



GEOSTRUX® TUBE INSTALLATION INSTRUCTIONS

PRODUCT DELIVERY, HANDLING, & STORAGE

Your Geostrux Tube will be delivered in a protective wrap that consists of a nonwoven geotextile and a plastic wrap. You should inspect the protective wrap for any signs of damage to the enclosed Geostrux Tube and report any damage with photographs to GSI within two days of delivery and before unwrapping your Geostrux Tube. Extreme caution should be used while removing this protective wrap to avoid cutting or damaging the Geostrux Tube inside. No hooks, tongs, or other sharp devices should be used to handle the Geostrux Tube at any time. It is recommended to use machinery fitted with a “stinger bar” that can be inserted into the core for loading/unloading and any movement of the Geostrux Tube. Alternatively, external lifting straps/slings are also provided and may be used to load/unload and move the tube. Care should be taken so as to not damage the protective wrap by sliding, dragging, or prodding the roll.

The Geostrux Tube should be kept dry until it is ready to be deployed. It is recommended to elevate (for example, on pallets) the Geostrux Tube during storage to keep the product dry. A tarp should be used to cover the Geostrux Tube while being stored outside to protect it from environmental conditions and UV exposure. The protective wrap should remain in place until the Geostrux Tube is ready to be deployed.

Care should be taken to assure that there are no sharp or protruding objects (such as roots, metal objects, etc.) or traffic in the storage area that may damage the Geostrux Tube. No equipment or materials should be allowed on or near the Geostrux Tube to avoid damaging any tubes.

In no event should you use any Geostrux Tube that shows signs of wear, cuts, strain, weaknesses, or damage.

PAD PREPARATION

The subgrade for the placement of the Geostrux Tube must be smooth and free of protrusions which could damage the Geostrux Tube. The subgrade can be graded to a maximum slope of 1% otherwise the Geostrux Tube may move or roll during use. For example, the difference in elevation from one end to the other for a 100 ft long tube would be less than 1 ft. The dewatering pad must have a non-erodible smooth surface or must be lined with an impermeable membrane.



Example of prepared dewatering pad utilizing 24 mil Woven Coated PE Liner

TUBE LAYOUT & DEPLOYMENT

Your Geostrux Tube should be aligned as straight as possible. The Geostrux Tube should be placed on top of the prepared subgrade and unrolled lengthwise in the final location of intended use. No hooks, tongs or other sharp instruments should be used for handling and the Geostrux Tube should not be dragged on the ground. Once unrolled, the Geostrux Tube should be carefully unfolded and aligned so fill ports are on top and centered. Each tube has straps along the longitudinal side seams that can be used to manually adjust the Geostrux Tube in order to remove any slack or folds. These straps can also be used to temporarily anchor the Geostrux Tube to limit movement while filling, but these straps will not be able to restrain movement of the tube during the filling process. This is why a level foundation is critical.

MULTI-TUBE APPLICATIONS

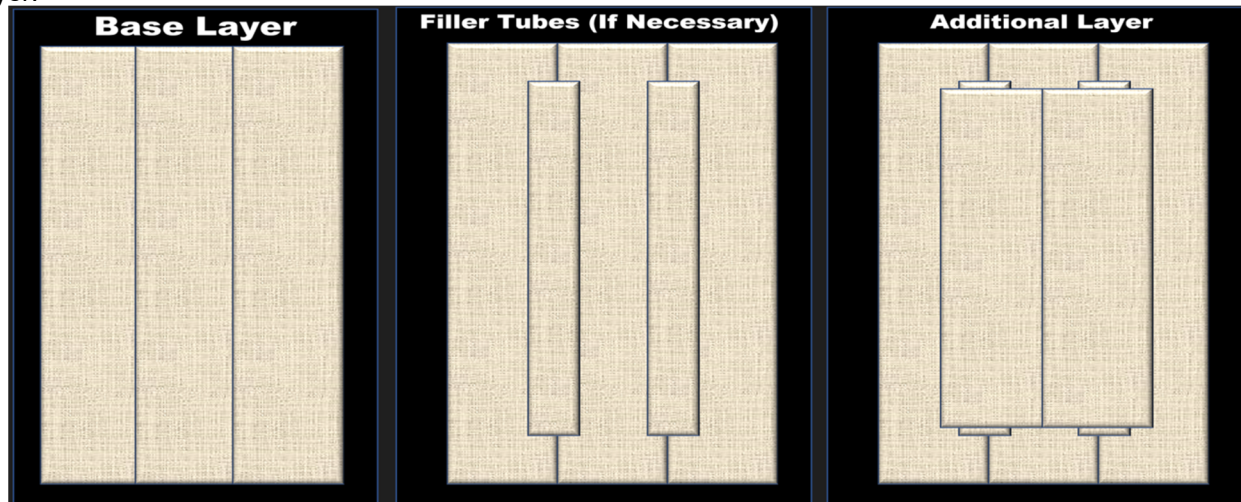
If your project requires the use of multiple Geostrux Tubes that are to be installed in close proximity to one another, or even stacked on top of each other, then GSI recommends the following. First, GSI recommends that you initially layout the unfilled Geostrux Tubes with an overlap of at least 3-5 feet of one tube over the adjacent tube. The overlap will shrink as the Geostrux Tubes are filled and the sides of the Geostrux Tubes rise vertically. This will result in the sides of the filled Geostrux Tubes being in contact with each other and will help provide stability as the Geostrux Tubes will be in contact with each other. Additionally, if you intend to stack your Geostrux Tubes, then this initial overlap, and resulting contact between the adjacent tubes, is necessary.



Example of a stacked application with filler tubes used to fill void space in base layer

If stacking is utilized, then GSI recommends you ensure there is a suitable base layer in place to limit undesirable gaps that could result in tensile failure of the bottom of the unsupported tube and impact stability and deformation of subsequent layers. In the event that significant voids or gaps are present in the base layer, filler tubes can be used to fill the undesirable spaces. Once a suitable base layer is available, then subsequent layers of Geostrux Tubes can be installed using the previously described layout and deployment procedures with one important consideration: Care must be taken to keep any stacked tubes far enough away from the edge of any base layer to prevent rolling or instability of either the base layer or stacked layer tubes. Any rolling or instability could result in a failure of the tubes or create a serious safety hazard.

The following illustration provides an example of a multi-layered tube installation that utilizes filler tubes to create a suitable base layer:



Note: If your intended use requires or contemplates the stacking of any Geostrux Tubes, you should consult an engineer to determine the stacking procedures and allowable stacking heights.

FILLING PROCESS

It is incumbent upon you to determine the type and consistency of materials to be placed into the Geostrux Tube, proper equipment selection, and flow rates to prevent excessive pressures or stresses that may be imparted on the Geostrux Tube. This includes determining the type and nature of the material to be placed in the Geostrux Tube, including any coagulants and chemical composition, and whether that material can be effectively dewatered through the Geostrux Tube so that excessive forces are not exerted on the Geostrux Tube. GSI recommends the engagement of a licensed engineer or experienced professional to perform any such calculations for your use or needs. Additionally, hanging bag tests per ASTM D-7701 are recommended. You should also engage an engineer to determine any other height, width, filling, or loading requirements or limitations in order to limit risk of sliding, overturning, bearing capacity issues, breakage issues, or global stability of the tube system.

Geostrux Tubes are made from polypropylene and polyester. These materials are stable under a wide range of pH and chemical compositions; however, certain caustic chemicals or solvents can degrade and damage the Geotextile Tube. Please consult your engineer prior to placing caustic or deleterious materials in the Geostrux Tube to ensure your materials will not degrade or damage the Geostrux Tube. Any materials or liquids to be placed in a Geostrux Tube should be screened or filtered to preclude the introduction of sharp objects, such as sticks, rocks, debris, etc., that could puncture the Geostrux Tube.

After completing the deployment of the Geostrux Tube, filling with dredged material shall be accomplished in accordance with any construction or engineering plans or requirements developed by others for your specific project. The discharge line of the dredge shall be fitted with manifold system or a “Y-valve” to allow control of the rate of filling. The Y-valve system should be fitted with an internal mechanism, such as a gate, butterfly valve, ball valve, or pinch valve, to allow the user to regulate discharge into the Geostrux Tube. Any excess discharge should be directed away from the Geostrux Tube. The dredge discharge line should be free of protrusions, nicks, sharp edges, etc. that could damage the Geostrux Tube or tear the fill port. The discharge line should be placed inside the port and cinched tight using a heavy-duty zip tie, ratchet straps, or some other means to properly secure the fill port to the discharge line.



Example of mechanical valves to control rate of discharge to the Geotextile Tube

The Geostrux Tube should be filled as evenly as possible utilizing the available fill ports that are spaced every 25’ (of tube length). It is important not to overfill the Geostrux Tube initially as the effluent will need to be allowed to continue to drain as solids consolidate. As the Geostrux Tube

nears the desired fill height, it is often helpful to break the surface tension of the Geostrux Tube to help with water discharge. This is typically done by briefly “slapping” the outside of the Geostrux Tube with a smooth piece of 1” pvc pipe or, if it can be safely accomplished, by walking across the perimeter and the top of the Geostrux Tube.

You should never fill a Geostrux Tube to more than the maximum fill height on more than two occasions as the Geostrux Tube may become compromised with additional fillings and cause a tube failure.

TUBE CAPACITY

GSI provides the following Geostrux Tubes Maximum Fill Capacities Chart as a general guide as to the *theoretical* capacity of each Geostrux Tube. There are a number of factors that go into the actual maximum capacity and any limitations of any Geostrux Tube, such as the intended fill rate, consistency of the dredged materials, dewatering properties of the dredged materials, and simple geometry, that can only be determined by you and your engineer considering your unique circumstances. This Geostrux Tubes Maximum Fill Capacities Chart may not be reflective of your application, and you should not rely on this Chart as being representative of the maximum capacity of the Geostrux Tubes given your unique circumstances. Therefore, you should consult an experienced engineer to help you determine the number and size of the Geostrux Tubes that you will need for your application and the filling limitations for each tube.

The Geostrux Tube may not be filled higher than as determined allowable by your engineer, but in any case, GSI does not recommend filling your Geostrux Tube higher than as follows as higher filling may result in rolling, instability, or failure of the Geostrux Tube. GSI suggests that you have an easily identifiable means of determining the fill height of any Geostrux Tube, such as cross bar, in order to ensure that the intended fill height of the Geostrux Tube is not exceeded.

Sediment Dewatering Applications

Theoretical Maximum Fill Heights and Estimated Capacity for Geostrux® Tubes



Height Feet	15' Circumference		22.5' Circumference		30' Circumference		45' Circumference					
	CY/LF	GAL/LF	CY/LF	GAL/LF	CY/LF	GAL/LF	CY/LF	GAL/LF				
1.0	0.2	46.4	0.4	73.3	0.5	102.5	0.8	156.4				
2.0	0.4	80.1	0.7	133.2	0.9	190.8	1.5	295.5				
3.0	0.5	106.2	0.9	181.8	1.3	264.8	2.1	423.5				
4.0	0.6	130.9	1.1	222.2	1.6	329.9	2.7	535.7				
5.0			1.3	265.6	1.9	392.8	3.2	641.9				
6.0					2.2	435.4	3.6	732.4				
6.5							3.9	781.1				
7.0	<i>Do Not Fill Geostrux Tubes Above the Maximum Fill Height Possible structural stability or failure is likely</i>						4.1	822.2				
7.5												
8.0												

Height Feet	60' Circumference		75' Circumference		90' Circumference	
	CY/LF	GAL/LF	CY/LF	GAL/LF	CY/LF	GAL/LF
1.0	1.0	209.5	1.3	272.3	1.6	326.9
2.0	2.0	407.7	2.6	517	3.1	626.2
3.0	2.9	584.3	3.7	746.7	4.5	908.3
4.0	3.7	750.4	4.8	968.1	5.9	1183.6
5.0	4.5	905.3	5.8	1178.3	7.2	1449.9
6.0	5.2	1054.9	6.8	1370.6	8.4	1696.1
6.5	5.5	1115.5	7.3	1473.9	8.9	1807.5
7.0	5.9	1188.8	7.7	1563.6	9.5	1924.2
7.5	6.2	1250.9	8.1	1639.9	10.1	2045.4
8.0			8.6	1730.5	10.6	2146.4
	<i>Do Not Fill Geostrux Tubes Above the Maximum Fill Height Possible structural stability or failure is likely</i>					

Additional Geostrux Tube size maybe available upon request

Notes as to assumptions used to determine the Theoretical Maximum Fill Heights and Estimated Capacity for Geostrux® Tubes:

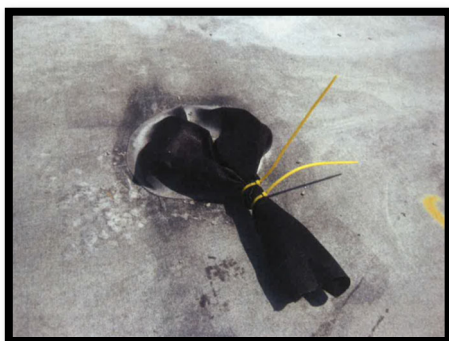
These calculations were performed assuming a typical slurry density of 78.0 lbs/ft³. This density can apply to a wide range of materials and pumping conditions. If your material is heavier or lighter, for example steel mill scale or biosolids, or your filling operation results in very high percent solids by volume, please contact your engineer to determine the appropriate adjustments to the allowable fill heights and estimated capacities. These calculations assume a slurry consisting of quartz-based sandy sediment at a specific gravity of 2.7 being pumped at an average 15% solids by volume. If the consistency of the slurry you intend to fill into a Geostrux Tube differs from the assumed slurry consistency, please contact your engineer to determine the appropriate adjustments to the allowable fill heights and estimated capacities. Stated tube circumferences are nominal. The actual tube circumference is slightly less than the nominal size due to the fabrication process. These calculations are based on the actual circumference.

Column Headings:

Height Feet = Top elevation of Geostrux Tube

CY/LF = Capacity of Geostrux Tube in cubic yards per linear foot

GAL/LF = Capacity of Geostrux Tube in gallons per linear foot



FILLING PORT CLOSURE

Typically, a 1-2' heavy duty zip tie or mechanical strap is utilized for final port closure to assure dewatered material is contained within the Geostrux Tube.

ISSUES

In the very unlikely event that you have any issues, it is important that you immediately contact GSI and maintain any tube with which there is an issue for inspection by GSI.

Thank you for choosing GSI's Geostrux® Tubes for your application