ENVIROTUBES®

A Geotextile Tube

DEWATERING

APPLICATION GUIDE



A Product By Industrrial Fabrics, Inc.

Industrial Fabrics, Inc. has been one of the pioneers in the United States in the manufacturing and installation of structural and dewatering tubes both nationally and internationally. For over 20 years, ENVIROTUBES® have been the most practical and cost effective choice. Industrial Fabrics designs custom DEWATERING and STRUCTURAL tube applications specific to a customers' needs.



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Envirotubes® Applications

Dewatering applications for Envirotubes® include but are not limited to:

- **Marinas**
- **Golf Course Ponds**
- **Urban Lakes**
- **Stormwater Ponds**
- **Municipal Sludge**
- **Super Fund Sites**
- **Power Plant (fly ash)**
- **Papermill Sediment**
- **Agriculture**
- **In-Plant Processes**

Overview



This document is provided only as a guideline for placement, installation, and filling of Envirotubes® for dewatering dredged and slurried material, as well as for some structural applications.

Final preparation and placement of the Envirotubes® is the responsibility of the end user. The proper installation of Envirotubes® is essential to the performance of the tubes both for dewatering and for structural applications.

These guidelines are intended to maximize the conformity between the design intent and the field finished conditions of the project.

Overview (cont.)



The following sections address the preparation and placement of the Envirotubes® as well as the filling procedure.

These guidelines do not purport to address the safety issues associated with the use of Envirotubes® and or Envirotube® systems, including the use or handling of hazardous materials, mechanical equipment and operations.

It is the responsibility of the contractor to establish and adopt appropriate safety and health practices. Also, the contractor shall comply with prevalent regulatory codes such as OSHA regulations while using these guidelines.

Choosing and Sizing

There are two important measurements when using an Envirotube® for dewatering.

One is the in situ volume [the material in the lagoon or pond before dewatering] the other is the haul away volume [volume after dewatering].

Envirotubes® are sized by the haul away volume.

Call IFI Envirotubes® at 225-273-9600 to get the hanging bag and instructions to establish a shrink rate of the sediment to be dewatered. This will determine the quantity of tubes and the laydown area needed.

Envirotubes® are sized by circumference and then length.

The fabric is woven in 15' width so the common denominator for the circumference is 15'. The tube circumference can be 15', 30', 45', 60', or even larger.

The larger the tube the lower the unit cost of dewatering the sediment.

Working Tube Capacity

Tube Circumference	Approximate Capacity (plf)	WT per Linear Foot
15’	0.5 CY	1.8#
30’	2.0 CY	3.6#
45’	4.0 CY	5.4#
60’	6.0 CY	7.2#
75’	8.0 CY	9.0#



Underlayment

The underlayment can be regular building supply 4 mil plastic or Industrial Fabrics, Inc. 12 mil woven coated liner underlayment for “leak-proof” jobs.

The 12 mil woven coated liner underlayment is white on one side for summer use and black on the other for winter use.

Inspection & Offloading



Envirotubes® are rolled on a core and wrapped with a protective cover for shipping. This cover should be inspected for damage before acceptance at the jobsite.

The best way to move Envirotubes® is with a bar through the core and a spreader bar with cables or chains.

With care, the Envirotubes® can be unloaded with a lift truck or rolled into a large loader bucket, especially if they can be placed where they are to be rolled out.

The Envirotubes® will be marked with an arrow showing the direction to be rolled out.

Site Preparation



Site Preparation

There are two major areas of concern placing the Envirotubes® for dewatering slurry.

1). Care must be taken to keep the tubes from rolling; therefore, the Envirotube® must be placed on a level site to work properly.

2). Erosion prevention.

Concern #1: Roll Prevention

The tube does not roll like a log, but like a slinky toy or crawler track. The tube will not roll uphill; therefore a prop must be used to keep the tube from rolling. This can be a pipe (under the underlayment - *see page 6.*), a pushed up dirt berm, or objects like pallets along the low side of the tube.



Also, objects like concrete highway barriers can be used for the Envirotube® to lean against. The second Envirotube® can lean against the first tube.

Where multiple Envirotubes® are to be placed, excavate the lay down area to slant toward the center of the width of the laydown area. Place the center Envirotube® first and let the other Envirotubes® lean on it. A slight grade [1% or less] lengthwise will help control the decant water.

Remember that any grade here will sacrifice Envirotube® capacity. A 1% grade on a 200' long tube will cost 2' of elevation on one end, or an average of 1' of capacity for the entire tube.

If the Envirotubes® must be placed on a lengthwise grade, use shorter Envirotubes® to save capacity. If two 100' long Envirotubes® are used

instead of one 200′ Envirotube® the elevation loss for the 200′ will be 6″ instead of 12″.

Also the longer the Envirotube® on a lengthwise grade, the greater the stress on the structure of the Envirotube® as the Envirotube® tries to roll lengthwise. The Envirotube® is very heavy and will tend to roll downhill.

Pull the Envirotube® straight. Any kinks or wrinkles in the side of the tube will result in a large kink and weak place in the tube. It will also cause the tube to roll.

Concern #2: The Erosion Problem

In order to prevent erosion of the soil underneath the Envirotube®, place the Envirotube® on a hard waterproof surface like concrete or asphalt. If unavailable, an underlayment must be used (see page 6).

When placing the Envirotubes®, an escape route must be prepared to prevent water being trapped behind the Envirotubes® in the laydown area.

Any time the water runs on uncovered ground, severe erosion will be encountered.

Site Preparation (cont.)



The best way to return the water or relocate it is by gravity.

If the water is to be pumped back to the body it came from or elsewhere, caution must be taken to handle the large volumes of water the Envirotubes® produce during dewatering. **CAUTION: Large volume surges of water will result from a sudden release.**

Normally a pit or sump will be dug at the low point. This is then lined with a plastic tarp. The blue tarp from a building supply works well in most situations.

The underlayment plastic is then placed so that it overlaps the tarp in the sump.

Rolling Out the Envirotubes®



Rolling out the Envirotubes®

Envirotubes® are wrapped with a protective cover so the tube will have to be rolled some distance to unwrap the cover.

Use the arrow on the outside of the wrap to get the correct direction.

A large tube can be more easily moved by hand after it is rolled out than when it is rolled up.

A 60' circumference Envirotube® 200 ft long weighs 1800 lbs. It is easier to roll it out downgrade.

Four or five people can roll the tube out, or even re-position it to the correct place after unrolling the cover.



If the Envirotube® has to be moved after it is rolled out the easiest way is to “inchworm” it.

1. Start at the far end of the Envirotube®.

2. Put one or two people on each side of the Envirotube® ten feet from the end.

3. Grab both sides and pull the Envirotube® overlap ten feet towards desired direction. Continue this process by moving up every ten feet, pulling out the slack while repeating until you reach your desired position.

4. The Envirotube® can be straightened by the same method.

Rolling Out Envirotubes® (cont.)



5. Wear gloves. Pull from the side seams and handles.

The corner handles can be used to establish the lay down shape with straight sides.

6. Only roll out the Envirotubes that will be filled or pumped into the same day.

A rolled out Envirotube® can become airborne in a stout wind.

If you need to leave a rolled out empty Envirotube® park a vehicle on both ends.

REMEMBER: The Envirotubes® get more narrow when pumped. Tuck the second Envirotube® up to or under the first Envirotube®.

Pumping into Envirotubes®

1. There will be a fill port sleeve 15' from each end, and ports evenly spaced between with no more than 50' between ports. Normally, a dewatering tube will be filled from one end.

2. Care should be taken to have the fill hose or pipe support itself, and not hang on the fill port sleeve. This can be done by running the line or hose up onto and or across the tube and then into the port.



3. A stinger (short piece of pipe) is used into the fill port sleeve. This can be tied in place or held in place with a small ratchet strap. There is not a lot of pressure on this connection as any pressure in the tube is gravity. The other ports are tied off so they do not leak.



4. When first pumping into the tube observe the level of the Envirotube®. If there is any tendency to roll to a low point it will be obvious at this time. Watch the top seams for sideways movement. If there is a lot of sideways movement in the top seams, let the tube dewater, prop up the low point, and then begin re-pump.

When first pumping into the tube, there will be flutter in the top fabric. This will cause solids to come through the fabric until the fill material is deep enough to prevent the flutter.

5. On a contaminated material job where this is not acceptable, raise the center of the tube fabric at the fill port so you are pumping into a tent and the fill slurry is falling on the floor of the tent.

Pumping Into Envirotubes® (cont.)

This can be accomplished with a couple of saw horses, a plank, and a C clamp. Place the saw horses on either side of the port about where the stinger comes in. In order to get the slack to pick up the fabric, stand on one side of the tube and pull the fill port toward you. Then stand on the other side and pull the fill port again toward you in the other direction. This will gain enough slack to lift the fabric and fasten it with the C clamp to the plank between the saw horses.

Once there is a foot or more of fill in the tube the flutter will be eliminated.



At first, the water will decant through the fabric and the solids will remain. Eventually the fine grain materials will blind off the fabric forming a filter cake. The tube will then pump up like a water balloon.

Pumping Into Envirotubes® (cont.)



As the second Envirotube® is being filled the slurry in the first tube will separate. The water will then get between the filter cake and the slippery fabric separating the filter cake allowing the tube to dewater. Kicking the tube or walking on it is sometimes needed to start this process.

When the second Envirotube® comes to elevation switch back to the first tube.

When needed on repeated fillings, it is possible to pump the Envirotube® to a 6′ elevation or more.

Polymer Application

Polymer

In ***most*** applications a polymer is needed to get timely dewatering and a clear decant. The polymer needs vary from application to application.

In order for the supplier to choose the right polymer, the supplier will need samples of the material .

Envirotubes® usually require 20% to 35% of the quantity of polymer as other dewatering methods.

Industrial Fabrics / Envirotubes® does not supply polymer. Industrial Fabrics, Inc. can furnish polymer supplier contacts; however, is not affiliated with any of them.



Polymer Application (cont.)



The normal procedure of applying the polymer on an Envirotube® dewatering job is to inject the polymer into the slurry line going to the tubes with a metering pump.

A sample port with a valve is installed in the line before the Envirotube® so a sample can be taken to judge the polymer function. The polymer feed rate is increased until a good floc (separation) is achieved and then backed off as much as possible to maintain the floc.

Polymer Application

Enviorotubes® use way less polymer than other dewatering methods. Often only 25% as much. **Note: it is important to use exactly the correct feed rate.**

Rarely two polymers are required, one after the other.

The first one sets up the + or - charge and the 2nd forms a strong floc. The polymer acts like an electric + or - charge only it is chemical.

Without the polymer, the suspended particles will repel each other. This is called hindered settling.

It is necessary to have a strong floc or the floc will extrude through the fabric.

With proper application the polymer stays in the tube with the solids and is approved and even preferred by most State DNR's.





Emptying the Envirotubes®



Emptying the Envirotubes®.

The longer the material is left in the Envirotubes® the less it will weigh and it will continue to shrink over time.

If there is a time restraint on how long the tubes can sit you can tell when the material will pass the paint filter test by opening a port and pushing a long handled shovel into the material handle first. When the shovel stands by itself, it should pass the paint filter test.

The Paint Filter Test

The cone shaped filter used to strain paint is used to test the moisture content of sludge at landfill.

A sample of sludge is placed in filter and no water should drip out. WARNING: When hauling in trucks the water will come to surface of sludge.

The center or core of the solids takes longer to dry. Mixing the center with the exterior will help to avoid a mess.

AVOIDING A MESS

1. The Envirotubes® should be emptied from one end.

2. Cut open one end of the tube just far enough to get at the solids.

3. Fold the flap down to drive on.

4. Continue to cut back the tube as it is emptied. If it rains during this time, just close the flap to eliminate loss and mess. The rain will run off and the solids will not re-saturate.



Frequently Asked Questions (FAQ)

1. WHAT ARE THE GREATEST ADVANTAGES OF USING ENVIROTUBES® OVER MECHANICAL DEWATERING?

- Turn a 90 day job into a 30 day job. (Mechanical processes are only 10% - 20% as efficient as Envirotubes)
- Envirotubes® avoid shutting down the pumping process of the job.
- Envirotubes® requires approximately 25% of the polymer as mechanical processes.
- Dewatering with Envirotubes® is not affected by weather. Rain & weather does not affect dewatering and the material in the Envirotubes® will not re-saturate. (Mechanical processes require the dewatered material to be protected or it will resaturate)
- Envirotubes® avoid capital outlay and expensive equipment to rent or buy.

2. WHAT TO DO ABOUT ODORS?

There is usually very little or any odor when using Envirotubes. Even when dewatering a very smelly organic material. Some chemical odor and cattle manure odor can be strong when using Envirotubes. There is often a visible gas release through the fabric but it is usually CO2 with little or no odor. The usual H2S odor associated with organic sediment is relieved by oxygen during the pumping process.

3. HOW DOES THE ENVIROTUBE® WORK?

The way the Envirotube® works is when pumping into the tube begins the water will come out through the fabric and the solids remain. Eventually the fine grain materials will plug the fabric and the tube will pump up like a water balloon. Then, switch to the next tube. While the next tube is being pumped, the solids will drop out in the first tube and the filter cake will peel off the slippery fabric. The tube will then dewater rapidly .

4. HOW CLEAN CAN I GET THE DECANT WATER?

Different states have their own specs on TSS that can be released to the environment. Any specification can usually be reached. This is especially important when dewatering contaminated materials or releasing to a fragile environment. To get very clean decant a second polymer is sometimes required. Also, special care needs to be taken at the initial fill of the tube to prevent flutter allowing solids to pass through the fabric. Many or most contaminates like PCBs, etc. will cling to the solids and stay in the tube, requiring little or no after treatment.

5. DO I NEED A POLYMER?

A polymer is usually needed and definitely speeds up the dewatering process, makes for clean decant water, and saves money on the Envirotubes. As the tubes and polymer work better with a wet slurry, it is very desirable to return the decant water to the pond.

6. HOW DO I TELL WHAT POLYMER TO USE?

This is determined by testing the slurry with polymers to choose the right one. This can be done on site, or by the polymer MFGR in a lab.

7. HOW DO I TELL HOW MUCH POLYMER TO USE?

When connecting the discharge line to the tubes allow for a sample port before the slurry enters the tube [a 2" ball valve works great]. This way the polymer feed can be adjusted for maximum efficiency, saving time and money.

8. HOW DO I TELL HOW MUCH TO PUMP INTO THE ENVIROTUBE®?

The first pumpings should be approximately about 4' or 5' high. The final pumping to 6' high. The easiest way to measure this is to place a post on both sides of the

tube and run a string across. This can be seen from a distance. Each time the tube is pumped to full height the fabric stretches and becomes weaker.
Note: No pumping rate limit

9. HOW DO I DETERMINE HOW MUCH HAS BEEN DEWATERED?

When dewatering with Envirotubes, the method of payment needs to be established before the job starts. Remember, haul-away yards will be approximately 1/3 or less of what is removed from the worksite. It is difficult to judge how much sediment is removed by measuring only the Envirotubes.

ALWAYS ESTABLISH THE METHOD OF PAYMENT MEASUREMENT BEFORE ACCEPTING A JOB!

10. WHAT SIZES ARE ENVIROTUBES?

Envirotubes are measured by circumference and length. (Always list the circumference first and the length second) The fabric is woven in 15′ width so the common denominator for circumference is 15′ The circumference of the Envirotube will be 15′, 30, 45′, or 60′. Any length to 200′ is common. The larger the circumference, the lower the unit cost of dewatered CY [cubic yards]. The Envirotube lays out half of its circumference in width by whatever custom or standard fabricated length.

11. WHAT SIZE ENVIROTUBE SHOULD I USE?

There are two CY measurements for the jobsite. One is the in situ CY [CY of sediment before removal]. The other is haul away CY [the dewatered CY of solids in the tube]. The difference is often 3 to 1. The in situ sediment will



shrink 3 to 1. For each 100 CY of sediment removed, about 33CY will be left dewatered in the tube. Our hanging bag test will show this ratio. (Please request a Hanging Bag with instructions from IFI). Example: A 45' circumference Envirotube will hold a maximum of 4 haul away CY per linear foot. A 60' circumference Envirotube will hold a maximum of 6 haul away CY per linear foot. With a shrink rate of 3 to 1, 1 linear foot of 60' circumference Envirotube for every 18CY of in situ is necessary. Note: Very organic material will often shrink more than 3 to 1.

12. HOW DO I PLACE THE ENVIROTUBES®?

• The Envirotube must either be placed on level ground and or be restrained to prevent rolling. If the tube is placed on a grade crosswise, the lowest tube must be placed and filled first. This must be restrained by a berm or structure for it to lean against. The sewn on handles will not hold it. The next tubes can be placed to lean against the first tube. This will prevent roll. If the Envirotube® is placed on a grade lengthwise some capacity will be lost. This will also cause stress on the Envirotube®. A 1% grade or more will require special instructions on a 50' long or longer Envirotube®.

• The other concern on the Envirotube® installation is erosion. There is a lot of water, anything other than a hard surface (blacktop or concrete) will erode. A plastic underlayment (see page 6) will prevent this. The Enviotube® dewaters out the top so no ***porous*** underlayment is needed.

FAQs (cont.)

13. HOW DO I EMPTY THE ENVIROTUBES®?

Empty the Envirotubes® from either end. In order to prevent a mess from weather, do no cut open the Envirotubes® full-length. By opening the Envirotube® on on end, the bottom Envirotube® fabric can be driven on to access the dried material. This will eliminate movement of the fabric.

14. WHAT TO DO WITH THE FABRIC FROM THE TUBE AND CAN IT BE USED AGAIN?

There is no practical way to close the tube so it can be used again; therefore, the Envirotube® is a one time use. Also, every time the Envirotube® is pumped the fabric stretches and weakens; however, it has secondary uses as a geotextile. Landfills and landscapers use the fabric but do not expect any financial compensation.

Dean Wickoren
Technical Director

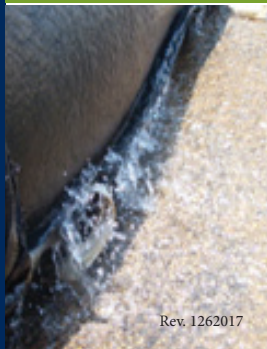
The leading expert in dewatering and ENVIROTUBE® technology answers the most frequently asked questions. Dean Wickoren has over 40 years of experience in the dredge and dewatering industry.

Dean is prepared to assist you with your project. His extensive in-field training has made him the best in the business.

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