



INDUSTRIAL FABRICS
Dewatering Systems

TenCate Geotube® Dewatering Technology



Protective Fabrics
Outdoor Fabrics
Aerospace Composites
Armour Composites

Geosynthetics
Industrial Fabrics
Grass



The Low Cost, High Volume Dewatering Solution

TenCate Geotube® dewatering technology has become the method of choice for organizations around the world. It is used for projects large and small, and there's good reason; simplicity and low cost.

Since TenCate Geotube® dewatering technology works without belts or gears, there are less moving parts, less wear, less downtime and less spare parts than in conventional techniques.

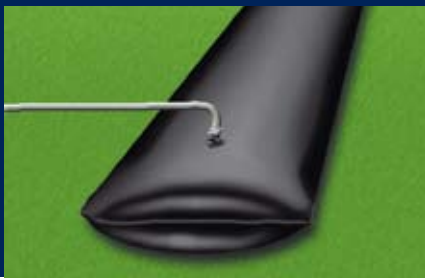
TenCate Geotube® containers are available in a variety of sizes, depending on your volume and space requirements. TenCate Geotube® systems can even be mounted in mobile roll-off containers that can be transported around your property as necessary. It's one of the most versatile dewatering technologies available.

Thereby it is one of the most effective solutions available. Volume reduction can be as much as 90%, with high solid levels that make removal and disposal easy.



Sludge before and after treatment with TenCate Geotube® dewatering technology.





1. Filling

Sludge is pumped into the TenCate Geotube® container. Environmentally safe polymers are added to the sludge, which make the solids bind together and water separate.



2. Dewatering

Clear effluent water simply drains from the TenCate Geotube® container. Over 99% of solids are captured, and clear filtrate can be collected and recirculated through the system.



3. Consolidation

Solids remain in the bag. Volume reduction can be up to 90%. When full, the TenCate Geotube® container with its contents can be deposited at a landfill, or the solids removed and land-applied when appropriate.





Case Study

application | **Dewatering of Mercury Contaminated Soil**
location | **Pauliström, Sweden**
product | **TenCate Geotube®
Dewatering Technology**

Industrial sites have been located along the Pauliström river since the 1700's, affecting the water quality. Svartsjöarna have for a long time served as sedimentation basin for pulp fibres coming from the Pauliström paper mill, 3 km upstream of the lake. In the mid-60's, a mercury based product was used for protecting the pulp from bacteria. The contaminated sediments consist of cellulose fibres polluted with mercury. The total fibre discharge from the mill amounts to between 15 and 20.000 tons. The remediation works in Svartsjöarna involves dredging of approx 260.000 m³ of mercury contaminated fibre sediments. These sediments are pumped to the landfill nearby, specially prepared for this project where it is treated with polymers (floculants) and pumped into TenCate Geotube®. A joint venture DEC and Dredging International was rewarded this design and construct contract.

Environmental Remediation

Effective Containment for Large and Small-Scale Projects

Rivers, bays, harbors, marinas, ports, and dock facilities have been collecting contaminated sediments from industrial runoff for many years. In many cases, these sediments pose significant environmental hazards, and remediation is a difficult and expensive task.

Marine sediments can be contained and dewatered easily with the TenCate Geotube® dewatering technology.

This can be accomplished at or very near the site by utilizing a dewatering basin where TenCate Geotube® containers can be stacked several layers high to minimize the space needed. TenCate Geotube® units can be sized for large-scale or smaller applications, and effectively contain even hazardous materials, reducing their volume dramatically and saving thousands in disposal costs.



Dewatered sludge being removed from TenCate Geotube® container with an excavator.



Pulp and Paper Multiple Uses

TenCate Geotube® dewatering technology is used for a variety of applications within pulp and paper mills, including:

- Primary and secondary lagoon cleanout
- Fly ash and alum sludge
- Contaminated sediments
- Continuous systems clarifier, sentrate, process waste stream
- Process rejects
- Separation dikes
- Emergency uses, such as cleanouts, spills, dumps, or exceeding discharge limits.



TenCate Geotube® containers in activated sludge basin at paper plant

The rapidity with which a TenCate Geotube® dewatering operation can be set up, as well as the low investment involved have also been advantages in paper mill applications, particularly in emergency situations where mills ran the risk of having to shut down.



Case Study

application
location
product

Cleanout, Kaskinen Lagoon
Kaskinen, Finland
TenCate Geotube®
Dewatering Technology

Oy Metsä-Botnia Ab is Europe's second-largest pulp producer, with pulps ideally suited for the production of high-quality printing and writing papers, packaging boards and tissue.

Botnia's oldest pulp mill, at Kaskinen, had a slurry pond with an area of around 40,000 m², and the construction of a new landfill required this pond to be emptied. The top 1.5 m of slurry was dredged and filled into TenCate Geotube®.

The work was carried out in two stages: In 2005, around two-thirds of the slurry was dredged into TenCate Geotube® and left to consolidate and dewater. Processing of this difficult slurry was successfully completed during the summer of 2006. The water discharging from TenCate Geotube® was monitored, confirming that BOD, COD and heavy-metal reduction was extremely high.





Mining and Mineral Processing

Flexible Enough for Available Space

Case Study

application | **Dewatering of Acidic Mine Tailings**
location | **Skytop Mountain, USA**
product | **TenCate Geotube® Dewatering Technology**

During the construction of I-99 in Pennsylvania, workers unearthed more than 700,000 cubic yards of pyritic rock left over from mining. The acid runoff from this material threatened local streams and groundwater. The solution: a process using TenCate Geotube® dewatering technology.

The pyritic rock is crushed and treated with a neutralizing agent. Acid runoff from this process is collected in sediment ponds, which is treated and pumped through TenCate Geotube® containers. Water, clear and neutralized, flows from the TenCate Geotube® container without requiring further treatment.

Mine tailings, coal sludge, and other materials can be managed and handled cost-effectively with TenCate Geotube® dewatering technology. Because TenCate Geotube® containers can be custom-sized to the application, they can be placed in available space between other structures, and removed once dewatering is complete. TenCate Geotube® dewatering technology is a cost-effective alternative to mechanical processes. It reduces disposal cost by consolidating higher solids with very little maintenance.

Effluent can be pumped directly from the process; or if a clarifier/thickener is used, effluent from the underflow can be diverted through the TenCate Geotube® container, eliminating the requirement for an expensive mechanical dewatering device. TenCate Geotube® units can be used to capture fines, silts, and clays from the tailings effluent prior to discharge into the ponds or directly into streams. TenCate Geotube® units will separate and dewater the fines and allow disposal without expensive dredging and transporting operations. In some cases, conditioners or polymers are used to promote flocculation to improve solids retention and filtrate quality.



Coal sludge dewatering using TenCate Geotube® dewatering technology

TenCate Geotube® containers can also be used to utilize the fines to build dikes and containment berms.



Power Generation

A Solution for Fly Ash and Bottom Ash

Power generation by-products such as fly ash and bottom ash can be a real challenge to remove and manage. But the simple technology of TenCate Geotube® dewatering allows facilities large and small to easily consolidate these materials. Because of the low investment involved you can always adapt the volume according to your actual needs.

TenCate Geotube® dewatering technology safely contains fly ash, preventing airborne particle contamination from windblown ash piles. The ash can then be used for road base applications or even to build up the berms around a lagoon to increase its capacity. In many fly ash operations, there is no need to add polymer to the dewatering process, making it simple and even more cost-effective.



TenCate Geotube® containers at fossil fuel power plant being used to dewater fly ash.



Case Study

application	Dewatering of Boiler Ash
location	Camden, USA
product	TenCate Geotube® Dewatering Technology

TenCate Geotube® dewatering technology was used for dewatering a lagoon containing approximately 3.8 million liters of boiler ash, with solids 2.6% by dry weight. Previous dewatering attempts using a long stick Trac Hoe were only partially successful, and the sludge had been laid up on the bank of the lagoon to dry; not an ideal approach.

However, by using TenCate Geotube® dewatering technology, the facility was able to remove and dewater practically all the solids in the lagoon. After 30 days, the material had consolidated to 37% solids. It is estimated that this approach saved the power plant more than \$60,000 annually.





Water and Wastewater Treatment

For Applications Large and Small

Case Study

application	Sewage Wastewater treatment
location	Valensole, France
product	TenCate Geotube® Dewatering Technology

Without any major investment TenCate Geotube® dewatering technology offers solutions to small and large waste water plants. TenCate Geotube® dewatering technology is also very suitable for sewage treatment plants in smaller towns. Especially if the sludge filtration is done on drying beds. With TenCate Geotube® it is easy to increase the capacity in a flexible and cost effective way in p.e. response to a growing population. Because of their higher capacity tubes need to be cleared much less frequently than a traditional drying bed, reducing handling- and transportation costs. An appropriate flocculant is added to the sludge just before it is pumped into TenCate Geotube®. Once the dewatered sediments have settled the filling process can be repeated until the TenCate Geotube® container is completely full.

A common problem at small Sewage Treatment Works, where sludge is dried on drying beds, is that the limited capacity of the beds can easily be exceeded. This could be due, for example, to an increase in sludge quantity resulting from an increasing population.

The TenCate Geotube® system is increasingly being used as a means of both simplifying the sludge dewatering process and effectively increasing the volume of the drying beds. Whereas in the past the drying beds had to be emptied at regular intervals, the time for a complete fill of the TenCate Geotube® can be increased to several months.

A significant saving can therefore be made in terms of handling and transportation.

After the sludge has been treated with a flocculant it is pumped into the TenCate Geotube® where the sediments remain and the water seeps through the pores of the tube. This process can be repeated over and over again until the TenCate Geotube® reaches its maximum level.



TenCate Geotube® unit in municipal wastewater treatment drying beds.

Larger Wastewater Treatment plants can also utilise the TenCate Geotube® system for sludge containment and dewatering as an alternative to belt-presses and/or centrifuges. It can also be used as an emergency kit if the available dewatering units are out of order.



Light Industrial

Managing an Ongoing Challenge

For many industrial applications, dewatering is a necessary evil. It disrupts operations, adds cost, and requires complicated and expensive equipment. But this doesn't have to be the case. One of the real values of TenCate Geotube® dewatering technology is that it can provide a quick lagoon cleanout solution, or it can add capacity by making drying beds much more efficient.

In some cases, companies have dewatered the material in their lagoons using TenCate Geotube® dewatering technology, then used the solid-filled TenCate Geotube® containers as berms. Since they can be stacked on top of each other, you can use them to further add capacity to the lagoons. With TenCate Geotube® containers you can improve the dewatering efficiency. Dewatered solids are protected from becoming saturated again in wet weather.



Water draining from a TenCate Geotube® container.



Case Study

application
location
product

Industrial Dewatering
Veendam, Holland
TenCate Geotube®
Dewatering MDS

In the original dewatering process a decanter would be used giving a flow of 4,5 m³/hr of water with an average dry solid content of 1%. Using the TenCate Geotube® MDS system two tubes are filled alternately with an exactly identical flow as in the old situation.

It takes approx. 205 hours to completely fill the first TenCate Geotube® MDS container. The volume it contains then reaches approx. 925 m³. After the last dewatering stage the containers are hauled away, each with a total of 18 tons of dewatered material at dry solid content of 43%.

In this case the total saving of labour cost alone is estimated at 40 hours per MDS. As we had expected.





Case Study

application
location
product

Farm Lagoon Cleanout
New Bern, USA
TenCate Geotube®
Dewatering Technology

A pig farm lagoon had reached capacity and was in need of cleanout. TenCate Geotube® dewatering technology was used as a simple, effective way of accomplishing this.

Solids at 4% were pumped from the lagoon. These dewatered to over 25% in the TenCate Geotube® container. The container retained 93% of solids, plus 78% of nitrogen and 90% of phosphorous.

Agriculture

Ideal for Swine, Dairy, Poultry, and Other Uses

TenCate Geotube® dewatering technology is an effective way for managing waste from animal feeding operations. It works for lagoon cleanout and closure, and manages nutrients very effectively (over 90% phosphorous and heavy metal removal; 50% or greater nitrogen reduction). It also controls odor and produces irrigation quality effluent water.

In a country with severe rules and legislations as the USA, TenCate Geotube® dewatering technology is designated as a Practice Standard.

In many cases it is possible to set up a TenCate Geotube® dewatering system inline, so you prevent solids from entering a lagoon. You store water for irrigation, not waste you have to deal with later. The system doesn't interrupt other operations.



TenCate Geotube® dewatering technology used inline keeps your operation running.



Aquaculture

Simple, Cost-Effective Waste Removal for Applications Large and Small all over the world

TenCate Geotube® technology is used all over the planet. In the USA it has even been approved as a Best Management Practice for Aquaculture by the State of North Carolina, TenCate Geotube® dewatering technology works for fresh water or marine finfish, shrimp, and other aquatic species. It simplifies the process for water recirculation, and retains more than 99% of suspended solids.

TenCate Geotube® dewatering technology reduces nutrient loading in filtrate. It can be used continuously or intermittently year-round in most climates. It is ideal for lagoon, retention pond, and filter waste applications. It can be used for cage waste removal, benthic table waste cleanup, recirculation waste removal for hatcheries, and processing plant waste dewatering. Dewatered solids can be land applied or disposed of in a landfill.



Aquaculture benthic deposit water before and after TenCate Geotube® treatment.

TenCate Geotube® dewatering technology is a proven technology. It offers secure solutions that have been tested by many institutions world wide. More importantly, TenCate Geotube® dewatering technology has been used in the field with solid success in many countries around the globe.



Test Your Material

A simple bench-scale test can determine if TenCate Geotube® dewatering technology is right for your application.

Our TenCate Geotube® Dewatering Test (GDT) uses an actual sample of the material you need dewatered. The results from this test have been proven to be an accurate indicator of how TenCate Geotube® dewatering technology will work in full-scale operation. You can effectively estimate effluent quality, solids, and dewatering rates.

See your TenCate Geotube® representative to schedule a test for your material.

See Our Presentation

To learn more about this technology, we invite you to look at our CD presentation, which provides detailed information. We can even schedule "lunch and learn" sessions for larger groups. For details, visit www.geotube.com or call +31 (0)546 544 811



TenCate develops and produces materials that function to increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions.

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