



**Plastatech**<sup>®</sup>

Film, Fabrics, and Laminate Solutions

**GEOMEMBRANE  
INSTALLATION GUIDELINES**

20, 30 and 40 Mil  
PVC

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## General Considerations

This manual provides information on Plastatech® PVC geomembrane products, including general recommendations for their use, as well as site, design and excavation considerations. Proudly produced in our Saginaw, Michigan, facility, Plastatech geomembranes are an American-made product.

As a product manufacturer, Plastatech does not perform geotechnical or other design functions. The following information is provided as general guidelines and design considerations only.

For some installations, the design of a project may be carried out by the owner or the contractor. However, in the case of larger installations such as ponds, canals, water features and commercial installations, there are often considerably more complex installation details that need to be addressed. It is recommended that a licensed engineer, geologist or architect be consulted to ensure the project is designed in accordance with applicable standards and performs as desired.

A thorough geotechnical investigation of the site should be conducted to ensure the underlying soil will remain stable.

Plastatech PVC geomembranes are not appropriate where any of the following conditions exist:

- Any containment structure where conditions exist that the substrate will not provide continuous and uniform support for the geomembrane.
- Any containment for hydrocarbons or chemicals that are known to damage Plastatech PVC geomembranes.
- Any application where the pH level exceeds a pH of 9 or below a pH of 5.

Installing Plastatech geomembrane in any of these conditions may reduce the service life of the material.

Plastatech PVC geomembranes are not applicable without special consideration from Plastatech at the site of liner material installation where any of the following conditions exist:

- Projects where geomembranes will be subjected to chemical discharge.
- Projects where the water table may reach the elevation of the liner.
- Projects that contain erodible or collapsing soils or karst terrain.
- Any project where subterranean gases will be generated or exist.
- Any project where the contained liquid exceeds 150 F (60 C).

Before installation begins, consult with Plastatech for membrane compatibility if these conditions are present.

NOTE: The contents of this guide are considered accurate at the time of posting. All information contained within should be validated for accuracy as it relates to specific project conditions and requirements. Specific codes, uplifts or other factors may result in changes to the information contained within this document. Validate all specific conditions with your architect, engineer or Plastatech representative.

## Sustainability

Sustainability is more than a concept at Plastatech, it's our culture, driving the sustainability of both our products and manufacturing processes. Plastatech's non-reinforced PVC geomembranes are free from Per- and Polyfluoroalkyl Substances (PFAS).

## Cautions and Warnings

- Confirm compatibility of the membrane with all materials being stored or retained.
- Confirm the suitability of the compacted subgrade.
- Non-UV enhanced materials should be covered as soon as possible. If they cannot, they should not be exposed for more than 30 days.
- Materials stored on-site should be tarped or covered to prevent direct exposure to sun and weather conditions.
- To prevent damage, keep Plastatech PVC geomembranes away from asphalt and petroleum products.
- Ballast the bottom and side slopes and design the perimeter anchorage to protect the membrane from wind damage.
- Ensure against mechanical damage from floating objects, ice, operating vehicles, equipment, etc.
- Animals can present significant issues. Provide escape ladders, fence around containments and use a geotextile under and above the membrane to prevent damage if animals are present.
- Protect all components of the Plastatech PVC geomembrane from discharges or contact with petroleum products, greases, oils (mineral and vegetable) and animal fats.

## Membrane Installation

### SCOPE:

The following instructions are intended as guidelines for the installation of Plastatech's 20, 30, and 40 mil geomembranes however, they do not supersede specific project guidelines set by project engineers, managers, or owners. It is vital that individual engineer's detailed specifications and procedures are followed.



### 1.0 Subgrade Site Preparation

- 1.1 A preinstallation site inspection shall be conducted by the geomembrane installer before moving liner materials to the placement area. If the site is deemed inappropriate for any reason, e.g., rocks, roots, moisture, etc., it should be remediated prior to geomembrane placement.
- 1.2 The foundation area for the PVC membrane liners shall be smooth and free of projections that might damage the liner. All stumps and roots shall be removed. Rocks, hard clods, coarse gravel and other such material shall be removed or shall be rolled so as to provide smooth surface or shall be covered with a cushion of fine soil. Subgrade must be

compacted to comply with design specifications and include a stable base to support equipment and necessary vehicle weight and shall be free of standing water.

### 1.3 Underlayment

- A. If site conditions and soils are not acceptable, a protection layer of nonwoven geotextile of at least 8 oz./yd.<sup>2</sup> (270 g/m<sup>2</sup>) thickness should be provided.
- B. On hard substrates such as concrete, it is always necessary to install a protection layer, unless the Plastatech PVC geomembranes are fully adhered. On a bituminous support (bituminous concrete, bitumen emulsion stabilized soil), a geotextile of at least 8 oz./yd.<sup>2</sup> (270 g/m<sup>2</sup>) should be used.
- C. The typical geotextile is a nonwoven, needle punched fabric. There are other types of geosynthetics, such as geonets and geonet composites that can provide gas and water drainage as well as protection and may be required dependent on the design for the installation.

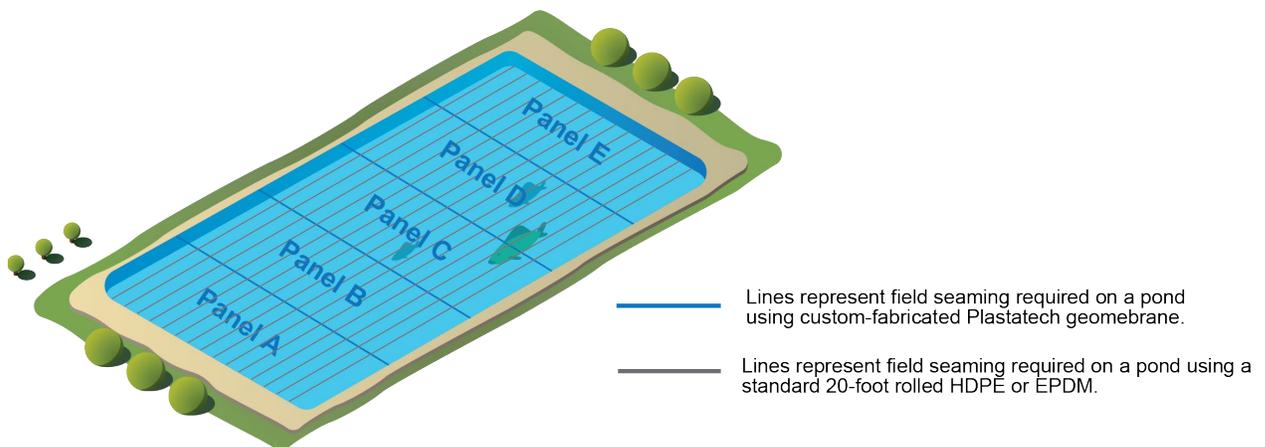
1.4 No standing water, mud, vegetation, frozen subgrade, snow or excessive moisture is allowed before geomembrane placement.

1.5 An anchor trench shall be excavated completely around the area to be lined at the planned elevation of the top of the lining. The top of the slope should be rounded to provide a smooth transition for the liner to reduce stress. The trench should be a minimum of 3 feet back from the top of the slope. The trench shall be a minimum of 24 inches deep and 12 inches wide, or according to the specifications of the design drawing. Care shall be taken when constructing the trench to avoid construction equipment coming in direct contact with the geomembrane liner.



## 2.0 Panel Layout

2.1 A layout drawing must be produced by the installer for all interested parties that specifies panel configuration and field seam location(s).





### **3.0 Panel Location**

- 3.1 Panels are to be placed in their respective locations as specified by the layout drawings. An as-built drawing must be completed indicating actual panel placement, seams and patches.



### **4.0 Identification and Record Keeping**

#### 4.1 Record Forms

- A. Proper documentation must be kept in a record form containing the following information or those required by site owner, designer or quality control/assurance.

#### 4.2 Panel Layout

- A. Each panel shall be assigned a numeric or alpha-numeric identifier.
- B. Panel configuration, showing factory seams and field seam location.

#### 4.3 Identification

- A. Product type
- B. Panel Identification Number: found on package label
- C. Manufacturing Date: found on package label

#### 4.4 Field Seaming Log

- A. Welding Equipment Model and Identification Number
- B. Welding Technician Name
- C. Temperature Control Settings
- D. Date
- E. Time
- F. Location
- G. Weather Conditions at Time

#### 4.5 Seam Test Results Log

- A. Seam Strength Results

#### 4.6 Defects and repairs

- A. Location of defects and repairs should be noted on separate panel layout drawing and field seaming log.



### **5.0 Weather Conditions**

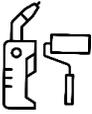
- 5.1 Unacceptable conditions for panel installation include: precipitation or the presence of any standing water, high winds, or extreme temperatures. Ideal installation air temperatures should range between 40 F and 90 F.

- 5.2 During extremely warm or cold temperatures it is recommended that frequent trial seams are made and evaluated to ensure the welders are properly set up for the conditions.



## **6.0 Method of Installation**

- 6.1 The method, personnel and equipment used for panel installation must not damage the membrane or the supporting subgrade surface. All installers must wear nondamaging footwear. Smoking or any action that may result in damage to the geomembranes in any way will not be allowed. Proper repair procedures must be followed should any damage occur.
- 6.2 Panels should be positioned to minimize handling and to allow enough slack to compensate for shrinkage or settling of the substrate.
- 6.3 After initial placement of material into position, remove as many wrinkles as possible. The edges need to be smooth and without wrinkles to allow proper seaming. Wrinkles creating folds in the material should be removed.
- 6.4 Detail flashings for items such as, pipes, concrete pads, corners, sumps and bottom drains should be factory fabricated whenever possible. See detail drawings section for specific termination and sealing recommendations.
- 6.5 For buried applications, the cover soil must be clean and free of debris and be a minimum of 12 inches deep. Care should be taken to ensure earth moving equipment does not come in contact with the geomembrane as it may damage the material. Any damage to the geomembrane should be repaired prior to proceeding with cover material placement.
- 6.7 For points of mechanical termination, remove any foreign materials from termination points where the liner will be sealed and fastened to walls, curbs or elevated structures. See detail drawing 1020, 1060, 1070 and 1120.
- A. Surface should be cleaned to the base material to ensure a proper water tight seal can be achieved.
  - B. Special care should be taken to remove any asphalt or bitumen-based sealants as they are not compatible and may affect the material performance over time.
- 6.6 Cover soils should be dumped and leveled over the geomembrane and not pushed from one end to the other to minimize rolling and wrinkling of the geomembrane beneath the soils. Cover soil should always be placed from the bottom to the top of slopes to avoid stressing the geomembrane and slope stability problems.



## 7.0 General Field Seaming Requirements

7.1 There are several different methods for field seaming Plastatech PVC geomembranes. The preferred and most common method is fusion welding. Adhesive bonding and solvent welding of seams are also possible. Material seaming should only be conducted by trained, experience technicians. Field taping of seams is not recommended for Plastatech geomembranes.

Putties or asphalt-based products should not be used at any time for seaming or sealing of Plastatech PVC geomembranes.

### 7.2 Welding Equipment

- A. A thermal fusion welder utilizes a hot wedge or hot air to heat and melt the surface of the geomembrane which is then compressed between two rollers where the combination of heat and pressure creates a uniform weld.
- B. Welder can be self-propelled (hot wedge or hot air) or handheld (hot air).
- C. The welder must be configured to produce a minimum 1 inch (25 mm) wide bonded weld.

### 7.3 Material Seaming Preparation

- A. Seaming requires a solid, dry, smooth substrate.
- B. A minimum overlap of 4 – 6 inches (100 mm – 150 mm) is required for all field seaming methods.
- C. Panel edges should be smooth and free of wrinkles.
- D. Geomembrane must be cleaned of all dirt, water and any foreign debris or substance prior to seaming.
- E. Properly functioning portable generators must be in close proximity of the seaming.
  - a. Generator fuel must be stored away for the geomembrane. If an accidental spill occurs on the geomembrane it must be removed immediately. The area should be inspected for damage and repaired as necessary.
- F. Extension cords must meet welding equipment manufacturer's recommendations.

### 7.4 Field Seaming

- A. Seaming and welding of the geomembrane should be completed by trained and qualified personnel in the method used.
- B. Welders must be set up and adjusted per equipment manufacturer's guidelines.
- C. A trial test seam should be conducted prior to panel seaming to ensure equipment is functioning properly and seams meet minimum bond requirements.
- D. Test seams should be run routinely to ensure equipment is operating properly under jobsite conditions. Tests should be conducted at least every 4 hours. These are clock hours not operational hours of equipment.
  - a. Test seams shall be performed using pieces of geomembrane liner long enough to allow welder temperatures to stabilize.
  - b. Test seams must be made under the same conditions as the actual seaming process.

- c. Test samples need to be 10 feet long.
- d. Test specimens should be cut from the end of the test weld to conduct the prescribe ASTM peel test as specified by site owner.
- E. When thermal fusing a seam, the welder operator must maintain observation of the equipment control settings and inspect completed seams to ensure adequate fusing has occurred.
- F. Burns or wrinkles (“fish mouths”) in field welds must be marked and patched according to repair guidelines.
- G. All field seams should be inspected to ensure all defects and repairs have been properly addressed.
- H. Special attention should be given to “T” joint welds to ensure there are no pinholes or gaps adjacent to the finished weld. Please reference detail drawing 1040 at the end of the manual.
- I. Each seam should be numbered, labeled with date completed, name of technician and number of defects identified along length of weld.

#### 7.5 Detail Installation Field Seaming

- A. Ensure the geomembrane liner material is clean, free of contaminates and moisture where the detail flashing is to be applied. See General Patching Guidelines for recommend cleaning materials.
- B. Remove any foreign materials from termination points where the flashing or liner will be sealed and fastened such as pipes and concrete walls. Surface should be cleaned to the base material to ensure a proper watertight seal can be achieved. Special care should be taken to remove any asphalt or bitumen-based sealants as they are not compatible and may affect the material performance over time.
- C. See detail drawings for proper sealing of details using high-quality sealants as indicated.
  - a. DO NOT USE asphalt or bitumen-based sealants.

#### 7.6 General Repair and Patching Guidelines.

- A. Clean material thoroughly with a cleanser such as liquid dish detergents, automotive bug and tar remover, etc.
  - a. DO NOT USE— gasoline or solvents such as acetone, methyl ethyl ketone (MEK), ethyl acetate, mineral spirits and toluene.
  - b. Wipe the area using an absorbent cloth.
  - c. Clean the area a second time, using a water-soluble cleanser such as Spic and Span®.
  - d. Rinse with clean water and dry with a lint free cloth.
- B. Cut a patch using the Plastatech PVC geomembrane material in a uniform shape with rounded corners.
  - a. Patch must be a minimum of 2 inches larger in all directions than the area to be patched. A minimum patch size of 4 inches x 4 inches should be used.
- C. Place the patch over the damaged area and weld the patch in place using a hot air welder and a silicone roller. Weld the entire patch, creating no less than a

continuous 1 ½ inch wide weld. Check the integrity of the weld once it is cooled. Repair as necessary.

- D. PVC adhesive patching may be used following the same guidelines for patch size with the entirety of the patch being adhered.
  - a. Follow adhesive manufactures application guidelines for proper application.
  - b. DO NOT USE asphalt or bitumen-based sealants.



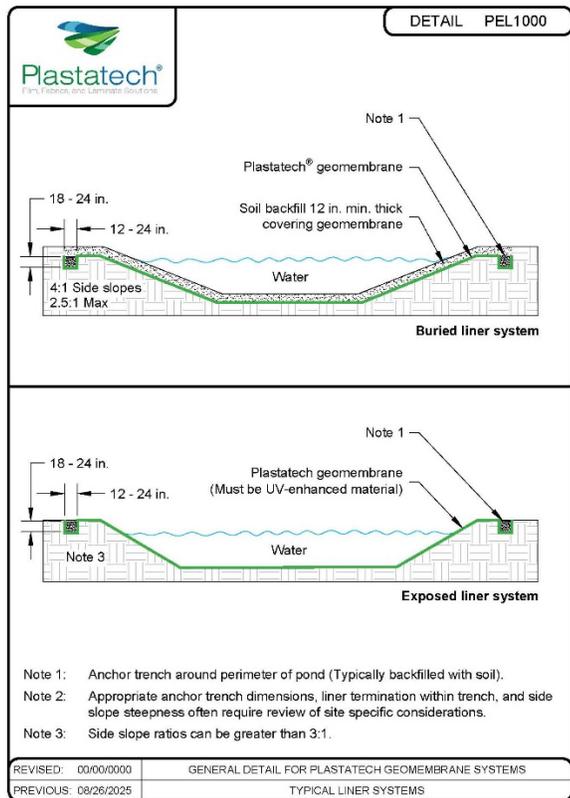
## 8.0 Nondestructive Seam Test

There are two methods commonly used, vacuum and air pressure.

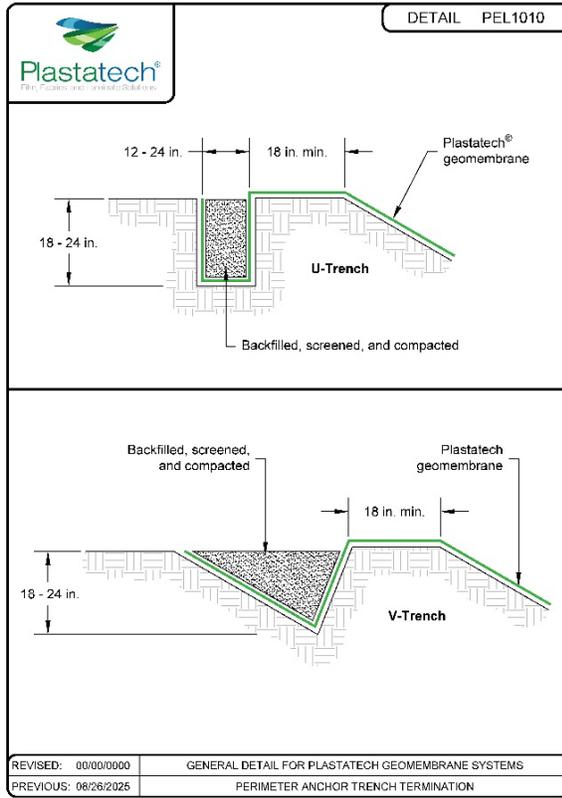
- A. Vacuum Test
  - a. The test utilizes a vacuum box which consists of a rigid housing with a viewing window, soft gasket, valve assembly, vacuum gauge, pressure control pump and a soapy solution. Vacuum box and procedures should be in accordance with ASTM D-5641.
- B. Air Pressure Test
  - a. Using the wedge welding process with the appropriate pressure wheel, a hollow channel of about 3/8-inch wide is created between welded seams. The channel is inflated to a desired air pressure and observed over a set period of time for stability. The test should be done in accordance to ASTM D-5820.

# Detail Drawings

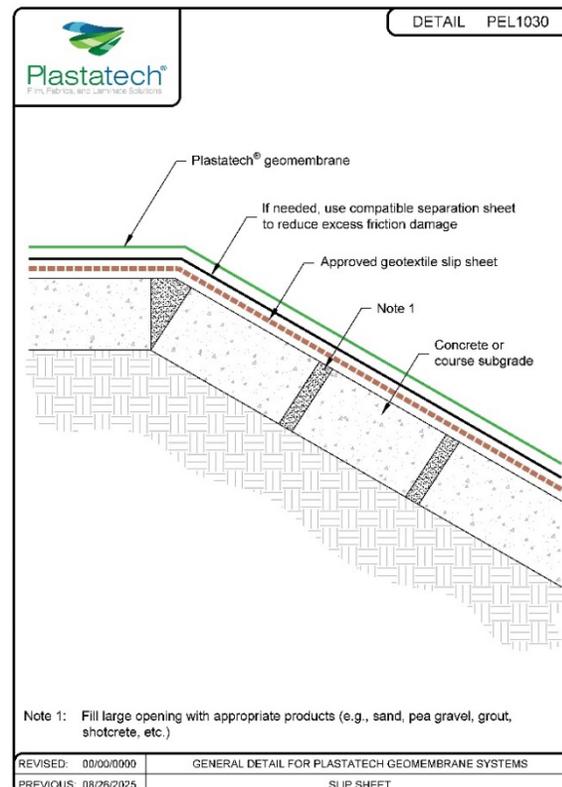
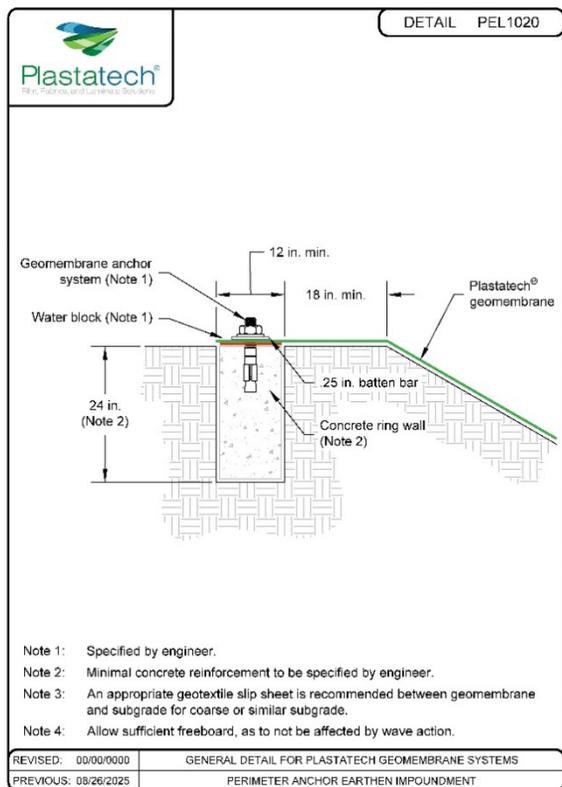
## 1000 Standard Geomembrane Installation



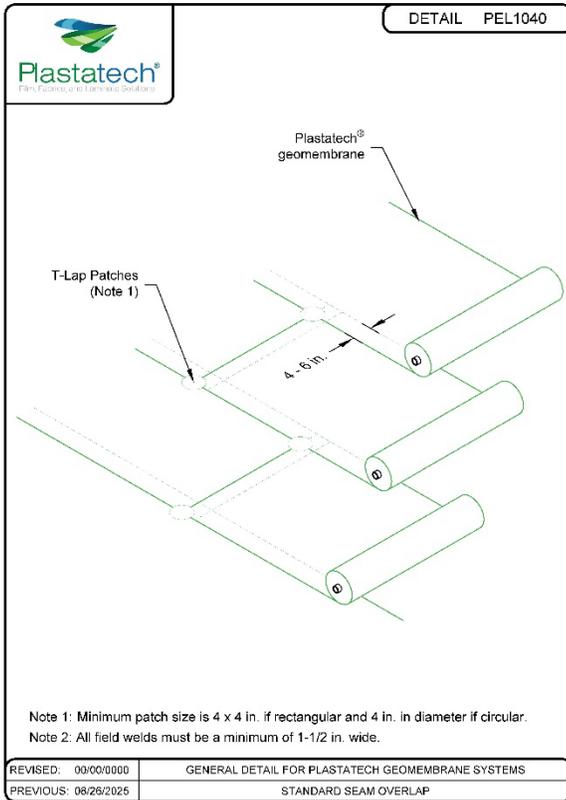
## 1010 Perimeter Anchor Trench Termination



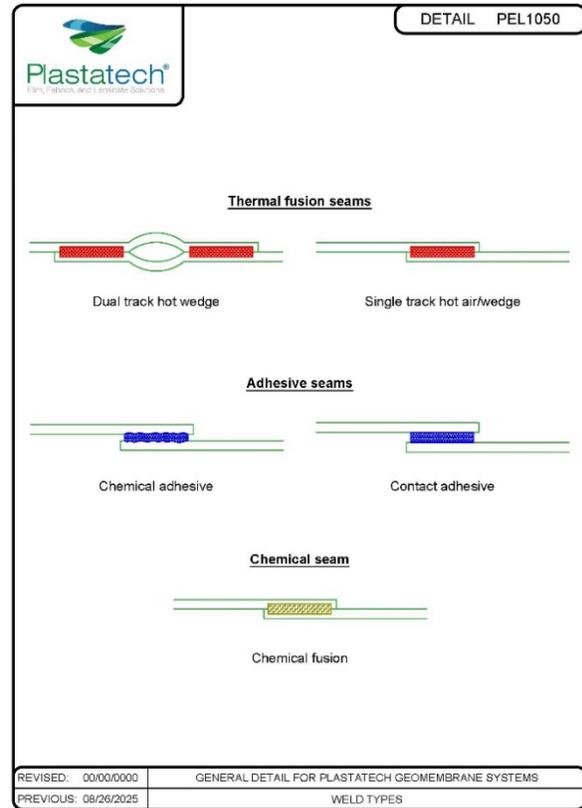
## 1020 Perimeter Anchor Concrete Termination 1030 Slip Sheet Installation



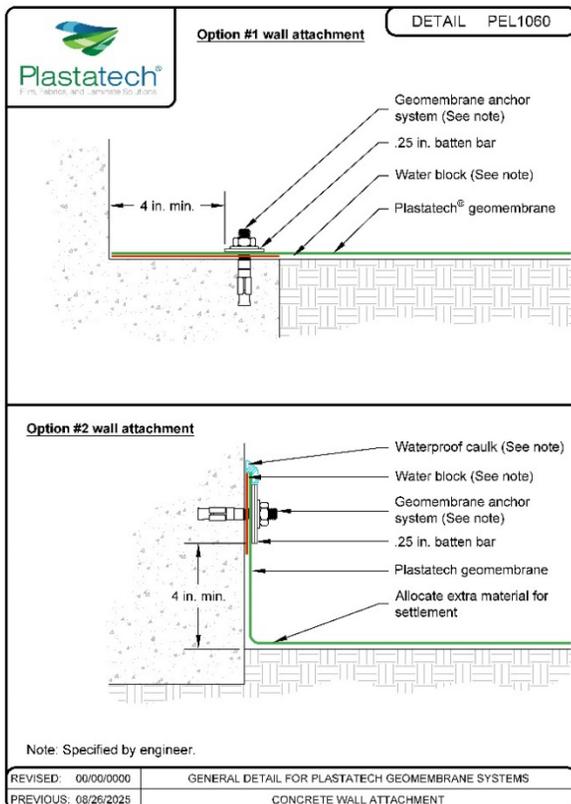
### 1040 Standard Seam Overlap



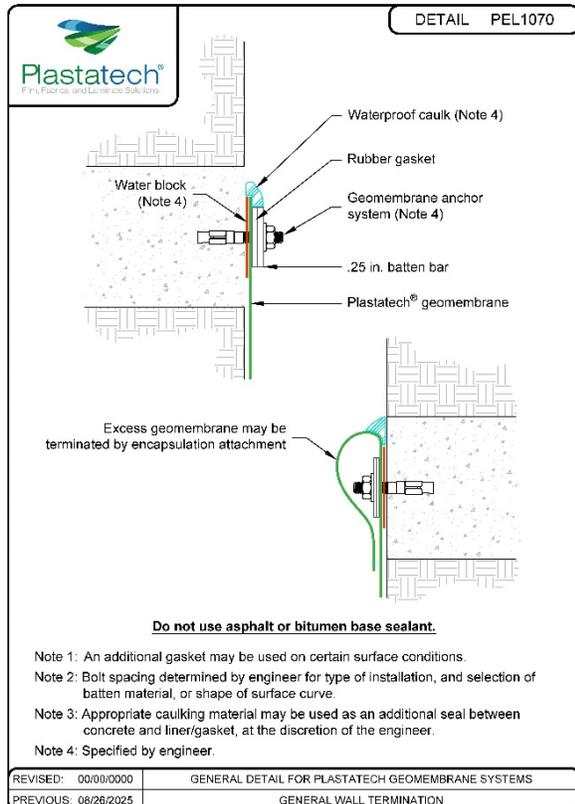
### 1050 Standard Welding Methods



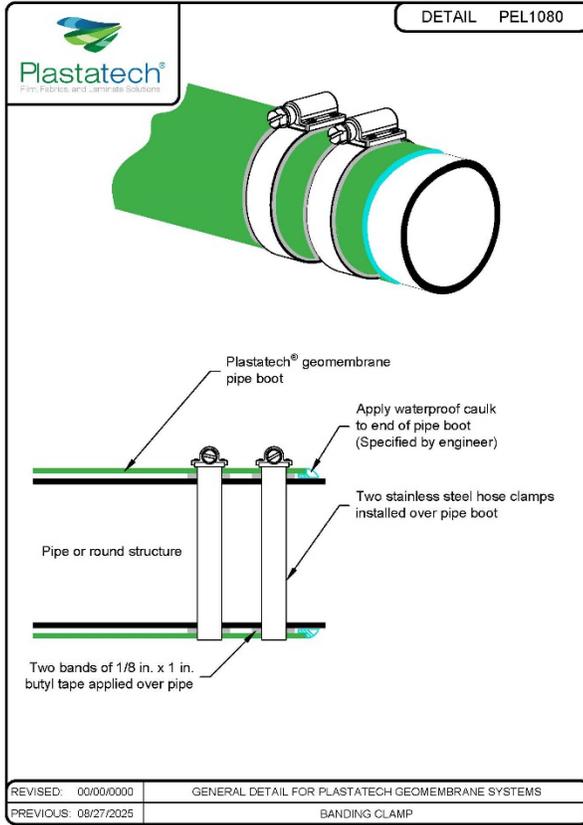
### 1060 Concrete Wall Attachment



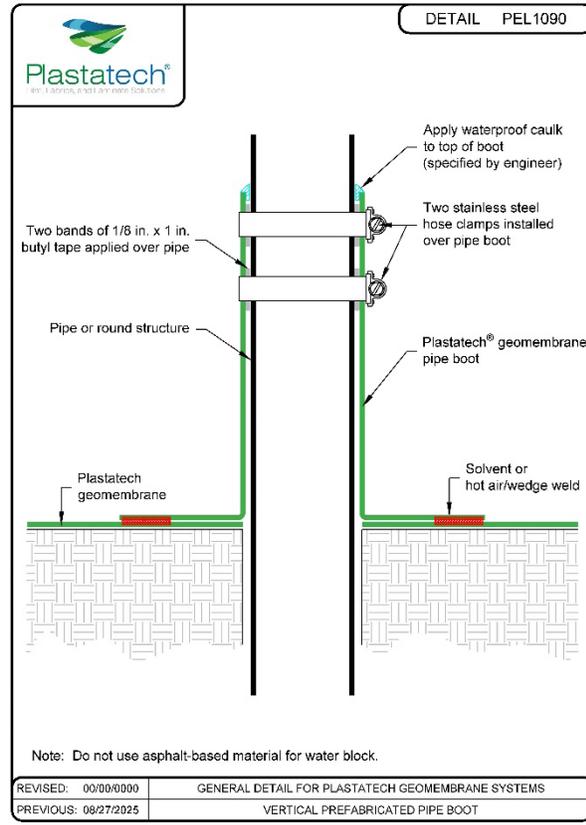
### 1070 Standard Wall Termination



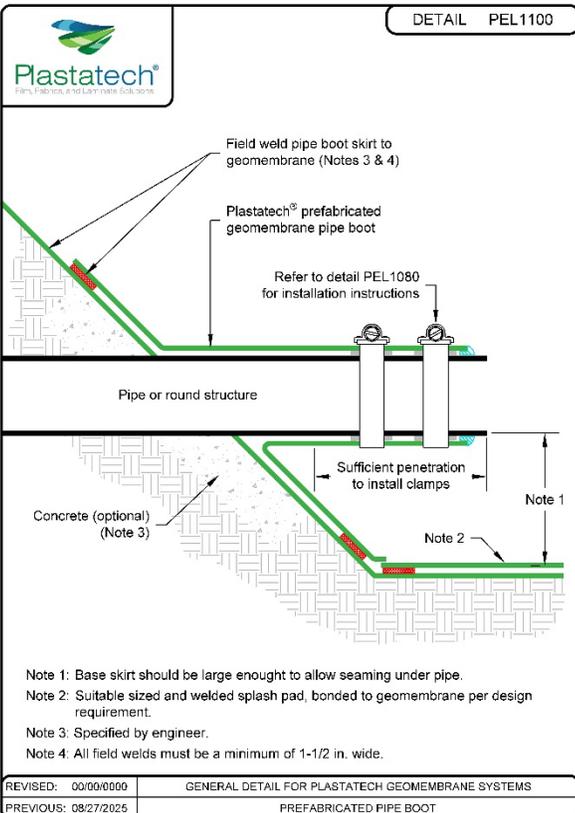
### 1080 Standard Pipe Boot Banding



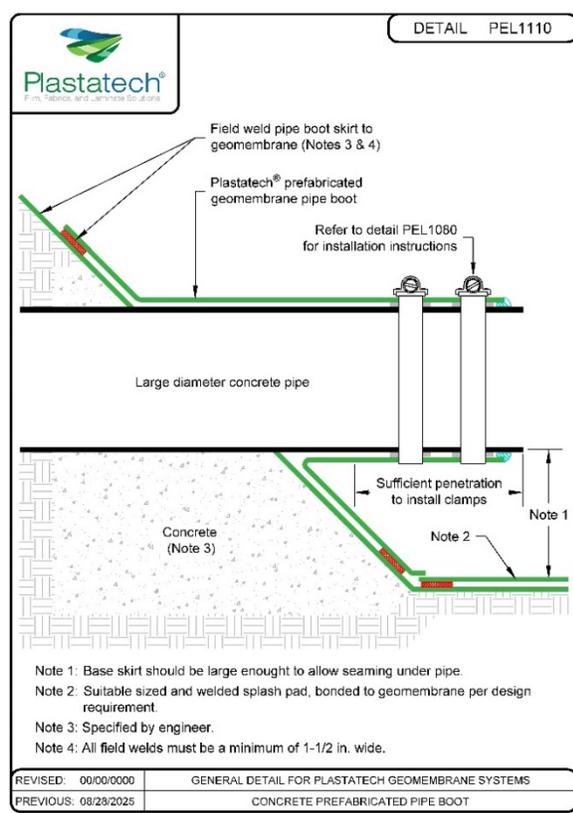
### 1090 Pipe Boot Installation



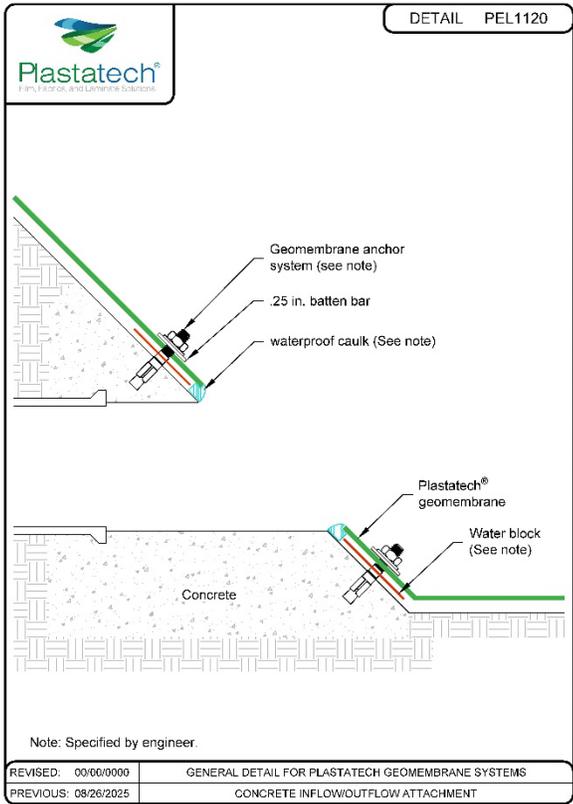
### 1100 Standard Angled Pipe Boot Installation



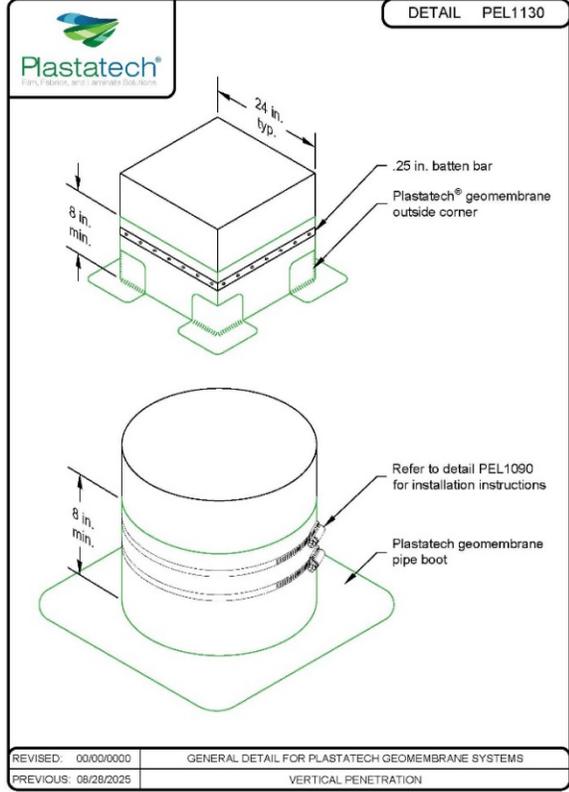
### 1110 Concrete Angled Pipe Boot Installation



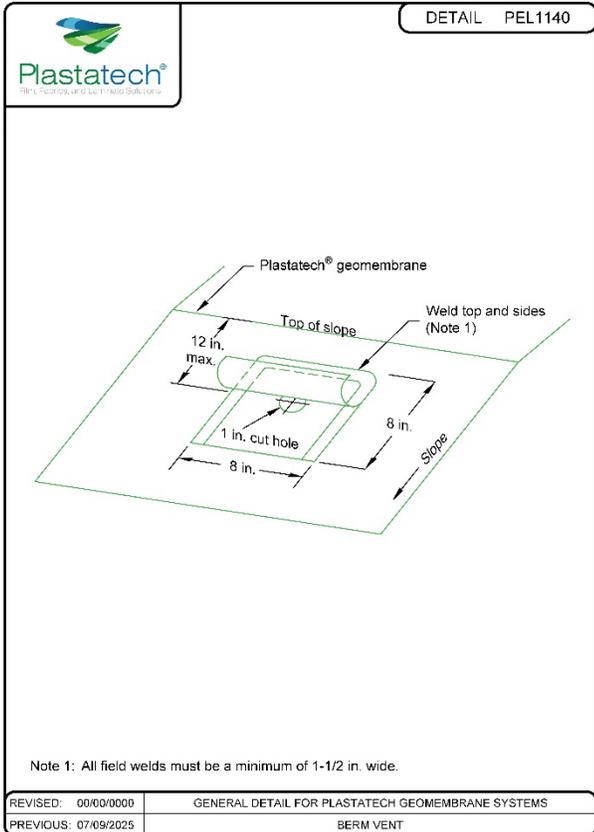
### 1120 In Flow and Out Flow Termination



### 1130 General Detail Flashing Installation



### 1140 Berm Vent Installation



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