the issuance of roofing warranties for these applications if the additional application instructions listed below are not followed, or with good reason, the installer has not taken any other steps to prevent an inferior installation.

#### Storage

Built-up and modified bituminous roofing materials become much less flexible in cold temperatures. Throwing or dropping rolls of membrane on the deck can cause cracking of the modified bitumen compound.

Position roll roofing on end and along with adhesives, sealant, primers, and coatings, store at 55° to 60°F (12.8° to 15.6°C) for 24 hours prior to installation.

#### On-Site Preparations

The roof deck, including rigid insulation, to which roofing materials are applied, shall be dry, firm, smooth, and completely free of debris, frost, ice, and surface moisture.

Review the layout of the roof, and position materials where they will be needed. All membranes must be unrolled and relaxed prior to application. Cut into shorter lengths ( $\frac{1}{3}$  to  $\frac{1}{2}$  the total length of the roll) for easier handling and reroll when ready.

Employ insulated rooftop bitumen transport and dispensing equipment; hot luggers and pipes leading to the roof from tank trucks must be properly insulated to maintain the correct temperature.

Keep materials in a hot box or warm storage area until ready and use promptly once removed.

#### Installation

The temperature at the time of installation should be a minimum of 45°F (7.2°C) and rising although ply sheets may be applied in colder temperatures. Do not begin too early in the day as the substrate also needs time to warm.

Leave no portion of roof unfinished; install only as much roofing as can be completed that day. Expect and plan for longer drying times in cooler weather. At the end of a day's work, install a *water cutoff* to prevent moisture from getting under the completed roof system.

Install membrane sheets so water runs over (shingle fashion) or parallel to (strapped), but never against the laps.

#### Hot Asphalt

Frequent temperature readings shall be taken to ensure the mopping asphalt is in the *Equiviscous Temperature* (EVT) range ( $\pm 25^\circ\text{F}$  [ $-3.9^\circ\text{C}$ ]) recommended by the manufacturer<sup>1</sup>. Only install roofing membranes when the point of asphalt application temperature can be maintained at the correct EVT in the mop cart, bucket, or mechanical spreader.

Never overheat asphalt to compensate for cold weather conditions.

Hot luggers, mini-moppers, mop carts, and mop buckets shall be kept at least half full or quickly emptied prior to refilling. Spread hot asphalt promptly to maintain proper application temperature.

Keep adhesives, sealant, primers, and coatings warm as well, as close to 60°F (15.6°C) as possible. Discard any water-based materials that have been frozen.

<sup>1</sup> Temperatures typically typically range from 400°F (204°C) to 425°F (218°C). ASTM D312 specifies a max kettle temperature of 550°F (288°C), but kettle temperatures should be kept as far below this temperature as possible while still maintaining a temperature within the EVT range.

Monitor water-based adhesives carefully when the ambient temperature is relatively close to the dew point, keeping in mind these temperature gaps are typically narrower in the early morning and late afternoon. Optimum conditions for adhesives and primers are at midday when the greatest difference between ambient and dew point temperatures exist.

Membrane layers shall be installed with the “roll-in method” of application and kept close to the mop, no more than 5' to 6' (1.5 to 1.8 m) in front of the roll. Quickly embed rolls into the asphalt, without delay between asphalt and membrane.

As membrane layers are applied, they should be *broomed* to eliminate voids and ensure full contact between the asphalt and bottom of the membranes. Heavy, weighted rollers work well for this.

**When adhering insulation, use the minimum board size available and never larger than 4' x 4' (1.22 m x 1.22 m).**

#### **Cold Adhesives**

Do not apply cold adhesive with a squeegee in temperatures below 45°F (7.2°C).

#### **Torch Application**

During membrane application, both the membrane and substrate should be heated in accordance with industry torch application safety guidelines. By warming the substrate before the molten asphalt is rolled into place, the adhesion of membrane to roof deck is enhanced. This is particularly important in the side and end lap areas, which should be given special attention.