

Gaco Western

S I N C E 1 9 5 5

Application Specification:

**GacoFlex LM-60 Garden Roof
August 2014**

07 55 63

GACOFLEX GARDEN ROOF ASSEMBLY

PART I - GENERAL

1.1 Summary

- 1) GacoFlex LM-60 is a two component, solvent free 100% solids, liquid polyurethane that cures to a full elastomeric, seamless membrane at ambient temperature and does not depend upon atmospheric moisture to cure. GacoFlex LM-60, when used in conjunction with protection board, drainage board and other components of a Garden Roof System shall be used to waterproof structural concrete, plywood and other structurally sound, existing roofing as described in this specification.
- 2) This specification is prepared in brief form so it can be used verbatim in the waterproofing section. It is only necessary to make the selections indicated to complete it. Gaco Western's General Instructions, which are incorporated by reference, provide specific detailed instructions for the guidance of contractors and inspectors.

1.2 RELATED SECTIONS

- A. DIVISION 2 - Site work [Section 02500/02870] -
- B. DIVISION 3 - Concrete [Section 03 30 0] - Roof Deck Surface/Substrate
- C. DIVISION [] - Wood blocking and curbing
- D. DIVISION [] - Insulation
- E. DIVISION [] - Sheet metal flashing and counter flashing
- F. DIVISION [] - Prefabricated roof specialties
- G. DIVISION [] - Caulking and sealants
- H. DIVISION [] - Plumbing specialties
- I. DIVISION [] - Roof hatches
- J. DIVISION [] - Landscaping

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM).
- B. Underwriters Laboratories (UL) Class A.
- C. Dow Chemical Company, TechNote 508 Ballast Design Guide for IRMA Roofs.

1.4 DEFINITIONS

- A. Green Roof -- An area of planting/landscaping built up on a waterproofed substrate at any level that is separated from the natural ground by a man-made structure.
- B. Extensive Green Roof -- Low to no maintenance landscaping consisting of shallow soil depths (< 6 inches (152mm)) with plant varieties restricted to primarily mosses, herbs and succulents capable of withstanding harsh growing conditions.
- C. Intensive Green Roof -- Landscaping requiring regular maintenance, consisting of deeper soil depths (> 8 inches (203mm)) with a wider variety of plant species possible including shrubs and small trees.
- D. Shallow-Intensive/Lawn Green Roof -- Landscaping requiring more regular maintenance than an extensive condition, but limited in plant selection due to shallower soil depths, (i.e., sod grass lawn).
- F. Steep Slope Green Roof -- Defined as a slope exceeding 3:12 pitch.

1.5 SYSTEM DESCRIPTION

- A. Furnish and install a completed GacoFlex Green Roof System Assembly including sealer/primer, LM-60 cold-applied membrane and flashings, protection course, root barrier protection, insulation (if required), water retention mat (if required), drainage/water retention component, filter fabric, lightweight engineered growing medium (soil) and vegetation.

1.6 SUBMITTALS

- A. Evidence that the roof membrane assembly is currently Class A listed with Underwriters Laboratories.
B. Applicator Qualifications: Submit current "Qualified Applicator" Certificate from the specified waterproofing manufacturer.
C. Provide product data on all components of the green roof assembly.

1.7 QUALIFICATIONS

- A. Primary fluid applied elastomeric coating system shall be of:
1. Single manufacturer. Manufacturer shall have a minimum of 10 years' experience in the manufacture of materials of this type. No toll manufacturing permitted. All components must be manufactured in-house.
 2. Applicators shall have a minimum of 5 years experience in the application of waterproofing materials of the type specified. Applicator shall possess a current "Qualified Applicator" Certificate from the specified waterproofing manufacturer.
- B. Pre-Bid Conference: Ten working days prior to the bid opening, there is to be a mandatory Pre-Bid Conference. Anyone not attending the Pre-Bid Conference will not be allowed to bid the project. All products considered an equal to the specified product or any changes in the scope of work, installation or specifications must be presented at the Pre-Bid Conference. If a change in the specifications is accepted, it will be considered as an alternate and will be presented as a bid amendment issued five working days prior to the bid opening. No other changes to the specification or bid documents will be accepted.
- C. Materials other than those specified shall be submitted to the architect/owner for approval no later than ten days prior to the bid date. In requesting prior approval, it shall be necessary to submit:
1. A letter of certification, signed by an officer of the manufacturer stating that the alternative material is equal to or better than the specified product.
 2. Independent laboratory test data giving physical property values in comparison to the specified material.
- D. Pre-Installation Conference: Just prior to commencement of the fluid applied waterproofing system, meet at the site with a representative of the coating manufacturer, waterproofing contractor, general contractor, architect and other parties affected by this section. Review methods and procedures, substrate conditions, scheduling and safety.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Store all coating materials in their original unopened containers at 50° to- 80°F (10° to 27°C) until ready for use.
B. Follow the special handling or storage requirements of the manufacturer for extreme cold and hot weather.
C. Safety: Refer to all applicable data including, but not limited to the MSDS, PDS, product labels and specific instructions for specific personal protection requirements.

NOTE: When working with Part B, avoid contact with skin and eyes. If contact occurs, wash skin with water or alcohol; flush eyes immediately with large quantities of water and get medical attention. Do not smoke during mixing, application or in the immediate area if thinners are used until all vapors have dissipated.

D. Ventilation: Provide adequate ventilation.

E. Environmental requirements: Proceed with the work of this section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the manufacturer's recommendations.

1.9 PROJECT CONDITIONS

- A. Application of the membrane shall not commence nor proceed during inclement weather. All surfaces to receive the membrane shall be free of water, dew, frost, snow and ice.
- B. Application of the membrane shall not commence nor proceed when the surface temperature is below 40°F (5°C). Application of the primer shall not commence nor proceed when the surface temperature is below 50°F (10°C).
- C. Preparation and application of the membrane shall be conducted in well ventilated areas.
- D. Do not expose the membrane or accessories over its service life to a constant temperature in excess of 180°F (82°C) (i.e., hot pipes, vents, direct steam, venting, etc).
- E. Do not allow waste products, (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the roof membrane. Any exposure to foreign materials or chemical discharges shall be presented to membrane manufacturer for evaluation to determine any impact on the roof membrane assembly performance.
- G. General Contractor shall assure that adequate protection is provided after the installation so other trades do not damage membrane.

1.10 WARRANTY

Warranties are available for 5, 10, 15, and 20 year periods for commercial and selected residential projects. The contractor must be eligible for and make application to Gaco Western, LLC prior to the start of the work under this section. Only Gaco Western, LLC Approved Applicators are eligible for labor and material warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sealer: GacoFlex U-5677 Polyurethane Sealer.
- B. Primer: GacoFlex E-5320 two component Epoxy Primer.
- C. Neoprene Sheet:
 - 1. Flashing: GacoFlex NF-621 Field Curing Neoprene 1/16" thick by 9" wide (.16 cm x 22.86 cm) minimum.
 - 2. Expansion Joints: GacoFlex NF-621 Field Curing Neoprene 1/16" thick by 9" wide (.16 cm x 22.86 cm) minimum.
 - 3. Moving Cracks: GacoFlex NF-621 Field Curing Neoprene 1/16" thick by 9" wide (.16 cm x 22.86 cm) minimum.
- D. Neoprene Adhesive: GacoFlex N-1207 single-component Neoprene Adhesive.
- E. GacoFlex LM-60 100% solids, liquid applied, two- component coating that cures into a water resistant polyurethane elastomeric membrane.

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>TYPICAL RESULT</u>
Flash point	ASTM D-56 (Closed Cup)	Above 200°F* (93°C)
Hardness	ASTM D-2240 Shore A	50 Shore A min @ 70° (20°)
Tear Resistance	ASTM D-624 Die C	LB./In. Min. 30 (5.4 kg(f)/cm)
Water Vapor Permeability	ASTM E-96, PROCEDURE BW 100% R.H. Difference	0.012 Perm Inches
Water Absorption	ASTM D-471	21 Days R.T. 1% Max
Low Temperature Brittleness	ASTM D-746	Pass @ -50F (-45C)
Tensile	ASTM D-412	Strength: 240 ± 10 psi (1.65 ± .07 MPa) Elongation: 300% ± 20 Permanent Set at Break: 10% Max.
V.O.C.		None
Solids Content		100%
Storage Stability		One year at 50° to 80°F (10° to 27°C).

F. Separation sheet / Protection Course / Root Barrier

- a) 6 mil polyethylene plastic separation sheet,
- b) 1/8" thick fiberglass reinforced asphalt protection sheet
- c) 90 pound mineral cap sheet root barrier
 - i) PC2 Protection Board manufactured by W R Meadows or equal

G. Prefabricated Drainage Course

1. Composite drainage system consisting of a three-dimensional, crush-proof drainage core and a filter fabric.
 - a. J- Drain 1000 Manufactured by JDR Enterprises
 - b. Miradrain Drain 9200 distributed by Carlisle
 - c. Delta Drain 6200 manufactured by Delta
 - d. or equal

H. Insulation (If required)

1. XPS extruded polystyrene rigid board insulation.
 - STYROFOAM® Brand insulation [TYPE] as manufactured by The Dow Chemical Company or equal.
 - a. Insulation shall meet ASTM C-578, Type VI or VII.
 - b. Minimum compressive strength, ASTM D-1621, 40 or 60 psi (276 or 414 kPa) (variance by type of product)
 - c. Maximum water absorption by volume per ASTM C-272, 0.1%
 - d. Water vapor permeance for 1" product per ASTM E-96, 1.0 perm (max.) (63 ng/Pa/s/m²)
 - e. Insulation shall have an R value of 5.0°F ft² h/Btu/in. (0.88 K m²/W) of thickness when tested at 75°F (23.9°C) mean temperature in accordance with ASTM C-518
 - f. Product shall be free of CFC's

2. SPUF Spray applied polyurethane foam may be used as an alternate to rigid board insulation if applied before the waterproofing membrane. This method would add an extra layer of seamless, waterproofing protection as the spray applied polyurethane foam is self- flashing.
Gaco Roof Foam 273 manufactured by Gaco Western LLC
Nominal density sprayed in place, ASTM D-1622-93, 2.5 – 3.0 lbs/ sq ft.
Closed Cells, ASTM D-2856 C-94, 94.3%
R Factor Initial, ASTM C-518, 7.1 @ 40°F
R Factor Aged, ASTM C-518, 6.6 @ 40°F
Compressive Strength parallel to rise, ASTM D-1921-94, 50.1 psi.
Compressive Strength perpendicular to rise, ASTM C-193-94, 30 psi
Tensile Strength, ASTM D-1621-94, 54psi
Water Vapor Transmission, ASTM E-96-95, 1.8 perm inches
Dimensional Stability at 158°F and 97% RH, ASTM D-2126-94, +5.98 % vol. change
Dimensional Stability at -20.2°F and Amb. RH, ASTM D-2126-94, 0.4 % vol. change

I. Air Layer (If required)

- a. Required air space over STYROFOAM® insulation when moisture mat is required shall be composed of a crush-proof core and non-woven filter fabric.
- b. J-Drain 300 manufactured by JDR Enterprise or equal.

J. Water Retention Mat

1. Non-woven, synthetic, fiber mat capable of retaining additional moisture for potential use by vegetation.
 - a. GS-232 Moisture Retention Mat manufactured by Cetco or equal.

K. Drainage/Water Retention Component

1. Three-dimensional, molded panels of recycled polyethylene with drainage channels on the top and bottom sides and water retention reservoirs on the top side.
 - a. Miradrain Drain 9200 or equal.

L. Filter Fabric

1. Non-woven, polymeric, geotextile fabric.

P. Hardscape / Roof Ballast

1. Pavers
Ballast Pavers as manufactured by Stepstone, Inc. or equal
2. Stone Ballast
Well screened and washed stone gravel meeting ASTM D-448-80, gradations #57, 2, 4 or 5 (as directed by Dow Chemical Company, Tech Note 508: [Ballast Design Guide for IRMA Roofs](#))
3. Concrete Pour Topping
NOTE TO SPECIFIERS: Dow Chemical Company, manufacturers of STYROFOAM® Brand insulation, recommends the incorporation of an air layer between the insulation and concrete.

2.3 RELATED MATERIALS

- A. Metal counter flashing is typically required to provide protection to vulnerable flashing materials from damage due to gardening activities.

PART III EXECUTION

3.1 INSPECTION

- A. The roofing contractor shall examine all surfaces to receive the roofing assembly to verify that it is acceptable and proper for the application of the membrane.
- B. The roofing contractor shall not proceed with the installation of the roof membrane assembly until all roof defects have been corrected.

3.2 PREPARATION

- A. All surfaces shall be dry, smooth, free of depressions, voids, protrusions, clean and free of unapproved curing compounds, form release agents and other surface contaminants.
 - 1. Cast in-place concrete/Composite deck
 - a. Poured in place concrete shall be monolithic, smooth, and free of voids, spalled areas, laitance, honeycombs and sharp protrusions.
 - b. **Refer to Section 1.2 of this specification, Division 3.**
 - 2. Precast Concrete Decks
 - a. Precast units shall be mechanically secured to minimize differential movement and all joints between units shall be grouted.
 - 3. Plywood decks
 - a. Minimum thickness of 3/4" (25.4 mm) is required with adequate structural support.
 - b. Tongue and groove joint edges are required.
 - c. Adequate number and type of fasteners shall be used to comply with applicable codes and maintain structural integrity.
 - 4. Re-Roof/Tear-Off Application
 - a. Asphalt, coal tar pitch or other existing membranes must be removed.
 - b. The deck type must be acceptable to Gaco Western LLC.
- B. Substrate Cleaning
 - 1. Clean the substrate to remove any and all surface contaminants using GacoFlex D-09 Wash. Refer to Gaco Western's General Instructions Section GW-1-1: Surface Preparation.
 - 2. Mask off all adjoining areas that are not to receive the fluid applied waterproofing.
 - 3. Provide a suitable work station to mix the coating materials.
 - 4. A final check to determine if the concrete has been properly prepared is to apply a test patch of GacoFlex LM-60 to the surface and check its adhesion. Consult your local Gaco Western Representative for the proper procedure for doing an adhesion test.

INSTALLATION

- A. Technical Advice: The installation of this waterproofing membrane shall be accomplished in the presence of or with the advice of the manufacturer's technical representative. Contact the nearest regional office for assistance.

Consideration should be given to the application of the Gaco Western Sealer/Primer System when waterproofing exterior concrete decks that will experience solar heating during application. A phenomenon known as concrete out gassing may occur which causes blisters and pinholes in the applied coating. The use of the sealer/primer system is the best method for preventing blisters and pinholes.

- B. Sealer: Seal the entire deck surface and all vertical or sloping surfaces of curbs, cants, parapets, etc. which are to receive coatings with GacoFlex U-5677 Sealer at the rate one gallon per 400 square feet (3.78 L / 27.9 m²). Allow it to dry a minimum of 1 hour and no more than 24 hours before applying the primer.
- C. Primer: Apply one coat of GacoFlex E-5320 Primer by roller at the rate of one gallon per 300 square feet (3.78 L / 23.2 m²). Allow it to dry a minimum of 24 hours. For maximum solvent resistance, see drying time directed in Gaco Western's General Instructions GW-2-2. Drying times vary depending on weather conditions such as temperature, humidity and air movement.

Note: Plywood surfaces do not require priming.

- D. Detail Work: Apply primer, expansion joint covers (where called for), seal cracks and joints, install flashings and apply the liquid polyurethane membrane.

E. Flashing and Joint Treatment:

1. Non-moving Cracks in Concrete: Stripe coat all non-moving cracks. Fill the crack with GacoFlex LM-60. Then apply GacoFlex LM-60 for a distance of 3" (7.62 cm) on each side of the crack at 60 mils thick (1.52 mm) (1/16") and allow it to cure. When applying the membrane on the main field of the deck, go over the stripe coat to achieve a total thickness of 120 mils (3.05 mm) (1/8").
2. Control Joints and Moving Cracks: Remove all dirt and loose chips of concrete from cracks. Seal them with a bead of polyurethane sealant (if possible) and strike the sealant flush with the deck surface. Center a 2" (5.08 cm) wide piece of GacoFlex 66R Release Tape (or paper masking tape) over the crack and apply it firmly and thoroughly to the deck. Stripe coat 60 mils (1.52 mm) (1/16") of GacoFlex LM-60 over the tape and to 3" (7.62 cm) on each side when applying the membrane on the main field of the deck. Go over the stripe coat to achieve a total thickness of 120 mils (3.05 mm) (1/8").

F. Expansion Joint Covers:

1. Choose GacoFlex NF-621 field curing Neoprene Sheet in a width that will provide at least 3" (7.62 cm) of bonding area on each side of the joint plus enough material to loop over the backer rod. Use a chalk mark placed 3" (7.62 cm) on each side of the joint as a guide for applying the adhesive.
2. Stir GacoFlex N-1207 Neoprene Adhesive to obtain a uniform consistency. With roller or brush, apply GacoFlex N-1207 to the deck on either side of the joint to a point just beyond the chalk marks. Allow the GacoFlex N-1207 Neoprene Adhesive to dry until it can be touched without sticking; about 1/2 hour. Apply a second coat of adhesive to the deck and one coat to the neoprene sheet (on the side not covered with the polyethylene liner). Allow the adhesive to dry.
3. Fold the neoprene sheet in half lengthwise so that the polyethylene surface is together. Place one edge of the sheet, adhesive side down, along the chalk line on one side of the joint. Place directly into position as the adhesive surfaces will bond immediately upon contact and the sheet cannot be moved. Stitch along the edge of the sheet to obtain a positive bond. Once the edge is bonded completely, work the stitcher or a flat faced steel roller toward the expansion joint to obtain 100% positive contact. End laps must be joined prior to placement of the flashing since a waterproof lap cannot be formed over a backer rod.
4. Place a backer material (solvent resistant, expanded plastic such as polyethylene or polypropylene) in the joint. The backer material should be 1/3 larger than the joint so it can be compressed into the joint and flush to the deck.
5. Install the neoprene sheet over the backer material and adhere it to the deck on the opposite side of the joint. Stitch the sheet from the joint outwards to the edge to obtain positive contact. Remove the polyethylene liner.
6. Apply a bead of polyurethane sealant along all edges and lap seams of the sheet.
7. After neoprene sheet has been installed a minimum of 24 hours; solvent wipe prior to the application of the GacoFlex LM-60 Liquid Membrane.
8. After placement of the protection board, a sheet metal protective cover must be installed to protect the expansion joint prior to the installation of any wear course.

G. Flashing at Deck and Wall Junctures:

1. If the joint at the wall and deck juncture is non-moving, apply GacoFlex LM-60 at a rate of 4 gallons per 100 square feet (15.4 L / 9.3 m²) (60 mils (1.52 mm) (1/16")) in a cove prior to the coating application of the main deck. Apply an additional 60 mils at the juncture when applying the overall membrane for a total thickness of 120 mils (3.05 mm).
2. If the joint at the wall and deck juncture is moving, flashing is accomplished by using the field curing NF-621 Neoprene Sheet. This is placed prior to the application of the overall membrane.
 - a. Choose a width of neoprene sheet sufficient to extend 4" (10.16 cm) onto the deck and 6" (15.24 cm) up the vertical wall. Roll out the sheet close to the application area. Use a length as long as possible to reduce the number of lap joints, but only as long as convenient to handle.
 - b. Place the masking tape on the wall and a chalk line on the deck as a guide for the adhesive application.
 - c. Mix the adhesive to obtain a uniform mixture. Apply by brush or roller to the deck 1/2" (1.27 cm) beyond the chalk line and to the wall onto the masking tape. Remove the masking tape while the adhesive is wet.
 - d. When the first coat of the adhesive is dry apply a second coat of adhesive to the deck, wall and to the neoprene sheet on the side not covered by polyethylene liner.
 - e. Place a 1" (2.54 cm) expanded plastic backer rod into the wet adhesive at the juncture of the deck and wall.
 - f. When the GacoFlex N-1207 Adhesive is dry, fold the neoprene sheet in half lengthwise so that the polyethylene surface is together. Carefully lift the neoprene sheet without stretching it and place the edge (adhesive surfaces together) along the chalk line on the deck. Stitch the edge to assure positive contact and continue with the roller and stitcher toward the wall. On the wall, work from the bottom to the top, in the same manner. Remove the polyethylene liner. End laps must be joined prior to placement of flashing since a waterproof lap cannot be formed over a backer rod.
 - g. Apply a bead of polyurethane sealant along edges and lap seams of the sheet.
 - h. After neoprene sheet has been installed a minimum of 24 hours; solvent wipe prior to the application of the GacoFlex LM-60 Liquid Membrane. (If in a VOC Regulated Area, the use of GacoFlex T-5110 Thinner is required in lieu of GacoFlex T-5116 Thinner).
 - i. If GacoFlex LM-60 Liquid Membrane comes into contact with a wall waterproofing system, the wall system must be installed prior to the GacoFlex LM-60 Liquid Membrane. Overlap the GacoFlex LM-60 Liquid Membrane a minimum of 6" (15.24 cm) onto the wall system. As an alternate, use a neoprene sheet as the dividing interface between the two systems.

H. Polyurethane Membrane: Apply GacoFlex LM-60 Liquid Membrane to secure a total minimum coverage of 6 gallons per square, (96 mils). A 7/16" x 7/16" notched trowel is effective in controlling the thickness. If installing the LM-60 Liquid Membrane with a squeegee, spread the material over the deck at an average thickness of 96 mils (2.43 mm). Where the LM-60 Liquid Membrane meets the neoprene sheet, the LM-60 Liquid Membrane must overlap a minimum of 3" (7.62 cm).

INSTALLATION USING SPRAY APPLIED POLYURETHANE FOAM

A. Technical Advice: The installation of spray applied polyurethane foam and this waterproofing membrane shall be accomplished in the presence of or with the advice of the manufacturer's technical representative. Contact the nearest Gaco Western Regional Office for assistance.

Consideration should be given to the application of the Gaco Western sealer/primer system when waterproofing exterior concrete decks that will experience solar heating during the application. A phenomenon known as concrete out gassing may occur which causes blisters and pinholes in the applied coating. The use of the sealer/primer system is the best method for the prevention of blisters and pinholes.

B. Concrete Sealer: Seal the entire deck surface and all vertical or sloping surfaces of curbs, cants, parapets, etc. which are to receive coatings with one coat of GacoFlex U-5677 Sealer at the rate one gallon per 400 square feet (3.78 L / 27.9 m²). Allow it to dry a minimum of 1 hour and no more than 24 hours before applying the primer.

C. Primer: Apply one coat of GacoFlex E-5320 Primer by roller at the rate of one gallon per 300 square feet (3.78 L / 23.2 m²). Allow it to dry a minimum of 24 hours. For maximum solvent resistance, see the drying time directed in Gaco Western's General Instructions GW-2-2. Drying times vary depending on weather conditions such as temperature, humidity and air movement.

Note: Plywood surfaces do not require priming.

D. Polyurethane Membrane: Apply GacoFlex LM-60 Liquid Membrane to secure a total minimum coverage of 8 gallons per 100 square feet (30.28 L / 9.3 m²) (Total wet film thickness 128 mils (3.25mm)). A (5/8" x 5/8" V Notched Trowel is effective in controlling thickness) or if the application is by squeegee, spread the GacoFlex LM-60 Liquid Membrane over the deck at an average thickness of 128 mils (3.25mm). Where LM-60 Liquid Membrane meets the neoprene sheet, the LM-60 Liquid Membrane must overlap a minimum of 3" (7.62 cm).

WATER TEST

- A. Allow the membrane to cure a minimum of 48 hours before running a water test. Plug drains and flood the waterproofed area. Let the water stand for 48 hours.
- B. The roof area or portions thereof shall be leak tested by ponding water at a minimum depth of 2" (50.8 mm) for a period of 48 hours to check the integrity of the membrane installation.
- C. **VERIFY that the structure can support the dead load weight of a water test before testing.**
- D. If leaks should occur the water shall be drained completely and the membrane installation repaired.

ALTERNATE WATER TEST

A. Low Voltage Vector Mapping is recommended when a structure cannot support the dead load weight of a water test. In low voltage vector mapping, the surface of the membrane is moistened (not flooded) to create an electrically conductive medium. Most green roofs can even be tested with soil overburden in place.

3.04 SEPARATION/Protection COURSE INSTALLATION

- A. Separation/Protection course shall be installed as follows:
 - 1. Install 6 mil polyethylene plastic over cured membrane
 - 2. Place W. R Meadows PC2 separation/protection course over the polyethylene.
 - a. Overlap adjoining sheet edges (dry) a minimum of 2"-3" (50.8 mm - 76.2 mm) to insure complete coverage.
 - b. Where required, install Root Barrier consisting of a 90 lb mineral cap sheet over the protection course.
- B. Insulation
 - 1. Where specified, STYROFOAM brand XPS Insulation shall be installed loose-laid in accordance with the manufacturer's recommendations.
 - 3. As an alternate, Gaco Western Roof Foam 273 can be spray applied before the LM-60 Liquid Membrane is installed.
 - 4. Install Gaco Western RoofFoam 273 in a thickness of _____ ± 1/4" (.64 cm), (1" (2.54 cm) minimum required.) Terminate the sprayed-in-place polyurethane foam on all vertical surfaces, (i.e. pipe penetrations, vents, mechanical equipment, parapet walls, etc.) a minimum of 3" (7.62 cm) or 2-1/2 times the specified minimum thickness.
 - 5. EXAMPLE: If 1" (2.54 cm) minimum is specified, all vertical terminations shall have a minimum of 2 1/2" (6.35 cm) sprayed onto the vertical surface and canted to the horizontal surface.
 - a. The spray applied polyurethane foam application shall be limited to an area which can be completed to its total thickness in one day.

- b. The completed polyurethane foam surface shall have a smooth to orange peel texture; a popcorn texture is not acceptable.
- c. The completed polyurethane foam surface shall be free of pinholes and “glass windows” due to improper equipment calibration or climatic conditions.
- d. Apply the base protective coating to the polyurethane foam surface on the same day (2 hours minimum).

B. Air Layer

1. When insulation ***and*** a water retention mat are specified, an air layer shall be required between both surfaces. An air layer is not required when using spray applied polyurethane foam.
2. Install J-Drain 300 over the insulation according to the manufacturer’s recommendation. Overlapping sheets can be held in place with duct tape.

D. Water Retention Mat (if required)

1. Where specified, a layer of Water Retention Mat shall be installed over the root barrier (when no insulation is specified) or air layer/ insulation, lapping adjoining rolls a minimum of 4 inches (100 mm). The Water Retention Mat shall be turned up on all vertical, roofed/flushed surfaces a minimum of 6 inches (150 mm) beyond the anticipated soil level. Any excess shall be trimmed to the level of the soil.
2. Install J-Drain 300 Water Retention Mat per the manufacturer’s recommendations.

3.07 HARD SCAPE/ACCESSORY INSTALLATION

- A. Stone and/or paver ballast shall be installed at all roof perimeters, building walls, penetrations, and access hatches and as required for flashing vegetation barriers, proper wind design, fire breaks and as walkway/maintenance paths.

Ballast design shall be in accordance with Dow Chemical Company TechNote 508 “[Ballast Design Guide for IRMA Roofs](#)” and other applicable codes or wind design guides.

- B. All drains shall be fitted with inspection/maintenance boxes and grilles, built up to ensure access at soil level.

3.08 SOIL INSTALLATION

- A. Soil shall be placed carefully to avoid damage or displacement of other materials such as walls, paving, drainage components, filter fabric, and roofing membrane.
- B. Soil shall be placed to within 1 inch greater than the final grade or to a depth of no greater than 8 inches and compacted as described in 3.08.C. below. For final grades less than 8 inches only one round of compaction shall be performed and the remaining soil shall be loosely placed so that the top of the soil exceeds the final grade by 1 inch (see 3.08.D. below). For final grades greater than 8 inches, place the soil at no greater than 6 inches and repeat the procedure until the soil has been compacted within 1 inch of the final grade.
- C. Compaction shall be performed with a 200 – 300 lb. landscape roller or lightly compacted with a hand held mechanical compactor to achieve a 50 – 60 % compaction as determined by ASTM- D1557.
- D. After compaction, the remaining soil shall be placed at 1 inch greater than the final grade and thoroughly watered or jetted over the entire area. Low settled areas shall be filled with additional soil and re-watered to achieve a uniform prescribed final grade.
- E. Erosion Control Mat.
1. The erosion control mat shall be installed directly over the growing media and properly staked into place.
 - a. Stake fastening pattern is based upon local wind speeds, building height and roof slope.
 - b. An erosion control mat is not required when Sedum Carpet is installed however; the Sedum Carpet shall be staked in place as required.