StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠

SC-310 / SC-740 / DC-780

Installation Instructions

StormTech® Chamber System for Stormwater Management

Before You Begin

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable nominal ¾" – 2" (19 - 51 mm) clean, crushed, angular stone per **Tables 4 & 5** on page 10
- Acceptable fill materials per **Table 5** on page 10
- Geotextiles
- 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 (53 kN) and a maximum dynamic force of 20,000 lbs (89 kN)

Requirements for System Installation

1 StormTech 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 StormTech's requirements for systems with pavement design (asphalt, concrete pavers, etc.): Minimum cover for the SC-740, DC-780 and SC-310 chambers is 18" (457 mm) not including pavement; Maximum cover for the SC-740 and SC-310 chambers is 96" (2438 mm) including pavement design; Maximum cover for the DC-780 chamber is 12' (3.66 m) 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 as stated above.

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

6 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.

7 Geotextile must be used as indicated in the engineer's drawings.

8 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.

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

10 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 traveling over the stormwater system.

11 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.

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

Requirements for Excavating and Preparing the Site

Far side of bed being prepared while near side is concurrently installed.

Geotextile and underdrains installed.

1 Excavate and level the designated area. Be sure to excavate at least one extra foot (305 mm) 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 subgrade soil as outlined in the engineer's drawings.

4 Place ADS 601 non-woven geotextile (or equal) over the prepared subgrade soils and up the excavated walls. **Table 3** lists other suitable geotextiles. The geotextile must overlap at least 2 feet (610 mm) where the geotextile edges meet.

5 Place ADS 601 non-woven geotextile (or equal) around the perimeter of the excavated bed including the manifold system as specified in the engineering drawing.
NOTE: (Geotextile is required over the top of the entire chamber system after the 6" (152 mm) of stone is placed over chambers.)

6 Install perforated underdrains as required by the engineer's drawings. Underdrains may be located around the perimeter of the bed or under the chambers with proper separation from the foot of the chamber to the top of the underdrain pipe.

7 Place acceptable nominal ¾-2" (19-51 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.
NOTE: Frozen aggregates or backfill shall never be used in the construction of these systems.

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.

Scour protection geotextile at manifold.

24" (600 mm) inlets are the maximum size that can fit into an SC-740/ DC-780 end cap and must be prefabricated with a 24" (600 mm) pipe stub. SC-310 chambers with a 12" (300 mm) inlet pipe must use a prefabricated end cap with a 12" (300 mm) pipe stub.

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

2 Place a minimum 12.5 feet (3.8 m) of ADS 315ST (or equal) woven geotextile over the bedding stone under each inlet stub off the manifold system. Check the engineer's drawing to determine if additional scour control measures are 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 spacing. A wider spacing may be required as indicated on the engineer's drawings.**

NOTE: If Isolator Rows are specified on the engineer's plans, see page 11 for installation instructions.

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 edge of the foot of the chambers).***

All pipe connections into and out of the chambers must be through the end caps or the inspection port knock-out. Never cut a hole in the sides of the chamber.

Requirements for Joining the Chambers

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

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 overlapping 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)

Clean, crushed, 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 nominal 3/4–2" (19-51 mm) clean, crushed, angular stone over the centerline of the chamber row.

Placing stone with an excavator is a 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 geotextile 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 the 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 and manifolds. **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 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 can often be the heaviest loads on a construction site. StormTech requires a minimum of 3 feet (914 mm) of cover during the initial installation of the chamber bed when large dump truck loads are present. The additional cover helps to offset affects from any wheel rutting that may occur as well as large loads induced on the back wheels during dumping loads.

During paving operations, dump truck axle loads on 18" (457 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18" (457 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.

Requirements for Placing Stone with a Telescoping Conveyer Boom

Placing stone with the conveyor boom extended.

Telescoping aggregate conveyer trucks are only limited by the range of the boom. Typical trucks have a boom range between 50 to 130 feet (15-40 m). Booms can convey up to 360 cubic feet (10.2 m^3) of stone per hour.

1 Anchor chambers by carefully ladling clean, crushed, 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 including manifolds 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 non-woven geotextile over the angular stone.

Backfill the bed using an acceptable fill material.

Continue to backfill the chamber bed.

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

2 Cover the entire installation area with ADS 601 non-woven geotextile (or equal). Take the geotextile from the trench walls and lay it over the top of the stone. The geotextile must overlap at least 2 feet (610 mm) where the edges of the geotextile 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 geotextile 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 until StormTech's minimum cover requirements are met. Use a walk-behind or vibratory roller not to exceed a maximum gross vehicle weight of 12,000 lbs (53 kN) and a maximum dynamic force of 20,000 lbs (89 kN).

5 Once StormTech's minimum cover requirements are met, continue to backfill over the chamber bed until the specified grade is achieved. The SC-740, SC-310 and DC-780 minimum cover requirement is 18" (457 mm) to bottom of flexible pavement. The SC-740 and SC-310 maximum cover requirement is 8 ft (2.44 m). The DC-780 maximum cover requirement is 12 ft (3.66 m). For pavement subbase 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

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

Fill Depth (in. over chamber) [mm]	Max. Axle Load (lbs) [kN]
6 [152]	8,000 [35]
12 [305]	16,000 [71]
18 with pavement [457]	32,000 [142]
24+ without pavement [610]	32,000 [142]

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) [mm]	Track Width (in.) [mm]	Max. Ground Pressure (PSF)* [kPa]
6 [152]	12 [305]	1070 [51]
	18 [457]	900 [43]
	24 [610]	800 [38]
	30 [762]	760 [36]
	36 [914]	720 [34]
12 [305]	12 [305]	1540 [74]
	18 [457]	1190 [57]
	24 [610]	1010 [48]
	30 [762]	910 [43]
	36 [914]	840 [40]
18 [457]	12 [305]	2010 [96]
	18 [457]	1480 [71]
	24 [610]	1220 [58]
	30 [762]	1060 [51]
	36 [914]	950 [45]

* Ground pressure is vehicle operating weight divided by total track contact area for both tracks.

Acceptable Geotextiles

Table 3 – Some Suitable Geotextiles

Manufacturer	AASHTO M288 Class 2 Non-Woven*	AASHTO M288 Class 1 Woven**
Belton Industries	—	Beltech 977
Carthage Mills	FX-60HS, FX-80HS	FX-66
GSE Lining Technology	NW6, NW8	—
Maccaferri	MacTex MX245, MacTex MX275	—
Pavco-Amanco	NT3000M, NT4000M	TR 4000
Propex	Geotex 651, Geotex 861, Geotex 601, Geotex 701, Geotex 801	Geotex 315ST, Geotex 2x2HF, Geotex 250ST
SKAPS Industries	GT 160NW, GT 180 NW	W315
Tencate Mirafi	Mirafi 160N, Mirafi 180N	Mirafi 600X, Filterweave 403, Filterweave 404, Geolon HP570, Geolon HP665, Geolon HP770
TNS Advanced Tech.	R060, R070, R080, R100	—
US Fabrics	US 205NW, US 160NW	US 315

*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: 1. 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. 2. At each inlet row to prevent scouring of the foundation stone.

Acceptable Fill Materials

Table 4 – Criteria for Acceptable Nominal 3/4 – 2" (19-51 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 Ⓐ & Ⓑ of Table 5 for additional angular stone requirements.

Table 5 – Acceptable Fill Materials

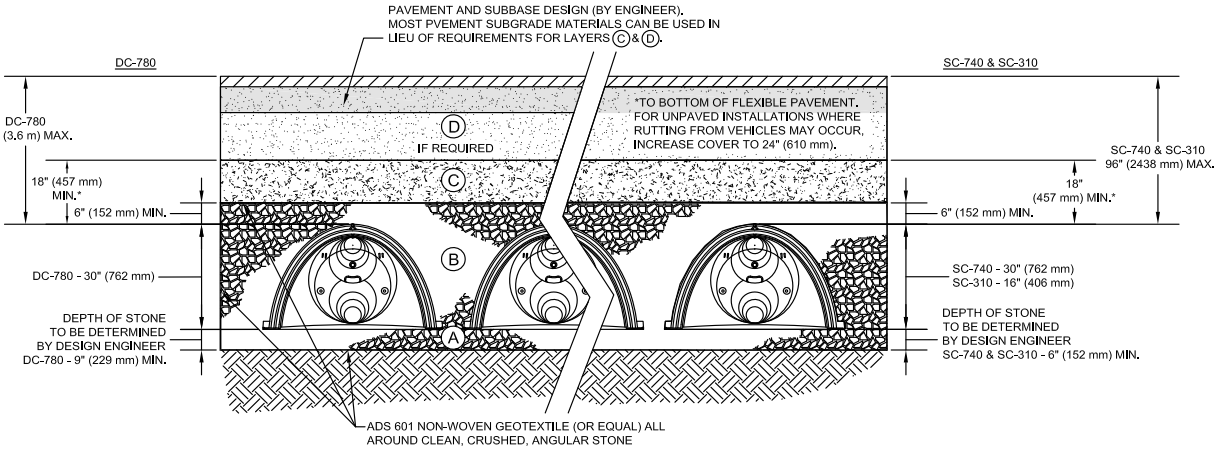
Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (457 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines. Most pavement subbase materials can be used in lieu of this layer.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (305 mm) of material over the chambers is reached. Compact additional layers in 6" (152 mm) max. lifts to a min. 95% Standard Proctor density. Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN).
Ⓑ Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone nominal particle size distribution 3/4 - 2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	No compaction required.
Ⓐ Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone, nominal size distribution 3/4-2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	Plate compact or roll to achieve a 95% Standard Proctor Density.[2]

PLEASE NOTE:

1. ***The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone."***
2. ***As an alternate to Proctor Testing and field density measurements on open graded stone, StormTech compaction requirements are met for 'A' location materials when placed and compacted in 9" (229 mm) (max.) lifts using two full passes with an appropriate compactor.***

Figure 1 – Fill Material Locations

Once layer 'C' is placed any soil/material can be placed in layer 'D' up to the finished grade. Most pavement subbase soils can be used to replace either layer 'C' or 'D' at the design engineer's discretion.



Requirements for Assembling the StormTech Isolator Row

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 typically 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 Roll out bottom material in a continual strip. Use ADS 315ST (or equal) over the angular stone foundation so the area where the Isolator Row chambers will be placed 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 geotextile strip required.

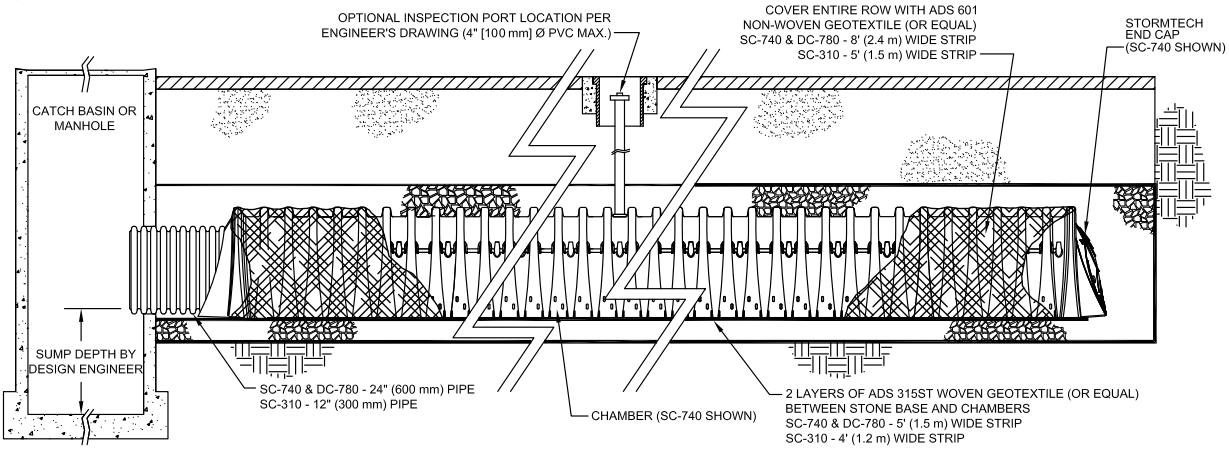
4 Form the Isolator Row by joining Stormtech chambers centered over the woven geotextile. *See Requirements for Joining Chambers* in this manual.

5 A short segment of pipe is typically used to connect the manhole to the Isolator Row through a StormTech fabaricated end cap.

6 Drape a strip of ADS 601 non-woven geotextile (or equal) over the row of chambers. This is the same type of non-woven geotextile 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.

7 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



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StormTech products are covered by one or more of the following patents: U.S. Patents: 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844; Canadian Patents: 2,158,418 Other U.S. and Foreign Patents Pending

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