ACE Geosynthetics

ACETube® Dewatering System

High-Performing and Flexible Sludge Dewatering Treatment Technology

2020

www.geoace.com

"ACETube® Dewatering System has versatile advantages in treatment capacity, efficiency, costs, mobility, and flexibility with easy operation process."

The Smart Solution for Sludge Dewatering

Sludge, a semi-solid slurry, is generated from various industrial and refining processes, covering industrial waste management, mining operations, water and wastewater treatment, and construction. Sludge can also naturally form, such as in the case of lagoons or rivers sediments, and agricultural activities. By disposing the sludge in landfills, the by-product, does not only decrease space utilization rate, but may incur environmental and public health distresses. Since sludge is hard to relocate and its discharge must be codified, dewatered sludge is the solution to dispose of contaminated sediments and treatment difficulties such as transportation and quantity.

Treatment efficiency and cost-effectiveness are two crucial concerns toward dewatering treatment. In general, there are two traditional common types used in dewatering treatment- drying beds and filter press. However, some disadvantages are involved in both methods. For instance, low dewatering efficiency, pricey facility installation, site and land restriction, and high carbon emission. Hence, an innovative method launches, ACETube® Dewatering System is a solid-liquid separation system having versatile advantages in treatment capacity, efficiency, costs, mobility, and flexibility with an easy operation process including three major steps- extraction, dewatering, and consolidation. After the sludge is pumped into ACETube® dewatering tube, the monolithic-tubular filter container made of high tensile strength and permeability geotextile, effects of pressure and gravity dewater it. This method does not require an increase in the separation efficiency by an extra external force. Besides, the deployment of the dewatering system is simple with very few requirements of space and equipment. ACETube® dewatering system offers a satisfying treatment experience from small to large-scale projects within budget.

ACETube® dewatering tube, the key component of the dewatering system, is made of high permeability geotextile with optimal apertures to enhance filtration performance.

Three-steps Operation

STEP 1
Extraction

Sludge is extracted and pumped into ACETube® dewatering tubes at a rate determined by either the pump suction capacity and/or the sludge content. According to the situation per case, polymers might be added, to agglomerate the suspended particles into flocs.

STEP 2
Dewatering

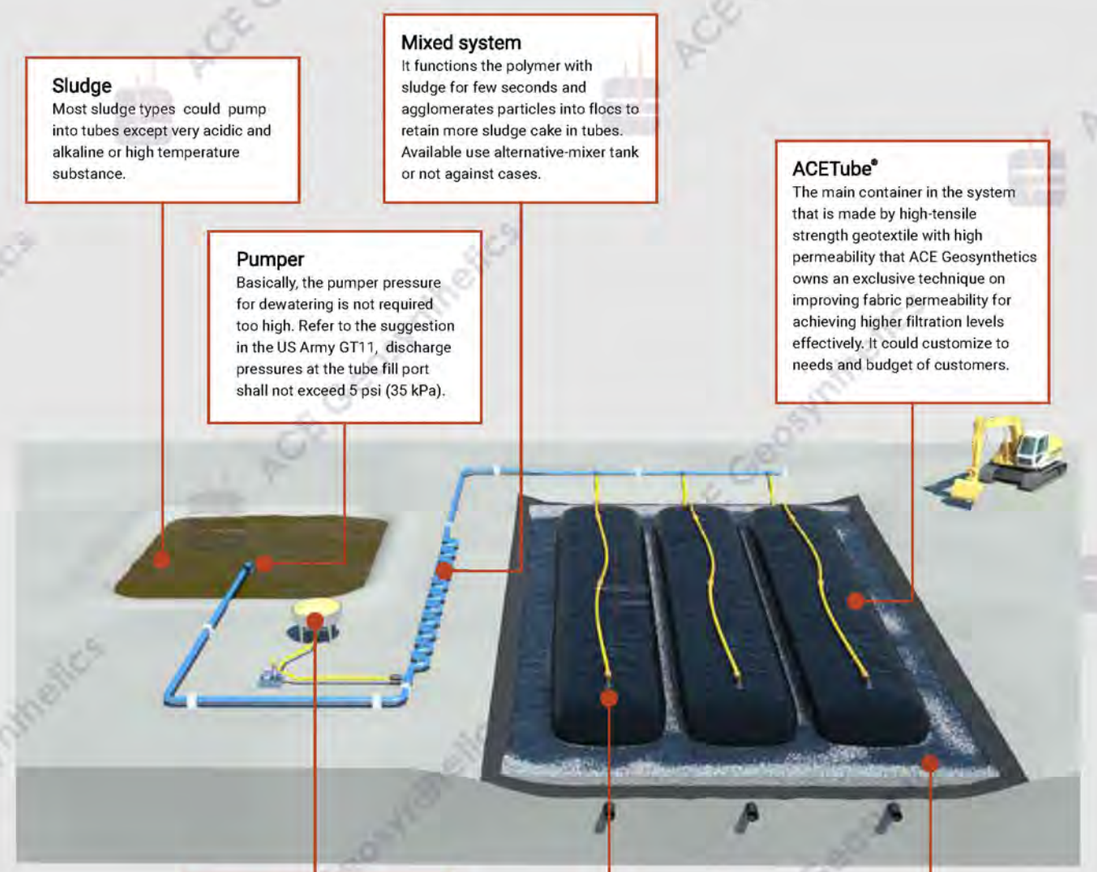
During/after the filling process, the water dissipates through the fabric under both pressure and gravity effects while the dewatered solid particles are retained within the geotextile tubes.

STEP 3
Consolidation

Under steady consolidation, sludge remains in the tube. Sufficient sunlight and air exposure further dry the retained solid particles, thereby leaving little or no moisture contents thereafter. This significantly reduces the sludge's volume making removal and disposal work easier.

How does ACETube® Dewatering System Work?

ACETube® dewatering system is an integrated method composed of few components. Pumper or suction dredger extracts sludge from the sludge accumulation area. When sludge is fed into tubes, it may flow through a mixed system where blends with flocculates and function to agglomerate particles into flocs in a curved pipe. Afterward, clear water drains out of tubes, and sludge cakes retain inside. The drainage layer could be placed depending on needs. More details for each element can refer as below:



Sludge
Most sludge types could pump into tubes except very acidic and alkaline or high temperature substance.

Mixed system
It functions the polymer with sludge for few seconds and agglomerates particles into flocs to retain more sludge cake in tubes. Available use alternative-mixer tank or not against cases.

Pumper
Basically, the pumper pressure for dewatering is not required too high. Refer to the suggestion in the US Army GT11, discharge pressures at the tube fill port shall not exceed 5 psi (35 kPa).

ACETube®
The main container in the system that is made by high-tensile strength geotextile with high permeability that ACE Geosynthetics owns an exclusive technique on improving fabric permeability for achieving higher filtration levels effectively. It could customize to needs and budget of customers.

Flocculate
Different flocculate types adds into distinct sludge. For further details, consultant with polymer supplier and do the jar test/cone test is the most accurate. Available use or not against the size of particles per case.

Filling port
It is a connector between pipe and tube. ACE could offer customized form to fill tubes.

Drainage Layer and pipes
Refraining water flows around at sites, the liquid is accumulated through the layer and drained out. The aim of pipes under the layer is the same. Both drainage and pipes could use or not against cases.

Operating Procedure

Pros and Cons of Current Dewatering Products

Multiple kinds of dewatering manners are adopted; however, dewatering tube system differs from the original design. It breaks through the shortcomings of common ways, so as to broaden the usable space and increase the treatment efficiency. For instance, the efficiency of the drying bed depends on the site for disposing of a large amount of sludge.

The cost-effectiveness of the filter press relies on the quantity of sludge treatment since its installation cost and carbon emission are comparable higher. Dewatering tubes enable us to customized according to each case requirement to optimized performance and lower capacity burden. Refer to the comparison as attached below:

		Drying Bed	Dewatering Tube	Filter Press
Treatment Capacity CMD: Cubic Meter per Day (m^3/day)		★	★★★★	★★★★★
		The treatment requires a large area and sufficient long-term sunlight exposure, the capacity is generally <30,000 CMD	Treatment capacity can generally be higher than 100,000 CMD *	Treatment capacity can be increased following equipment expansion.
Treatment Efficiency		★	★★★★	★★★★★
		Requires long-term exposure, affected by exposure area and weather.	High dewatering rate in the first stage. Stacking tubes is suggested to speed up the dewatering rate at the end of the process.	Keeps dewatering stability after setup and equipment.
Cost	CMD<5000	★★★★★	★★★★	★
	CMD:5,000-30,000	★★★★★	★★★★	★★
	CMD>30,000	Inapplicable	★★★★	★★★
		No equipment installation and electricity consumption required. Frequent sand layer replacement needed.	Simple equipment, better dewatering function, and much lower energy-consuming than filter press.	High setup cost and electricity consumption. Higher maintenance costs for regularly replacing the filter belts.
Flexibility		★	★★★★★	★★
		Requires occupying a large area for a long time and cannot move it.	Easy to adjust and install on different in-situ environments.	Requires building a place for installing equipment and it is hard to move.

* Solid content of sludge is not applicable for a too lower one. (e.g. below 1%)

Why should we choose ACETube® dewatering system?

There are three decisive aspects for selecting a decent dewatering tube: filling capacity, processing time and processing cost. ACETube® dewatering system displays an impressive competence in order to fulfill the requirements. The key component for the dewatering system is the dewatering tube- ACETube® -, which is fabricated with premium geotextile ACETex® with excellent filtration and sludge containment performances.

ACETex® has a patented design: The characteristics of the geotextile can have both an outstanding filtration and a high tensile strength. Due to its high permeability and optimal aperture opening size, ACETube® is able to achieve higher treatment capacity. Besides, the bi-axial tensile strength of ACETex® is up to 300/300 kN/m, along with high seam strength, it allows ACETube® to have a large size and a high filling capacity. Another characteristics of ACETex® is its excellent abrasion resistance and can withstand ultraviolet light, acidic, and alkaline environment. Last but not least, ACETex® products are ISO 9001 certified which complies with international norms and regulations for quality control and quality assurance manufacturing process.

The distinguished properties of ACETex® make the ACETube® dewatering tube more competitive. With higher application flexibility and less processing time and cost, why not choose the ACETube® dewatering system?

ACETube® Features

- High treatment capacity for cost saving.
- High permeability for time saving.
- Efficient containment of particles.
- Less area requirements (Tubes can be stacked.)
- High seaming strength for a higher filling height.
- Excellent resistance to abrasion, ultraviolet light, acid, and alkaline substances, depending on the sludge content/type.
- Customized specification available for circumferences up to 34.5 m and lengths of more than 100 m.

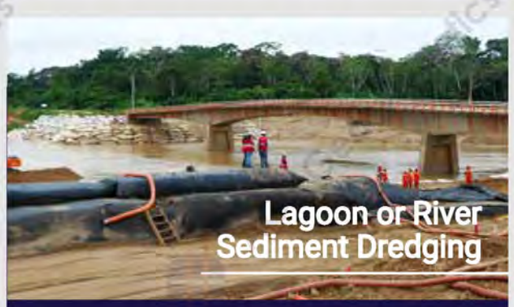
ACETube®, an economical and high filtration treatment container for large-scale and small projects, can be utilized in a variety of applications including:

Industrial Waste Sludge Treatment

Treat the by-product produced from factories (such as paper mill, sawmill, chemical related processes, etc.).

Mine Slurry Dewatering

Separate the tailing sludge constituents by clearing the water from the fine solid suspended particles, and clear more space for further mining disposals.



Lagoon or River Sediment Dredging

To dredge sediments in river, reservoir, lagoon, lake, and pond and keep the working of these systems.

Municipal Water Treatment and Wastewater Sludge

Effluent flowing from pipes for domestic and industrial water supply.

Construction Dewatering

Sludge from amassed water in trenches and excavations.

Agriculture Waste Sludge

Treat sludge coming from livestock and farming to prevent harmful effects on soil, vegetation, animals and humans.

For cases which require a temporary solution, we strongly suggest our dewatering tube as a convenient and versatile solution for your works. It can be efficiently used for contaminated dredged material, from construction sites or lagoons and rivers, dewatering. Similarly, for cases such as sewage treatment plants, wherein the concerns of insufficient area for drying beds and considerable cost for installing filter presses, ACE recommends utilizing dewatering tubes. However, to achieve the optimal effect, the volume of sludge solids content should be at least 1% or more.

ACE Services

- Engineering Planning and Design.
- Professional Technical Consultation.
- Construction Guidance and Support.
- Geosynthetic Product Testing.

ACE Geosynthetics offers a series of integrated business service aligning with our brand tagline:

"Reliable support all around your needs."

REFERENCE 1

Sewage and Sludge Dewatering Treatment in Chuansing Industrial Park

Taiwan
2016
ACETube®

Sewage and sludge containing heavy metal substances from the waste of dyeing, finishing plants, and electroplating plants require a decrease in the volume before disposal. However, the daily output of sludge generated from factories has doubled compared with the previous year.

Originally, the treatment factory introduced drying beds where sludge flows into and waits for dehydration- its longer, highly connected to weather conditions, and the bed space. Owing to the shortage of drying beds, it has become inefficient to treat the sludge. Thus, the urge to seek a faster alternative dewatering method.

ACETube® dewatering system offers an effective solution with high dewatering speed and lower space demand. Pumping the sludge into ACETube®, which powerfully filters, allows for an efficient solid-liquid separation, thereby reducing the overall sludge volume. The tubes (circumference: 12.9 & 8.6 m; Length:10 m) are fabricated with ACETex® PP, and they can be stacked up to considerably increase the total volume of sludge treatment.

Successful as it is, ACETube® dewatering system solved the challenging problem. The treatment capacity of using ACETube® (circumference: 12.9 m; Length:10 m) reached 250 m³ per piece. After dewatering for about a month, the water content of the sludge cake was lowered by 85 percent which meets the sludge removal standard in Taiwan.

Compared to conventional mud or pit sludge solutions, the ACETube® dewatering system is much more effective and convenient.

After pumping the sludge into ACETube® tubes, the water dissipates through the fabric while the solid particles are retained with low moisture contentsThe system is highly adaptable to the in-situ environment and requires simple and few equipment to operate, however, it performs better dehydration with a low energy consumption. It is especially suitable for temporary sludge dewatering treatment.

The dewatering tubes, in this case, are fabricated with ACETex® PP (circumference: 17.2 m; Length:10~55 m), and a total of 44 pieces were used. ACETube® dewatering system successfully treated the oily sludge and prevented further environmental contaminations. After an initial dehydration of four (4) to seven (7) days, the sludge water content was about 90%, while the last dehydration that took 30 to 45 days yielded in a 70% remained water content.

REFERENCE 2

Oily Sludge Treatment in Siberia

Russia
2014
ACETube®

Since the region of Agan River in Khanty-Mansi Autonomous Okrug in Tyumen is known to be oil-contaminated, the Siberian Research and Design Institute for Environmental Management is carrying out a series of environmental improvement actions to make from the river a safe and healthy ecosystem. In terms of Nizhnevartovsk's case, caused by the oily sludge, in a river region, to solve the problem, a temporary, low cost and ecological method was required.

REFERENCE 3

Municipal Sludge Dewatering by Using Geotextile Tube

Moldova
2010
ACETube®

The East- European agrarian country, Moldova, has a tight budget for municipal sludge treatment according to the fiscal condition. As a result, an economical and environmentally friendly solution is required to cope with the problem.

ACETube® dewatering system was introduced as a versatile and cost-effective solution to separate liquid and solids for simplifying further treatment and transportation. The method is based on three major steps: extraction, dewatering, and consolidation.

Municipal sludge is extracted to pump into the geotextile fabricated tube (circumference: 20.5~21.6 m and length: 30~45 m) that is made of ACETex® PP with the polymer conditioning. Due to its outstanding characteristic- high permeability with optimal aperture size, the ACETube® is able to strengthen both the filtration efficiency and effectiveness. The filtration occurs under both the pressure and gravity effects. The sludge fully remains in the tube under a steady consolidation rate.

ACETube® dewatering system, in this case, treated a large volume of the municipal sludge: more than 600,000 cubic meters. The filtration effect was considerably remarkable; it did not only perform a high dewatering rate, but also a notable filling volume. Our customer highly appreciated the economic effect of the solution.

REFERENCE 4

Organic Sludge Treatment in a Coffee Factory

South America
2012
ACETube®

This case involves a coffee factory ; during the production process, a large amount of organic sludge is produced. The by-product is mainly stored in a lagoon where, the liquid-solid separation, depends on a long-term sedimentation.

The efficiency of the current treatment method is low resulting in sludge accumulation to fill the lagoon. Besides, the lagoon's area is limited and any expansion is impossible. Thus, it is imperative to find a better solution.

The offered solution was to rebuild the storage lagoon into a series of drying beds, and then decrease the volume of sludge by introducing ACETube® dewatering system to separate solid-liquid waste.
The dewatering tubes (circumference: 12.9 m* Length:30 m) for this case were fabricated with ACETex® PP , next to its resistance to ultraviolet light, acids and alkalis, is endowed with optimal apertures ensuring a high permeability performance. Polymers were introduced to the dewatering system to better separate solids and water.

ACETube® dewaters the sludge to efficiently decrease its volume, and significantly shorten the sludge treatment time.

REFERENCE 5

Dredging Work at Wujia Port

Taiwan
2015
ACETube®

Wujia port has been experiencing sediment problems for many years. When low to moderate tides occur, fishing rafts are unable to go out in the sea. This is as a result of upstream sediments of the Wenliao River and littoral drift from northeastern monsoon and tidal currents.

Harbor siltation severely affected the fishermen's livelihood as well as curtailing the local fishing industry. To minimize this impact, the government allocated considerable funds for improvement plans which includes dredging, breakwater building, waterways dredging, harbor maintenance, etc.

To avoid frequent dredging and littoral drift problem, ACETube® dewatering system is used for dredging work. It allows liquid-solids separation while also containing the sediments. In this case, the tube was fabricated with ACETex® PP geotextile, with excellent filtration characteristics to achieve high dredging efficiency, with a circumference and length of 8.6 m and 5 m respectively. The tubes were placed along the coastline. After pumping the in-situ sediments into the tubes, they form a barrier structure to stop littoral drift flowing in the harbor. This solution makes it easy to both clean the harbor siltation and recycle the sediments as well.

Apart from reinvigorating the sluggish fishing economy, ACETube® system has also served as an environment-friendly and economical solution without the need to transport materials to build the breakwaters and/or create waterways.

Why Choose ACE Geosynthetics?

2017 IFAI AWARD OF EXCELLENCE
2016 IFAI AWARD OF EXCELLENCE
2015 IFAI AWARD OF EXCELLENCE
2013 IFAI OUTSTANDING ACHIEVEMENT
2011 IFAI OUTSTANDING ACHIEVEMENT
Award of Excellence
Outstanding Achievement
BEST IN CATEGORY — GEOSYNTHETICS — IAA 2017 - NEW ORLEANS, LA

Since 2006

Since 2003

Participation in relevant associations

International awards

6 Continents

70 Countries

Countries where our products are sold

A diverse team with 20 years of experience

Patent Portfolio

Issued Patents 60+

Countries 25

Published Papers 56

Annual Participation 10+

Journal publications, exhibitions, seminars

From product development/ manufacturing to processing

Professional Ability

Integration Ability

Quality Assurance

From engineering planning and design analysis to construction

International Certification

BBA

GOSTR

TAF

ISO9001

CE

NTPEP

ISO14001

ISO50001

ISO14064

Geogrid Carbon Footprint Assessment

Geotextile Tube Carbon Footprint Assessment

Reinforced Embankment Carbon Footprint Assessment

ACE Geosynthetics EcoPark

Would Like to Know More about Geosynthetics?

Come to Explore and Learn Geosynthetics Applications in ACE Geosynthetics Ecopark!

ACE Geosynthetics Ecopark is organized and constructed by ACE Geosynthetics with a 10,000m2 total area to demonstrate various geosynthetics applications in civil engineering. The concept of considering the sustainability of both engineering and environment is influencing the contemporary engineering methods. As traditional engineering methods issues and environmental impacts constantly arise, geosynthetics are gradually becoming the preferred solution for the broad civil engineering application. It is proven constructions can be easier and more environment-friendly with geosynthetics.
When visiting our educational Ecopark, you will be capable to find out over 20 applications built in actual dimensions (1:1) with vivid demonstration. This Ecopark is not only to demonstrate the geosynthetics applications, but also to achieve an educational purpose in promoting the benefits of applying geosynthetics to our environment.

Welcome to visit ACE Geosynthetics Ecopark to explore more about geosynthetics!
http://www.acegeosyntheticsecopark.com/

Reinforcement

1. Segmental Precast Concrete Panel Facing
2. Cast-in-place Concrete Facing
3. Modular Block Facing
4. Gabion Facing
5. Wrap-Around
6. Wire Mesh Facing

Shore Protection

16. Ecological Tank
17. Geotextile Tube
18. Geotextile Mattress
19. Sand Bag
20. Modular Block
21. Masonry Block
22. Riparian Tank
23. Gabion with Geotextile Bag
24. Reinforced Levee

Erosion Control

13. Geomat
14. Rectangular Pyramidal Geomat
15. High Strength Geomat

Landscape

25. Footpath Pavements
26. Landscape Facility

Other Applications

7. Basal Reinforcement of Railway
8. Monitoring System
9. Pavement Reinforcement
10. Waste Landfill
11. Rainwater Harvesting System
12. Ecological Pond

ACE Geosynthetics

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2020/08