


GEOTUBE

Shoreline protection solutions





GEOTUBE® technology
is a proven, cost-effective,
and sustainable solution
for marine applications.

COASTAL PROTECTION WITH GEOTUBE

GEOTUBE systems by Solmax trace their origins to the 1950s, following severe flooding in the Netherlands. This event spurred the development of innovative solutions for coastal protection, leading to the creation of geosystems designed to contain sand and build structures resistant to erosion.

What sets **GEOTUBE** geosystems apart is the specialized fabric used in their construction. Unlike standard geosynthetics, these fabrics are engineered with specific additives that enhance UV stability, ensuring long-lasting performance without the need for additional coverings.

For engineers looking to design **GEOTUBE** systems, we recommend the booklet *Geosystems: Design Rules and Applications* by Adam Bezuijen and E.W. Vastenburg, which contains essential guidelines and information. This resource ensures that engineers can create reliable, effective structures using **GEOTUBE** technology, whether for coastal protection, erosion control, or other environmental applications.

Principal features of **GEOTUBE** geosystems:

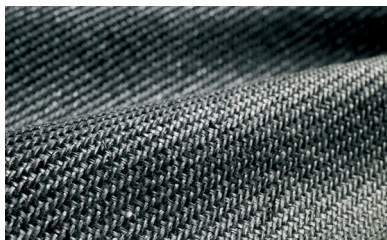
- Tailor-made for every project
- Global availability of products
- Different types of woven products available
- Various fill opening possibilities
- High seam strength
- Engineering support available

GEOTUBE woven products



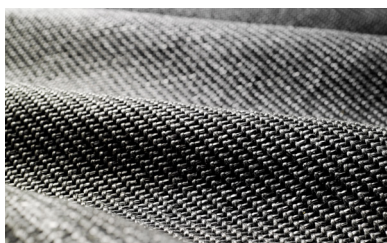
GEOTUBE GT600M

The lightweight **GEOTUBE GT600M** product is a woven polypropylene fabric with interwoven loops. These loops can be used to attach fascines to the fabric, making it suitable as a fascine mattress. The woven has specific technical properties for their intended application. The product is black, with loops visible on one side of the fabric, clearly marked by two outside white yarns.



GEOTUBE GT750M

The **GEOTUBE GT750M** product is a woven polypropylene fabric made from fibrillated yarns. This lightweight material is used for smaller tube systems, less than 3 m in diameter. The product has specific technical properties for its intended application. It is black, with a tensile strength of around 120 kN/m in both directions, making it suitable for applications requiring high seam strength.



GEOTUBE GT1000M

The high-strength **GEOTUBE GT1000M** product is a woven polypropylene fabric made from fibrillated yarns. This robust, heavy weight material is used for larger tube systems, greater than 3 m in diameter, and geocontainer systems. The product has specific technical properties for its intended application, including high UV resistance for prolonged outdoor exposure. It is black, with a tensile strength of around 200 kN/m in both directions, suitable for applications requiring high seam strength.



GEOTUBE GT1000MB

This robust heavy weight fabric is used for large tube systems. The fabric has specific technical and aesthetic properties for specific applications. The fabric is highly UV stabilized to ensure the performance for the duration of its lifetime. The beige color of the fabric blends with the local sandy beach. The high strength material with similar strength in both directions has sufficient seam strength for a durable **GEOTUBE** product.



GEOTUBE marine systems and features



GEOTUBE Marine tube

GEOTUBE Marine tubes are made from high-strength UV-stabilized woven materials, available in diameters ranging from 1.6 to 5 m and lengths from 10 to 50 m. The exact dimensions depend on the project location and execution possibilities. These systems are designed to be filled hydraulically with a mixture of sand and water. The water is expelled through the textile pores, leaving densely packed sand inside the tube.

GEOTUBE Marine tubes can be applied both below and above the waterline. High-strength seams are essential due to the hydraulic fill under pressure, and the special synthetic woven material ensures this strength.



GEOTUBE Geocontainer system

For deep water applications (> 3 m), tube systems are more complicated to use. If the site is accessible by split hopper barges, **GEOTUBE** Geocontainer systems can be an alternative solution. These systems are tailor-made for the specific split hopper barge used in installation. Key parameters include the cross-direction dimension and the barge's opening width. By stacking several layers of these systems, an underwater bund can be constructed.



GEOTUBE Geobag

GEOTUBE Geobag, produced from high-strength woven materials, have a volume between 2 and 10 m³. The design of these systems depends on the project and is typically handled by the contractor or designer. Prefabricated systems are ready to be filled on-site. After filling with sand, the systems can be closed using either a sewing solution or rope joint. These large-scale sandbags can be used for various marine works, both temporary and permanent structures.



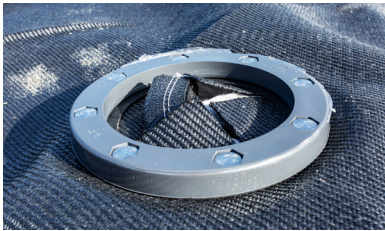
GEOTUBE Scour apron

For constructing submerged breakwaters on sandy bottoms, Solmax offers tailor-made scour aprons. These prevent sand erosion in front of or behind the breakwater due to turbulent water around the submerged structure. The scour aprons feature small 0.5 m diameter tubes that can be filled with sand, using a filling process similar to **GEOTUBE** systems. The dimensions of the systems depend on the breakwater dimensions and the significant wave height in the application area.



GEOTUBE fill sleeve

The **GEOTUBE** fill sleeve systems can include standard textile fill sleeves with diameters of 30 or 50 cm. This solution is chosen for larger diameter filling pump lines. The textile sleeve is made from **GEOTUBE** GT750M material and sewn into the tube system body. After filling, the sleeve can be sealed by tying a rope around it.



GEOTUBE geoport

For filling, the **GEOTUBE** geoport systems come standard with at least two fill openings. For lengths over 20 m, more openings are included. The marine tube systems feature geoport fill openings with an internal diameter of 25 cm for inserting 20 cm diameter fill pipes. After filling, the geoport can be sealed with 10 mm PVC lids, which are included in the package.



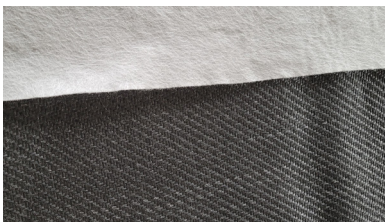
GEOTUBE flat end

GEOTUBE systems can also feature flat ends, where an additional textile is sewn into both ends of the tube. When installed in the length direction, the tubes can butt against each other without needing additional overlap.



GEOTUBE tapered end

Standard **GEOTUBE** systems feature tapered ends, allowing for the construction of longer structures with overlap between systems in the length direction. This overlap can range between 1 to 2 m depending on the tube system's diameter.



GEOTUBE woven + internal nonwoven

Standard tube systems are produced from high-durability woven products. For cases where the fill material is very fine compared to the fabric's opening size, a layer of nonwoven material can be added. This allows the systems to be filled with fine-grained materials.

The robust and durable textiles used in **GEOTUBE** systems make them ideal for the challenging conditions of marine engineering structures.





ADVANTAGES

- Strong, robust products
- High seam strength, > 80% of fabric strength
- High UV stability for long outdoor exposure
- Extensive experience in applying these products
- Tailor-made solutions
- Flexible system dimensions
- No need for special filling equipment

Coastal and inland water applications

Land reclamation

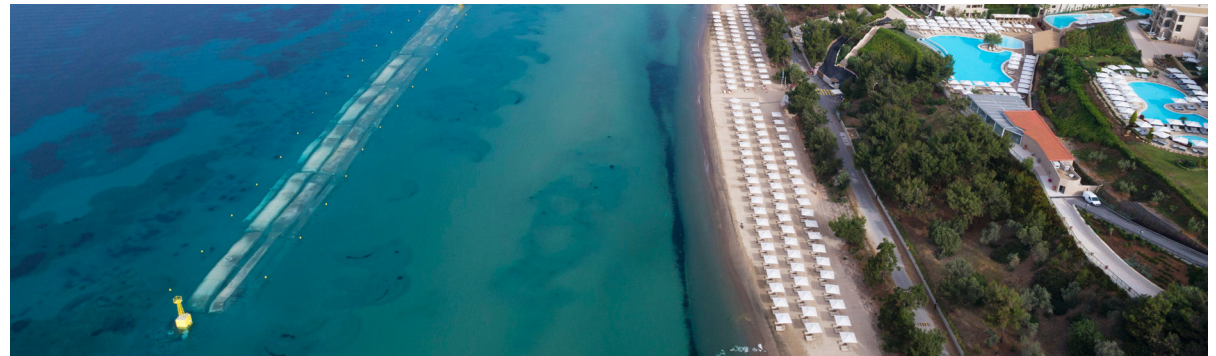
For creating reclamation bunds in shallow water, **GEOTUBE** systems can be applied. Using sand, a steep slope greater than 1:3 can be constructed in the water. The containment of sand particles within the encapsulated element prevents erosion, maintaining a dynamic wave zone on the bund without sand loss.



Pemba port, Mozambique

Submerged breakwater

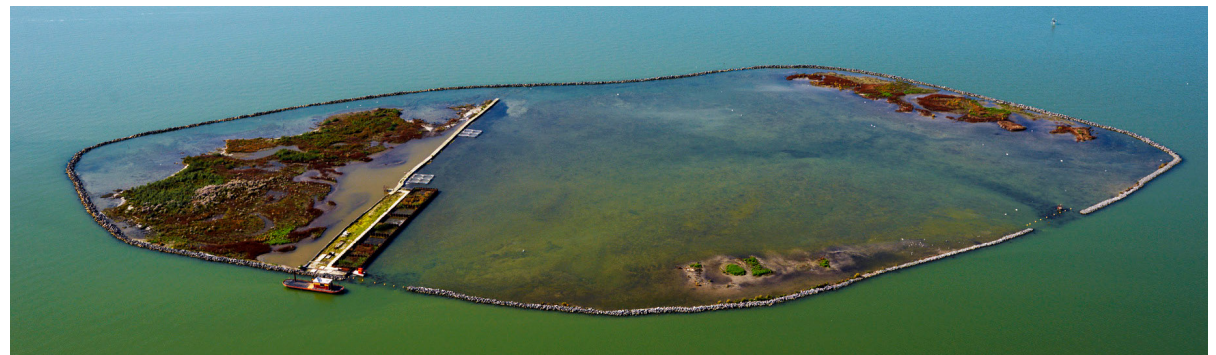
Many coastlines suffer from severe erosion due to dynamic wave action. Waves erode sand particles from beaches. Installing submerged breakwaters along the coastline reduces wave action on the beach, dissipating energy. These breakwaters are especially effective in areas like the Mediterranean, where tidal movements are minimal. **GEOTUBE** systems can be installed on sandy sea bottoms, often in combination with scour aprons.



Moudania, Greece

Disposal area

In inland lakes, large amounts of sediment sometimes need to be stored to prevent the lake from becoming silted. Large sand bunds can be constructed using **GEOTUBE** systems, allowing for steep internal and external slopes, which increases storage capacity and efficiency. These systems can be filled with locally available sandy materials, minimizing the need for transporting construction materials. For deepwater applications (> 2 m), **GEOTUBE** Geocontainer systems can be installed first, followed by tube systems to raise the bund above the water.



Lake Markermeer, Netherlands

Coastal and inland water applications

Groynes

Severe erosion can occur along coastlines due to parallel currents. Groynes can be constructed to divert the current away from the coast. **GEOTUBE** systems filled with locally available sand can be used to create groynes, encapsulating the sand in textile to prevent erosion.



Costa Verde, France

Dune reinforcement

Storms can cause high water levels and waves that erode significant amounts of sand from dunes, which serve as coastline defense structures. Rebuilding dunes with sand alone can lead to the same erosion issues. By installing sand in **GEOTUBE** systems within the core of the dunes and covering them with sand, the dunes are reinforced. In severe storms, the sand may be eroded, but the **GEOTUBE** systems provide structural protection to the hinterland.



Pedro Alta, Portugal

Temporary structures

For contractors, constructing large civil engineering structures from land can be easier. Small temporary land reclamation can be achieved using **GEOTUBE** systems, reducing the need for marine equipment. Temporary dikes can also be constructed with **GEOTUBE** Geobags or tube systems to support current dike improvements.



Maasvlakte 2, Netherlands

About Solmax

Solmax is a world leader in sustainable construction solutions, for civil and environmental infrastructure. Its pioneering products separate, contain, filter, drain and reinforce essential applications in a more sustainable way – making the world a better place. The company was founded in 1981, and has grown through the acquisition of GSE, TenCate Geosynthetics and Propex. It is now the largest geosynthetics company in the world, empowered by more than 2,000 talented people. Solmax is headquartered in the province of Quebec, Canada, with subsidiaries and operations across the globe. To find out more, contact infoasia@solmax.com.

Uncompromised quality

Our products are manufactured to strict international quality standards. All our products are tested and verified at our dedicated and comprehensive laboratories which maintain numerous accreditations. We offer our partners a wide scope of testing according to published standards to ensure products delivered to sites meet specified quality requirements.

Let's build infrastructure better

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