Teranap Waterproofing Systems

Installer Guide

Plaza Decks
Vegetated Roofs
Protected Roofs

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With you every step of the way

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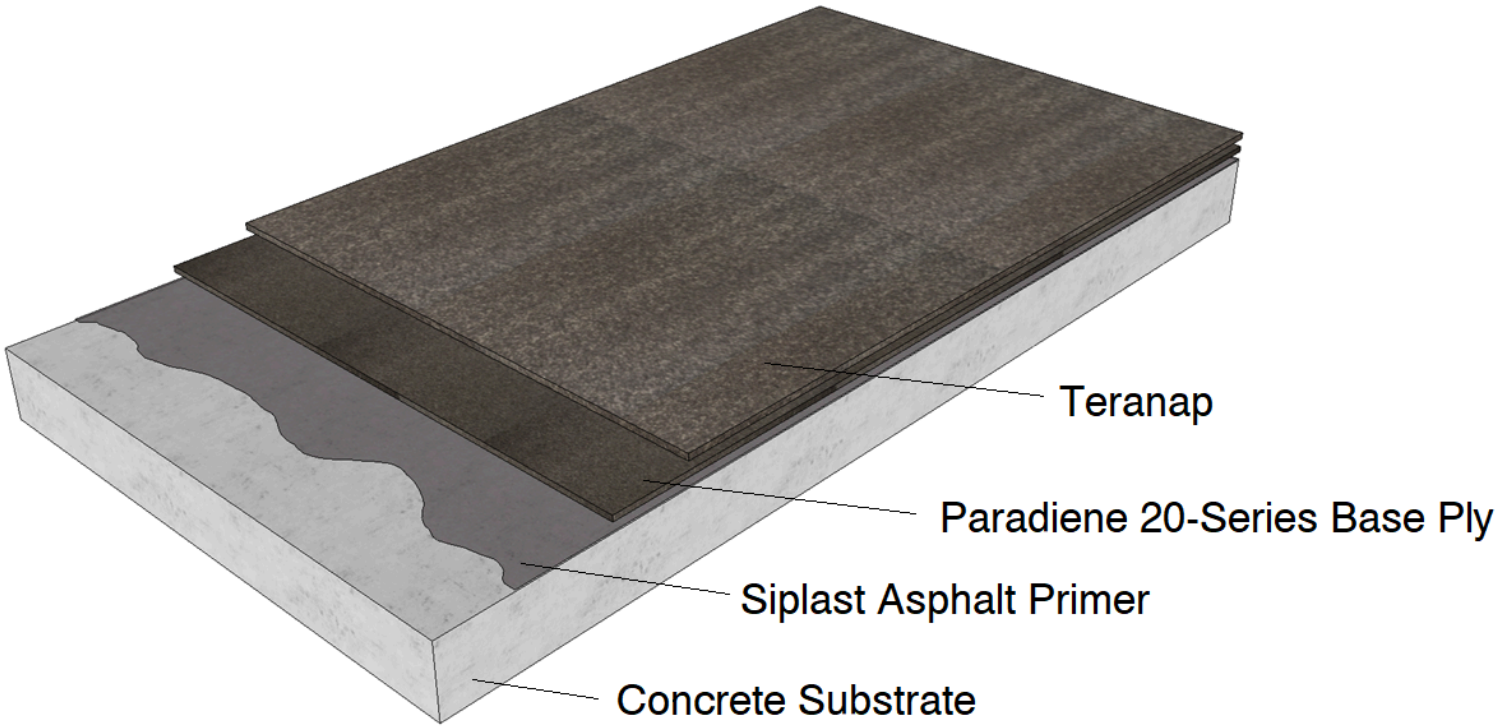
I. System Overview & Products

The Siplast Teranap Waterproofing assembly is an SBS-modified bitumen system incorporating two membrane layers. The base ply, Paradiene 20-series, is an elastomeric membrane which is fully adhered to the concrete substrate. The top ply, Teranap, consists of a fiberglass scrim / nonwoven polyester mat composite, impregnated and coated with SBS-modified bitumen, which is fully adhered to the Paradiene 20-Series base ply to form a thick, multi-layer waterproofing system. The Siplast Teranap System is typically torch applied but may also be applied in Siplast PA-311-series Adhesive, SFT Adhesive, or hot asphalt. UV exposed flashing conditions can be treated with Veral, Parafor 30, Parafor 50, or Paradiene 40 FR-Series flashing sheets. Parapro 123 or Paraflex 531 Liquid Flashing Systems may also be used to flash UV exposed conditions. Concealed flashing conditions that are not exposed directly to UV light can be treated with Teranap 1M Sand, Teranap 1M Film, or any of the flashing products listed previously for UV exposed conditions.



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Teranap System Products

Product	Application
Teranap 1M Film	Torch
Teranap 1M Sand	Torch, Cold Adhesive, Hot Asphalt
Teranap 1M GS	Torch, Cold Adhesive, Hot Asphalt
Paradiene 20	Cold Adhesive, Hot Asphalt
Paradiene 20 TG	Torch
Paradiene 20 HT	Cold Adhesive, Hot Asphalt
Paradiene 20 HT TG	Torch
Paradiene 20 EG	Cold Adhesive, Hot Asphalt
Paradiene 20 EG TG	Torch
Paradiene 20 SA	Self-Adhesive

Accessory Products

Primer	Application
PA-1125 Asphalt Primer	Roller, Brush, Spray
PA- 917 Primer	Roller, Brush, Spray
Mastic	**Application**
PA-1021 Plastic Cement	Trowel
Sealant	**Application**
PS-209 Elastomeric Sealant	Caulk Gun
PS-715 NS Elastomeric Sealant	Caulk Gun

II. Safety Considerations

Personal Protection - General

Refer to the Safety Data Sheet (SDS) for each Teranap, Paradiene, Parafor, Parapro, and related accessory products for specific PPE information. Only properly trained and professionally equipped Siplast Select Contractors experienced in the installation of the roofing applications listed herein should install these systems.

Some products are harmful if inhaled, swallowed, or absorbed through the skin. They can cause skin, eye, and respiratory irritation, and may cause skin and respiratory sensitization. Use all of the products with adequate ventilation or respiratory protection as needed to keep exposure below threshold limit values (TLV). Do not ingest the products, and avoid contact with eyes, skin, and clothing. Wear suitable gloves and eye/face protection. Wash thoroughly after handling all materials. Keep the products out of reach of children. First aid information is available on Safety Data Sheets (available at Siplast.com).

Torch Application

Follow all practices pertaining to industry standards and local code torch safety regulations and requirements. This includes performing a fire watch following any torch applications. Always have approved fire-extinguishing equipment nearby when using a torch.

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III. Storage and Handling

Preconstruction Meeting

Schedule a preconstruction meeting prior to commencement of work to discuss means and methods of protecting the waterproofing membrane during construction. The meeting should be attended by the specifier or design professional, an authorized Siplast representative, the waterproofing contractor, and any applicable subcontractors.

Storage

Store Siplast Paradiene, Parafor, Veral, and Teranap rolls on end, on a clean, flat surface out of direct exposure to the elements. Care should be taken that rolls are not dropped on ends or edges and are not stored in a leaning position. Deformation resulting from these actions will make proper installation difficult. Place all material stored on the deck overnight on pallets. Care should be taken to ensure that stored materials do not overload the deck and building structure.

Store materials such as solvents, adhesives, and asphalt cutback products upright and away from open flames, sparks, or excessive heat. Cover all materials with a breathable canvas cover. Polyethylene or other non-breathable plastic coverings are not appropriate. Further, handle all materials in such a manner as to ensure that they remain dry prior to and during installation.

Precipitation

Do not apply Teranap waterproofing materials during precipitation or if there is a threat of precipitation during installation.

IV. Installation Materials, Tools, and Equipment

Substrate Preparation

- Application rollers for primers
- Granule embedding torch

Torch Application

- Propane roofing torch
- Multi-burner torch cart (minimum 7-burner) for modified bitumen field sheet applications
- Modified bitumen roll puller

Adhesive Application

- Squeegees: Siplast PA-725 Adhesive Squeegee or generic squeegee having a notched neoprene blade (3/16” depth of tooth and 5/16” width of tooth).
- Spray Equipment: Graco King 45:1 Airless or Hennes-Johnson HJ4520 (with heating unit) or similar equipment. Graco XHD Reverse-A-Clean tip (reference HXD645 or similar to provide the desired application rate and fan width). Please note that SFT Adhesive is typically not sprayed.
- Rollers: 12-inch width medium nap roller with heavy-duty metal frames for field application and 3-inch width medium nap roller for end laps.
- Lap roller (typically 4 inches wide) with a long handle.

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V. Substrate Requirements, Preparation & Repair

Acceptable Substrates

Teranap Waterproofing Systems are typically installed over structural concrete substrates/decks. Contact the Siplast Technical Department regarding application over substrates other than structural concrete.

Substrate Preparation

Ensure that structural concrete surfaces are properly cured, clean, dry, and free from laitance. Perform any remediation necessary to ensure that the concrete surface is level, smooth, without ridges, depressions, or exposed reinforcement. Patch depressions, holes, or cuts in the substrate. When necessary use a quickset concrete repair compound and allow to cure thoroughly prior to application of the waterproofing system. In retrofit applications, use all reasonable means to remove existing waterproofing materials. In cases where residue from the old waterproofing system cannot be removed, contact the Siplast Technical Department for recommendations.

Primer Application

Prime the concrete substrate with a uniform coating of Siplast PA-1125 Asphalt Primer or PA-917 Primer and allow the primer to dry thoroughly. Prime all metal flanges (jacks, edge metal, lead drains, flashings, etc.). Please note that adhesive applications do not require priming of the substrate.

VI. Membrane Application

Torch Application- System Layout

Stagger the lap seams between the base and finish plies to avoid stacking the laps. Apply all courses perpendicular to the slope of the deck.

Application

1. Beginning at the low point of the area to receive the waterproofing, fully adhere the Paradiene 20 TG-series base ply to the prepared, primed structural concrete substrate. Torch uniformly, side-to-side, using an “L” motion to preheat the selvage of the previous sheet, ensuring full adhesion of the side lap. Burn off the plastic film and soften the back coating until the grooves are no longer visible without causing the Paradiene 20 TG-series base ply sand surface to become displaced. Fuse the membrane completely with only a small bead of bleed-out. Lap sides and ends a minimum of three inches. Paradiene 20 TG can be applied using an approved torching wagon with a minimum of seven burners.

2. Cut a “dog ear” angle at end laps on the overlapping selvage edge.

3. Again, beginning at the low point of the area to receive the waterproofing, install the Teranap-series finish ply. Lap sides and ends a minimum of 4 inches. Concentrate the heat where the Teranap-series finish ply and the Paradiene 20 TG-series base ply make contact. Torch uniformly, side-to-side, using an “L” motion to preheat the selvage of the previous sheet. Teranap can also be applied using an approved torching wagon with a minimum of seven burners.

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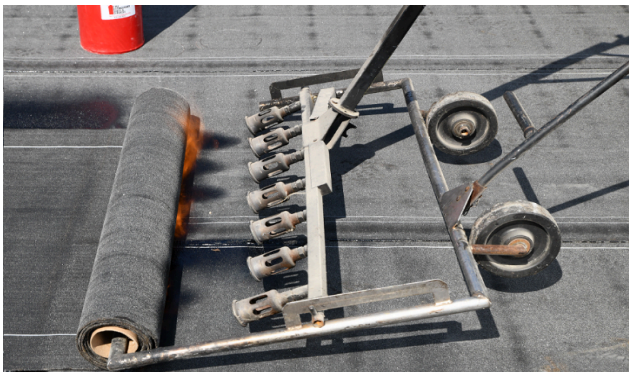

4. Alternatively, the roll can be unrolled in its entirety, set into place, and rolled back from each end to the center of the roll. Using this technique assists in keeping the roll straight during installation.

5. After back-rolling, fully torch the Teranap-series finish ply to the Paradiene 20 TG-series base ply in one direction. Concentrate the heat where the Teranap finish ply and the Paradiene 20 TG-series plies make contact. Torch uniformly, side-to-side, using an “L” motion to preheat the selvage of the previous sheet. Lap sides and ends a minimum of 4 inches.

Direction of Flame

Recognize that flame can travel to places further than those visible to the torch operator. Always direct flame away from any penetrations, the roof edge, deck-to-wall transitions, etc.

Proximity of Combustible Materials

Never allow a flame to come into contact with combustible materials, flammable or explosive vapors, or gases.

Recognize that combustible materials may be present in areas not visible to the torch operator, such as: below the roof deck or rooftop penetrations; within rooftop mechanical equipment, HVAC service lines, and utility pipes; at walls and perimeter edges; and on adjacent structures.

Foot Traffic During Application

The surfaces of Siplast products remain hot long after torch application. During this period, the finished roof surface can be marred by foot traffic even after the products have cooled. It is best to limit foot traffic over the completed base ply and/or finished Teranap system. To prevent tracking of asphalt or adhesives across the field of the roof, consider the use of talc or release liners on work boots.

Exposure

For phased application of the Teranap system, the Paradiene 20-series base ply may be installed and exposed to the elements and conditions for up to ten weeks prior to the application of the Teranap ply. Teranap 1M Sand or Teranap 1M Film may remain exposed for up to 10 weeks prior to the installation of the overburden system. In the event that the Paradiene 20 Series base ply or Teranap membrane remains exposed in excess of 10 weeks, or significant surface damage occurs, the authorized Siplast Technical Representative may call for remedial repair or replacement.

Cold Adhesive Application Guidelines

1. Beginning at the low point of the area to receive the waterproofing, apply Paradiene 20 in the specified Siplast Adhesive using a notched hand squeegee at a rate of 1.5 to 2.5 gallons per square, depending on porosity of substrate. A 1/4-inch thick squeegee blade with notches cut in a saw tooth pattern 3⁄16-inch high and 1/4-inch wide will deliver a proper amount of warm adhesive.

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2. At end laps, make a “dog ear” angle cut on the overlapping selvage edge.

3. Apply pressure on the sheet to ensure full contact with the substrate and complete embedment in the adhesive.

4. Using a clean trowel, apply pressure to top seal all edges at T-laps.

5. Apply Teranap in Siplast adhesive using a notched hand squeegee at a rate of 1.5 gallons per square. A 1/4-inch thick squeegee blade with notches cut in a saw tooth pattern 3⁄16-inch high and 1/4-inch wide will deliver a proper amount of warm adhesive. Hot air welding the laps is recommended with certain applications and weather conditions.

6. When hot air welding laps, place a straight 2"x6" or larger board adjacent to the modified bitumen sheet overlap to help reduce lifting of the overlapping sheet beyond the selvage area, inhibiting the potential for entrapped air during heat welding. Lay the board such that the welder nozzle does not extend into the overlap beyond the specified lap width. Fully hot-air weld all side laps with a minimum 1/8 inch to maximum 1/4 inch continuous bleed out to ensure that all laps are watertight. Immediately following, use a weighted roller at the step down. Roll all laps and T-Joints with a weighted roller and check laps after cooling to ensure full lap adhesion has been achieved. (The use of a self-propelled high-speed flameless automatic hot air welding machine for welding modified bitumen membranes is recommended to ensure a unified and even application of heat to the side laps. The unit should be equipped with a 100mm (4”) welding nozzle.

Allow the membrane system to fully cure prior to installation of the overburden components. This process may take from 2 to 4 weeks, depending on application rate of the adhesive, as well as ambient conditions.

Foot Traffic During Application

It is important to remember that with solvent-based cold adhesive applications, curing times are much longer than with asphalt or torch applications. During this curing time, the roofing sheets are in a softened state and may be more susceptible to damage from foot traffic. Refer to the Siplast Technical Guide for specific cold adhesive application guidelines.

Wrinkles and Fishmouths

Correct any membrane wrinkles and fishmouths that occur during application immediately by slicing, re-adhering the loose material, and patching. Extend the materials used to repair the slice in the base ply layer a minimum of 3 inches beyond the slice in all directions. Cut materials used to patch a slice in the finish ply off the end of the roll. Extend patches in the finish ply from side lap to side lap.

Hot Asphalt Application

1. Beginning at the low point of the area to receive the waterproofing, fully mop Paradiene 20 with an approved Type IV or polymer modified asphalt. Keep the asphalt temperature between 375º-400ºF (193º-204ºC) at the point of contact with the sheet being applied. Lap sides and ends a minimum of 3 inches.
2. At end laps, make a “dog ear” angle cut on the overlapping selvage edge.
3. Using a clean trowel, apply pressure to top seal all edges at T-laps while asphalt is still hot enough to create a bond.

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4. Again, beginning at the low point of the area to receive the waterproofing, fully mop Teranap with approved Type IV or polymer modified asphalt. Keep the asphalt temperature between 375°-400°F (193°-204°C) at the point of contact with the sheet being applied. Lap sides a minimum of 3 inches and ends a minimum of 6 inches.

VII. Flashing Application

Unexposed/Protected Flashings- Teranap

Flash masonry parapet walls and curbs using the Paradiene 20 series reinforcing sheet and Teranap 1M Film or 1M Sand for non-exposed applications. After application of the Paradiene 20 series base ply, install the reinforcing sheet with minimum 3-inch laps, extending a minimum of 4 inches onto the Paradiene 20 base ply surface and 4 inches up the parapet in a manner that results in a 90° transition. Pre-cut the Teranap flashing into maximum 4-foot lengths. Extend flashing pieces a minimum of 6 inches beyond the wall onto the Teranap finish ply surface. Fasten the top edge of the flashing on 9-inch centers.

UV Exposed Flashings

Flash masonry parapet walls and curbs using the Paradiene 20-series reinforcing sheet and an approved Siplast foil-faced or granule surface flashing sheet for exposed applications. Install the reinforcing sheet with minimum 3-inch laps, extending a minimum of 4 inches onto the Paradiene 20 base ply surface and 4 inches up the parapet in a manner that results in a 90° transition. Pre-cut the flashing sheet into 3-foot lengths (cut from the end of the roll). Torch-apply the flashing into place with the factory selvage edge at laps. Extend flashing pieces a minimum of 6 inches beyond the wall onto the Teranap finish ply surface. Apply pressure on the flashing sheet during application to ensure complete contact with the substrate, preventing air pockets. When Veral-Series flashing is used, this can be accomplished by using a damp sponge or shop rag. Take care not to damage the surface of the flashing sheet during application. Fasten the top edge of the flashing on 9-inch centers.

VIII. Water Cut-Off

At the end of the day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using Siplast PA-1021 Plastic Cement or pieces of the Teranap membrane. Completely remove cut-offs prior to the resumption of waterproofing with Teranap. Alternating stripping plies of torchable material to the concrete substrate is also an acceptable method of installing a water cut-off. The 8-inch stripping ply is installed without a cant strip 4 inches up the parapet in a manner that results in a 90° transition.

IX. Final Inspections- Membrane Integrity Testing

Final Inspections

NOTE: A final inspection by Siplast of the completed waterproofing membrane and completion of all related punch list items are required prior to installation of the overburden for projects to be eligible for a Siplast Guarantee.

The Siplast representative will compile required punch list items indicating any deficiencies in the waterproofing membrane and flashing membrane system that require remediation before the installation will be accepted.

We recommend that sufficient advance notice be given to your local Siplast inspector in order to schedule the final inspection. Please contact the Siplast Technical and Design Support Department at 800-922-8800 should further clarification be required.

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Membrane Integrity Testing

Integrity testing of the finished waterproofing membrane system is recommended and may also be required by the project specifications. Testing is typically conducted using one or more of the following methods.

Fully document all tests, regardless of method(s) used. Complete reports with a description of the techniques employed, summary of findings, and CAD scaled roof plans and applicable photographs of the tested areas with the locations of all defects accurately mapped on the plans.Please forward all copies of test reports to the Siplast Technical Department.

Water Flood Test

ASTM D5957: Standard Guide for Flood Testing Horizontal Waterproofing Installations. This practice describes testing the water-tightness of waterproofing installations applied to horizontal surfaces having a slope of no greater than 1/4 inch per foot (2% slope).

Prior to the application of the overburden, plug the drains and scuppers and flood the waterproofing surface with water a minimum of 1 to 2 inches deep. Leave the water for a minimum of 24 hours to ensure the system is leak free.

Take necessary precautions to determine/verify if the structure can sustain the weight of the water for the duration of the test.

Electronic Leak Detection

This practice allows for using a low and/or high voltage electronic detection system to verify that the membrane is free of any holes, open seams or capillary defects that will allow water to pass.

Each of the following methods allows for using a low voltage electronic scanning system to locate membrane breaches on both horizontal and vertical surfaces to identify potential leaks in exposed roofing and waterproofing membranes.

ASTM D7877-14, Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes. Four separate test methods are referenced below.

1. Low-voltage membrane EFVM
2. Low-voltage horizontal membrane scanning platform
3. Low-voltage vertical membrane surface scanning
4. High-voltage membrane testing

X. Overburden Installation

Overburden Installation Overview

Following the final inspection of the waterproofing system and remediation of any punch list items, remove any debris, excess waterproofing materials, equipment, and other related items prior to overburden application.

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Membrane Protection

It is the waterproofing contractor's responsibility to ensure that the party responsible for installation of the overburden takes all necessary precautions to protect the waterproofing membrane during installation of the overburden.

Insulation- Inverted Assemblies

Place the specified insulation unadhered directly over the membrane protection layer or drainage mat (if applicable), with the channeled edges down. Install the panels to fit tightly; leaving a maximum opening between panels of 3/8 inch. Closely abut walls, penetrations, and projections leaving a maximum opening between panels and projections of 3/4 inch.

Conform to the following requirements where insulation is installed in multiple-layer configurations.

A. Apply the thickest layer (2 inches minimum) of the insulation system as the bottom layer.

B. Stagger the panel joints between insulation layers.

C. Install all layers unadhered.

Overburden Solutions

The Teranap Waterproofing System can be specified with a wide variety of overburden systems including pedestals and pavers, poured in place concrete, mortar and pavers, and road asphalt. The Teranap Waterproofing System may also be specified beneath modular or layered vegetated roof solutions. Use overburden components that are approved by Siplast and installed per the manufacturer's published recommendations. Contact the Siplast Technical Department for specific overburden information.

Asphaltic Protection Board (If Applicable)

Place the protection board unadhered directly over the completed membrane surface with the end joints staggered. Install the panels to fit tightly; leaving a maximum opening between panels of 3/8 inch. Closely abut walls, penetrations, and projections leaving a maximum opening between panels and projections of 3/4 inch.

Pedestals/Pavers

Install the pedestals/pavers following the instructions and requirements of the insulation and pedestal/paver manufacturer, including specifications for perimeter securement and incorporation of metal fabricated restrainments at the perimeter if required. Include a protection layer atop the membrane assembly, beneath the base of the pedestals.

Vegetated Overburden

Siplast ParaGREEN Vegetated Roof Solutions include a range of layered and modular vegetated roof assemblies to meet project demands. ParaGREEN may be installed over our Teranap Waterproofing System to provide a single source solution. Contact ParaGREEN@siplast.com for more information.

Root Barrier

Siplast requires the installation of ParaGREEN Root Barrier when installing ParaGREEN Vegetated Roof Solutions over Teranap. ParaGREEN Root Barrier seams may be heat welded or taped with an 18" overlap using ParaGREEN Root Barrier Tape. ParaGREEN Root Barrier is available in 20, 40, and 60 mil thicknesses. Contact Siplast for application recommendations**.**

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Polyethylene Membrane Protection Layer (If Applicable)

Place the specified polyethylene slip sheet unadhered directly over all areas of the newly applied membrane, extending to walls, curbs, and other related junctures. Lap the polyethylene sheets a minimum 6 inches at the sides and ends.

Drain Mat (If Applicable)

Install specified drain mat with filter fabric side up. Lap salvage edge over adjacent drain mat. Extend drain mat to walls, curbs, and other penetrations/junctures.

Filter Fabric

Place the specified filter fabric unadhered directly over the insulation. Overlap edges and ends of the fabric a minimum of 1 foot. Extend the fabric a minimum 3 inches above the stone/gravel ballast at all penetrations with the exception of drains. Do not lap the fabric within 6 feet of the perimeter of the area. Immediately install ballast over the fabric to prevent heat-buildup beneath the fabric. High temperatures may result in damage to the underlying insulation panels. Consider the use of a light-color tarp if fabric is to be exposed in hot weather or when exposed to severe UV.

Ballast

For the installation of stone ballast, follow the instructions of the insulation manufacturer and the following requirements.

1. Distribute the stone ballast evenly over the insulation/filter fabric or drainage mat at a minimum rate of 1000 lb/sq.
2. Provide for a ballast distribution at the roof perimeter of 2000 lb/sq in an area extending 4 feet in from the perimeter.

Please contact the Siplast Technical and Design Support Department at 800-922-8800 for specific applications not listed above.

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