



StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management™



Installation Instructions

StormTech® Chamber System for Stormwater Management

Before You Begin

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable $\frac{3}{4}$ " – 2" (20-50 mm) clean, crushed, angular stone per **Tables 4 & 5** on page 10
- Acceptable fill materials per **Table 5** on page 10
- Filter fabric
- StormTech end caps
- StormTech chambers
- Reciprocating saw or router (to custom cut end cap holes)
- OSHA compliance
- Stone bucket
- Tracked excavator
- Transit or laser
- Vibratory roller with maximum gross vehicle weight of 12,000 lbs and a maximum dynamic force of 20,000 lbs

Requirements for System Installation

1 StormTech LLC requires installing contractors to use and understand StormTech's most current installation instructions prior to beginning system installation.

All illustrations and photographs are examples of typical situations. Actual designs may vary. Be sure to follow the engineer's drawings.

2 StormTech offers installation consultations to installing contractors. Contact StormTech at least 30 days prior to system installation to arrange a pre-installation consultation. Our representatives can answer questions, address comments and provide information about the StormTech chamber system's installation requirements. Call **1-888-892-2694** or visit www.stormtech.com to receive the most current version of our installation instructions.

3 Contact local underground utility companies prior to construction.

4 All StormTech system designs must be certified by a registered professional engineer.

5 StormTech's requirements for systems with a pavement design (asphalt, concrete pavers, etc.): Minimum cover is 18" (457 mm) not including pavement; maximum cover is 96" (2438 mm) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 24" (610 mm), maximum cover is 96" (2438 mm).

6 The contractor must report any discrepancies with the system subgrade soil's bearing capacity to the design engineer.

7 Check chambers for shipping damage prior to installation. Units that have been damaged must not be installed. Contact StormTech immediately upon discovery of any damage.

8 Filter fabric must be used as indicated in the engineer's drawings.

9 To maintain row separation distances and prevent chamber displacement, place stone between chamber rows and around perimeter as required by the most current version of StormTech's Installation Instructions.

10 Backfilling of the chamber system must be in accordance with the most current version of StormTech's Installation Instructions.

11 The contractor must refer to StormTech's Installation Instructions for Tables of Acceptable Vehicle Loads at various depths of cover. This information is also available at www.stormtech.com. The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.

12 The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.

13 StormTech products must be designed and installed in accordance with StormTech's minimum requirements. Failure to do so will void the limited warranty.

14 StormTech product warranty is limited. See current product warranty for details. To acquire a copy call StormTech at 1-888-892-2694 or visit www.stormtech.com.

15 For installation instructions for any additional structures or fittings not covered in these instructions, contact StormTech at 888-892-2694.

Requirements for Excavating and Preparing the Site



Left side of bed being prepared while right side is concurrently installed.



Filter fabric and underdrains installed.

1 Excavate and level the designated area. Be sure to excavate at least one extra foot around the perimeter to allow for proper fit and adequate compaction.

2 Excavation must be free of standing water. Dewatering measures must be taken if required. Positive drainage of the excavation must be maintained.

3 Prepare the chamber bed's subgrade soil as outlined in the engineer's drawings.

4 Place AASHTO M288 Class 2 non-woven filter fabric over the prepared subgrade soils. **Table 3** lists suitable geotextiles. The filter fabric must overlap at least 2 feet (610 mm) where the fabric edges meet.

5 Place AASHTO M288 Class 2 non-woven filter fabric around the perimeter of the excavated bed as specified in the engineering drawings.

NOTE: (Fabric is required over the top of the entire chamber system after the 6" (152 mm) of stone is placed over chambers.)

6 Perforated pipe outlet underdrains may be designed within the one foot stone perimeter. Install perforated pipe outlet underdrains as required by the engineer's drawings.

7 Place acceptable $\frac{3}{4}$ -2" (20-50 mm) clean, crushed, angular stone foundation material over the entire bottom surface of the bed (see **Tables 4 & 5** for stone requirements). Refer to the engineer's drawings for subgrade soil preparation and required stone foundation thickness.

8 Compact the stone using a vibratory roller with its full dynamic force applied to achieve a flat surface.

Requirements for Assembling Inlet Pipes

NOTE: Depending on the system's design, it may be advantageous to lay out the inlet and outlet pipe systems prior to forming the bed of chambers.



Cut an opening for the distribution pipe.



24" - 18" (610-457 mm) reducers installed to stay within the 25" (635 mm) maximum OD limit for the SC-740.

1 Temporarily layout the header/manifold system according to the engineer's drawings.

2 Stone foundation scour control measures such as splash pads, riprap, or geotextiles may be required by the design engineer. Locate and install scour control measures per engineer's drawings if required.

3 Set first chamber of each row aligned with their inlet pipes if applicable. A minimum 6" (152 mm)* clear spacing, measured between feet, is required between adjacent rows. Separate chambers and inlet fittings as necessary to maintain 6" (152 mm) clear space between chamber rows.

4 With a reciprocating saw, cut an opening for the inlet piping in the applicable endcaps at the specified invert height.

NOTE: Inlet pipe openings may be cut anywhere on an endcap. To do this, take a short length of pipe and use a marker to draw an outline of the pipe on the endcap at the correct height.

5 Insert the distribution pipes into the endcaps.

6 Once chamber spacing requirements are met, the header/ manifold system may be permanently assembled.

***6" (152 mm) is the minimum recommended spacing. A wider spacing may be required as indicated on the engineer's drawings.**

Requirements for Installing the Chambers



Maintain a minimum of 6" (152 mm) between chamber feet.

1 To begin building the chamber bed, orient the chambers so the end labeled "Build Rows in This Direction" is closest to the bed's edge and the arrows point in the direction of the build.

Maintain a minimum 6" (152 mm) separation between chamber rows (measurement taken from the foot of chambers).



Requirements for Joining the Chambers StormTech



Construct the chamber bed by overlapping the chamber's end corrugations.

Although not visible to the eye, a chamber's end corrugations are sized differently to allow for an overlapping joint. To ensure proper joint fit, orient all chambers in the bed with their arrows pointing in the direction of the build. The chamber's overlapping feet are a distinguishing feature to help quickly identify the proper chamber orientation.

1 Construct the chamber bed by joining the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber onto the end corrugation of the last chamber in the row. Be sure that chamber placement does not exceed the reach of the construction equipment used to place the stone.

NOTE: Do not overlap more than one corrugation.

Requirements for Attaching the End Caps



Lift the end of the chamber and place the end cap into the end corrugation.

1 Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber's end corrugation.

NOTE: End caps are required only at the beginning and the end of each row of chambers.

Requirements for Placing Stone Over the Chambers



A minimum of three feet (914 mm) cover is required for trucks to dump stone. (See page 7, Section 4)

Angular stone meeting the specifications in **Tables 4 & 5** and **Figure 1** on page 10 may be placed over the chambers with an excavator, pushed with a dozer or walked in with a stone conveyer boom. Each method has benefits and limitations. These three processes will be explained separately, however there are some common requirements for each: The 6" (152 mm) minimum clear spacing must always be maintained between adjacent StormTech's chamber rows; and, construction vehicle loads must not exceed the requirements of **Tables 1 & 2** on page 9.

Requirements for Placing Stone with an Excavator



Carefully ladle 3/4-2" (20-50 mm) clean, crushed, angular stone over the centerline of the chamber row.

Placing stone with an excavator is currently the most common method of placing stone over StormTech's chambers. Its biggest limitation is the reach of the excavator arm. For larger beds it is common practice to work across a bed by joining only a few rows of chambers and placing their angular stone embedment, the filter fabric and soil fill before moving onto the next few rows.

A bed may be built either parallel to or perpendicular to the chamber row's direction with this process. The excavator typically works inside the excavation, leading the way across the bed. It is also possible for the excavator to work at grade over the recently placed chambers following the build across. If this process is done it is required that the depth of cover between tops of chambers and the excavator's tracks be the minimum required by **Tables 1 & 2** on page 9.

- 1** Anchor chambers by carefully ladling angular stone directly over the centerline of the chambers. Evenly distribute stone to minimize chamber movement while maintaining row separation distances.
- 2** After chambers are anchored, continue to place the stone, surrounding the chambers and filling the perimeter areas to a minimum of 6" (152 mm) over the top of chambers. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2** on page 9.
- 3** Repeat steps 1 & 2 until all the chambers are laid to the dimensions of the engineer's drawing.

Requirements for Pushing Stone with a Dozer



Low ground pressure track vehicle pushing stone parallel with rows.

A dozer may be used to push the angular stone embedment into place over the chambers. There are some strict requirements for this process.

- 1** **All stone must be pushed in a direction parallel with the rows of chambers.** Pushing stone perpendicular across chamber rows may cause the chambers to move, possibly reducing the required 6" (152 mm) minimum spacing between rows.
- 2** Always maintain the required cover between the tops of chambers and the dozer tracks, per **Table 2** on page 9. The contractor must check **Table 2** on page 9 to determine if their construction vehicles can be used over the chamber bed.

Requirements for Pushing Stone with a Dozer (cont.)

3 The angular stone cover height should never differ by more than 2 feet (610 mm) over adjacent chambers unless there is a minimum cover of 3 feet (914 mm) over the chambers. Stone should be pushed in small piles and spread evenly to prevent movement of chamber rows.

4 Full dump trucks must not drive over or dump stone over StormTech chambers unless

there is a minimum of 3 feet (914 mm) of cover over the chambers. It is convenient for truckers to dump stone as close to the dozer as practical, however a full truck is often the heaviest load on a construction site. Raising the body to dump stone significantly increases the rear wheel loads. Three feet (914 mm) of cover is the minimum requirement for dumping stone over StormTech chambers.

Requirements Placing Stone with a Telescoping Conveyor Boom



Placing stone with the conveyor boom extended.



Evenly distributing stone with conveyor boom.

Telescoping aggregate conveyer trucks are becoming increasingly popular at construction sites. Their use can save a significant amount of time, money and free up other heavy equipment for other uses. They are only limited by the range of the boom. Typical trucks have a boom range between 50 to 130 feet (9-15 m). Booms can convey up to 360 cubic feet (110 m³) of stone per hour.

1 Anchor chambers by carefully ladling angular stone directly over the centerline of the chambers. Evenly distribute stone to minimize chamber movement while maintaining row separation distances.

2 After chambers are anchored, continue to place the stone, surrounding the chambers and filling the perimeter areas to a minimum of 6" (152 mm) over the top of chambers. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2 on page 9.**

3 Repeat steps 1 & 2 above until all the chambers are laid to the dimensions of the engineer's drawings.

Requirements for Backfilling the System



Roll out filter fabric.



Backfill the bed using an acceptable fill material.



Continue to backfill the chamber bed.

1 Place the required angular stone over the entire bed area as described in previous sections.

2 Cover the entire installation area with AASHTO M288 Class 2 non-woven filter fabric. Take the fabric from the perimeter and lay it over the top of the stone. The filter fabric must overlap at least 2 feet (610 mm) where the edges of the fabric meet.

3 The first 12 inches (305 mm) of fill material must meet the requirements of **Table 5** on page 10. Backfill over the top of the filter fabric in lifts that do not exceed 6 inches (152 mm). Distribute the fill with a construction vehicle that meets the maximum wheel loads or ground pressure limits specified in **Tables 1 & 2** on page 9.

4 Compact each lift of backfill as specified in the engineer's drawings. StormTech requires compacting to a minimum of 95% of the Standard Proctor density. Use a walk-behind or vibratory roller not to exceed a maximum gross vehicle weight of 12,000 lbs and a maximum dynamic force of 20,000 lbs.

5 Continue to backfill over the chamber bed in 6" (152 mm) maximum lifts until the specified grade is achieved. StormTech's cover requirements are 18" (457 mm) minimum and 96" (2438 mm) maximum over the top of the chambers. For pavement sub-base or special fill requirements, see engineer's drawings.

The backfill height differential should never differ by more than 2 feet (610 mm) over adjacent chambers. Minimum cover heights must be met before vehicles are allowed on top of the system. Large rocks and organic matter such as roots, stumps, etc. must not be part of the backfill material. Refer to **Table 5** on page 10 for Acceptable Cover Materials or contact the design engineer for approved fill types.



Acceptable Vehicle Loads

StormTech

TABLE 1 – Maximum Allowable Axle Loads for Wheeled Vehicles at Various Cover Depths

Fill Depth (in. over chamber)	Max. Axle Load (lbs)
6	8,000
12	16,000
18 with pavement	32,000
24+ without pavement	32,000

NOTE: 36" (914 mm) of cover over the chambers is required for full dump truck travel and dumping. See instruction number 4 on page 7.

TABLE 2 – Maximum Allowable Ground Pressures for Various Vehicle Track Widths and Fill Depths

Fill Depth (in. over chamber)	Track Width (in.)	Max. Ground Pressure (PSF)*
6	12	1070
	18	900
	24	800
	30	760
	36	720
12	12	1540
	18	1190
	24	1010
	30	910
	36	840
18	12	2010
	18	1480
	24	1220
	30	1060
	36	950

* Ground pressure is vehicle operating weight divided by total truck contact area for both tracks. Call StormTech at **1-888-892-2694** or visit www.stormtech.com for examples of allowable tracked vehicles.

Acceptable Geotextiles

TABLE 3 – Some Suitable Geotextiles

Manufacturer	AASHTO M288 Class 2 Non-Woven*	AASHTO M288 Class 1 Woven**
Amoco Fabrics and Fibers (Part of BP)	ProPex 4506, ProPex 4508, ProPex 4551, ProPex 4552, ProPex 4553	ProPex 2006, ProPex 2016, ProPex 2004
Belton Industries	—	Beltech 315 Style 883
Carthage Mills	FX-60HS, FX-80HS	FX-66
Contech Const. Products	C-70NW	—
GSE Lining Technology	NW6, NW8	—
Maccaferri	MacTex MX245, MacTex MX275	—
Mirafi Const. Products	Mirafi 160N, Mirafi 180N	Mirafi 600X, Filterweave 403, Filterweave 404 Geolon HP570, Geolon HP665, Geolon HP770
Pavco - Amanco	NT 3000, NT 4000	TR 4000
SI Geosolutions	Geotex 601, Geotex 801	Geotex 315ST
TNS Advanced Tech.	R 060, R070, R 080, R100	M 403
US Fabrics	US 205NW-C	US 315
Webtec	TeraTex N06, TeraTex N08	TeraTex HD

*AASHTO M288 Class 2 Non-Woven Geotextile Application: 1. Separation layer between angular stone cover and fill to prevent fines intrusion. 2. Filter layer over the chambers of the Stormtech Isolator™ Row to prevent fines migration out of row while maintaining adequate hydraulic flows.

**AASHTO M288 Class 1 Woven Geotextile Application: Stabilization layer for the angular stone foundation of the StormTech Isolator™ Row to prevent scouring of the stone base during the JetVac maintenance procedure, modest hydraulic flows maintained.

Acceptable Fill Materials

TABLE 4 – Criteria for Acceptable 3/4 – 2" (20-50 mm) Clean, Crushed, Angular Stone

Clean Crushed Stone	Description	Criteria
Acceptable	Angular	Stones have sharp edges and relatively plane sides with unpolished surfaces
	Subangular	Stones are similar to angular description but have rounded edges
Unacceptable	Subrounded	Stones have nearly plane sides but have well-rounded corners and edges
	Rounded	Stones have smoothly curved sides and no edges

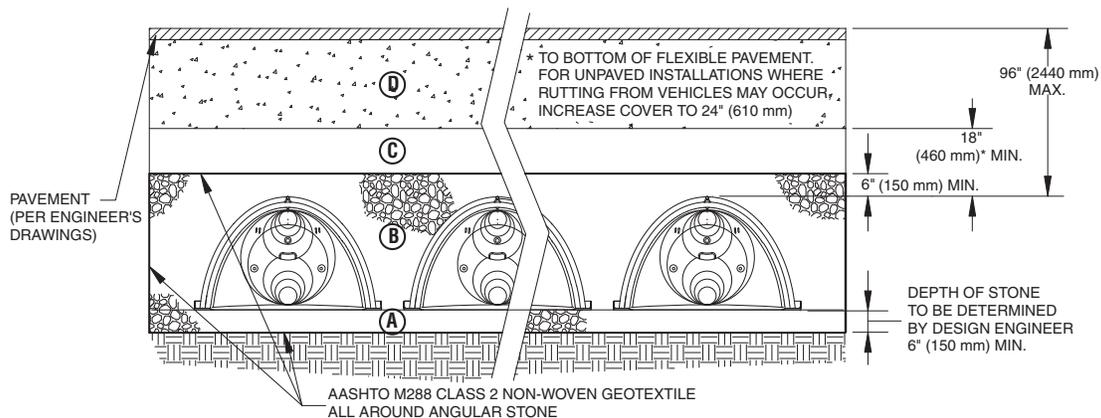
NOTE: See (A) & (B) of Table 5 for additional angular stone requirements.

TABLE 5 – Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation	AASHTO M145 Designation	Compaction/Density Requirement
(D) Fill Material from 18" (457 mm) to grade above chambers	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	N/A	Prepare per engineer's plans. Paved installations may have stringent material and preparation requirements.
(C) Fill Material for 6" to 18" (152-457 mm) elevation above chambers [24" (610 mm) for unpaved installations]	Granular well-graded soil/ aggregate mixtures, <35% fines	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	A-1 A-2 A-3	Compact in 6" (152 mm) lifts to a min. 95% Standard Proctor density. Roller gross vehicle weight not to exceed 12,000 lbs. Dynamic force not to exceed 20,000lbs.
(B) Embedment Stone surrounding and to a 6" (152 mm) elevation above Chambers	Clean, angular stone with the majority of particles between 3/4-2" (20-50 mm)	3, 357, 4, 467 5, 56, 57	N/A	No compaction required.
(A) Foundation Stone below Chambers	Clean, angular stone with majority of particles between 3/4-2" (20-50 mm)	3, 357, 4, 467 5, 56, 57	N/A	Plate compact or roll to achieve a 95% Standard Proctor Density.

PLEASE NOTE: The listed AASHTO designations are for gradations. The stone must also be clean, crushed angular. For example, the stone must be specified as clean, crushed, angular No. 4. stone.

FIGURE 1 – Fill Material Locations





Requirements for Assembling the StormTech Isolator Row

The StormTech Isolator Row is a row of chambers designed to trap sediments in stormwater and provide access for inspection and maintenance. The StormTech Isolator Row is a row of StormTech chambers surrounded with two types of filter fabric: a strip of AASHTO M288 Class 1 woven geotextile laid down between the foundation stone and the row of chambers, and; a strip of AASHTO M288 Class 2 non-woven geotextile draped over the row of chambers. Note that the tough, woven geotextile is required on the bottom to provide a durable surface for future maintenance procedures. See **Table 3** on page 9 for a list of Acceptable Geotextiles. Isolator Row configurations are custom designed for each project and may vary from project to project. The actual layout shall be installed according to the engineer's drawings and these installation instructions.

1 The Isolator Row is designed with an access manhole just upstream of the Isolator Row inlet. It is recommended that the access manhole be installed prior to assembling the Isolator Row. The access manhole generally contains a high flow weir that diverts the first flows to the Isolator Row. Flows that exceed the design capacity of the Isolator Row over top the bypass weir and discharge to the distribution manifold. For weir construction details, see the engineer's drawings.

2 Installation of the Isolator Row may begin after the stone foundation is laid and prepared per the engineer's drawings. See *Requirements for Excavating and Preparing the Site* in this manual.

3 Layout the Isolator Row. For detailed layout dimensions, see the engineer's drawings or StormTech layout details for the project.

4 Roll out a continuous strip of AASHTO M288 Class 1 woven geotextile over the angular stone foundation so the open bottom area of Isolator Row chambers will be completely covered. There must not be any seams in the woven geotextile. **Table 3** lists acceptable woven geotextiles. See **Figure 2** for the width of the fabric strip required.

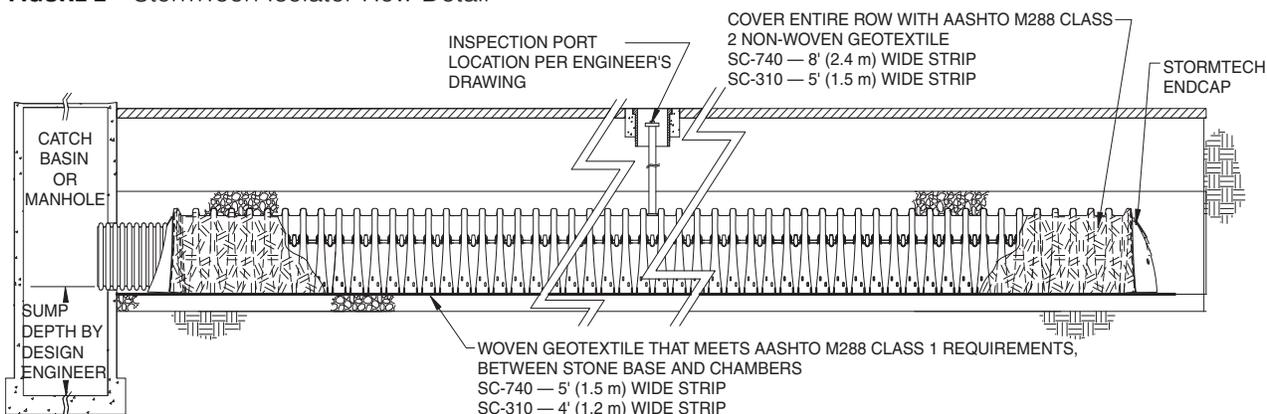
5 Form the Isolator Row by joining Stormtech chambers centered over the woven geotextile. See *Requirements for Joining Chambers* in this manual.

6 A short segment of pipe is typically used to connect the manhole to the Isolator Row through a StormTech endcap. See *Requirements for Attaching Inlet Pipes* in this manual for direction on connecting the pipe to the endcap.

7 Drape a strip of AASHTO M288 Class 2 non-woven geotextile over the row of chambers. This is the same type of non-woven filter fabric used as a separation layer around the angular stone of a StormTech system. A single continuous piece is preferred. **Table 3** lists suitable non-woven geotextiles.

8 See *Requirements for Placing Stone and Requirements for Backfilling the System* in this manual for directions on completing the Isolator Row installation.

FIGURE 2 – StormTech Isolator Row Detail



STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

- (A) This Limited Warranty applies solely to the StormTech chambers and endplates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and endplates are collectively referred to as the "Products."
- (B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.
- (C) **THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**
- (D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. **UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.**
- (E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.
- (F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.
- (G) **THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLIGENCE; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.**



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