

SoilTain®
Bags for
Erosion Control and
Scour Protection



HUESKER
Ideen. Ingenieure. Innovationen.



Overview of a typical **SoilTain®** bag construction site

The **SoilTain®** bag system

Bags provide an efficient and economic solution for erosion and scour problems. The bag system comprises a geotextile shell which is normally filled with dry sand. Depending on the geosynthetic material and construction boundaries ordinary soil can also be used as fill. By using the **SoilTain®** bag system expensive rock fill can be substituted by locally available materials which are contained in a flexible geosynthetic bag.

After installation the geotextile sand bags form a durable and robust anti-erosion system which is characterized by a high degree of flexibility and self adaption. Erosion prone areas can be stabilized with an efficient soft solution, avoiding rock, concrete or steel.

Installation and typical dimensions

A typical installation process is as follows:

1. The pre-fabricated bags are filled with locally available material on-site;
2. Closure of the bags by means of a hand-sewing machine;
3. Final installation with the aid of a excavator grab, or similar mechanism.

According to the site-specific requirements and type of

application of the **SoilTain®** bags, the installation of the sand containers may be also done by placing them from a barge by use of a crane.



Transportation of the **SoilTain®** Bag

SoilTain® bag sizes vary in between 0.02 m³ up to 5.00 m³. There is a smooth transition between the definition of geotextile sand bags and geotextile sand containers regarding the corresponding containment volume. Therefore the 5.00 m³ sand bags may sometimes already be designated as "containers". However, the common **SoilTain®** Bag has a 1 m³ containment volume at an 80% filling.

Advanced geosynthetics

The used geosynthetic material can vary according to the specific project requirements. HUESKER offers an



Placement of the **SoilTain**[®] Bag

appropriate **SoilTain**[®] bag solution with a range of different materials: bags made of non-wovens, wovens or geocomposites. The corresponding material properties vary from low tensile strength accompanied by high elongation to high tensile strength in combination with low elongation.

Durability and long-term performance

History has proven that geosynthetics are a soft but at the same time durable solution. One fundamental criteria for materials used in the marine environment is the abrasion resistance. The wave and current induced movement of sand particles or even of heavy armour stones can lead to the disintegration also of hard materials such as steel and concrete. HUESKER can supply bags made out of geosynthetic materials with enhanced abrasion resistance.

Filtration stability

The use of geosynthetic bags offers stable filter construction without additional measures. A double layer of **SoilTain**[®] bags can be a substitute for one or



SoilTain[®] bags as scour protection for a bridge pier

more granular filter layers. This is beneficial especially for underwater constructions as the installation of submerged granular filters is always a challenge.

Versatile application possibilities

SoilTain[®] bags offer a wide range of possible applications: They can be used for permanent structures or temporary measures such as emergency repair of dike breaches. Apart from short-term applications **SoilTain**[®] bags are a durable solution for permanent works such as slope protection elements, beach repair or scour protection for structures like wind turbines, bridge foundations or piers. Additionally, geotextile encapsulated sand elements have previously been successfully used for artificial reefs, supporting sea life.

Ecological sustainability

Past practice has shown that geosynthetics are well accepted by the marine flora and fauna. This has been confirmed and supported by executed research projects. This tells us that the rough outer surface of the



Colonization of geotextile sand element by the marine flora and fauna

geosynthetics provides opportunities for the colonization and growth of marine organisms on the sand container structures without any damage to the container itself. Furthermore this ecological blanket enhances the UV- and abrasion resistance of the geosynthetic sand container.

Design

HUESKER engineers can help to design the right **SoilTain**[®] bag size with the corresponding appropriate geosynthetic material and they can also assist finding the best customized solution.

Brief history of HUESKER SoilTain® sand bag milestones



Construction of the dike core at the Rüstersieler Watt 1963

One of the first large applications of 25.000 1m³ bags worldwide was executed in 1963 near Wilhelmshaven at the Rüstersieler Watt (Germany). A dike was constructed with woven polyamide ("nylon") bags forming the dike core, retaining the soil and offering a stable slope for further construction.



Endicott Island after completion of work in 1985

In 1985 the Endicott development was constructed as the first oil exploration facility in the Beaufort Sea, Alaska. A part of the revetment was built with 35.000 3m³ woven polyester fabric bags, filled with gravel. In 2010 the Endicott project reached the end of its intended 25-year design life. The performance of the slope armour has been excellent and the service live of the platform has now been extended indefinitely.



Endicott Island after 25 years of service-life in 2010 (source www.wikipedia.com)

In 2011 approximately 60.000 1m³ bags made out of a BAW certified non-woven have been installed for slope and bridge pier protection of the river banks located at the North-South Express Highway in Sungai Melaka, Malaysia. A system was required which provides erosion resistance including a "green concept". The **SoilTain**® sand bag system offered the possibility of a stepped slope construction in combination with an environmental friendly solution. This construction method is widely accepted by the Malaysian local authorities and well known as a "green revetment" post construction due to the growth of algae and grass on the geotextile bags.



Sungai Melaka project, Malaysia in 2011

Construction cycle

The following pictures illustrate the installation of **SoilTain®** Bags. According to site-specific conditions and requirements the procedure and the utilized equipment may vary from site to site.



Fig. 1: Delivered **SoilTain®** Bags



Fig. 2: Filling process of the **SoilTain®** Bags with a funnel



Fig. 3: Closing of the **SoilTain®** Bags with a hand-held sewing machine



Fig. 4: Prepared **SoilTain®** bags, waiting for installation



Fig. 5: Transportation by an excavator with a grab



Fig. 6: Placement of the **SoilTain®** Bags

SoilTain® is a registered trademark of HUESKER Synthetic GmbH.



HUESKER Synthetic GmbH is certified by:



HUESKER offers a wide range of technically demanding solutions relying on our many years' experience. Our solutions are economical, reliable and up-to-date and used in:

Earthworks and foundation engineering, landfill construction, hydraulic engineering, road construction

Technical assistance, planning, support - worldwide

Reliable and advanced techniques characterise our products in many applications:

Fortrac® - a flexible, high modulus and low-creep geogrid for soil reinforcement

HaTelit® - a flexible, high-modulus and temperature resistant grid for asphalt reinforcement

Stabilenka® - a high-modulus polyester woven for reinforcement and separation of soils

Robutec® - a very high-modulus and alkali-resistant wove for reinforcement and separation of soils

Fornit® - a biaxial geogrid for subbase reinforcement

Comtrac® - a geocomposite for reinforcement, separation and filtration of soils

Duogrid® - a geocomposite made of biaxial high-modulus flexible geogrid and a nonwoven

NaBento® - geosynthetic clay liner for sealing

Incomat® - a concrete- or sand-mat for sealing and erosion control

Ringtrac® - geotextile tube for reinforcement and soil containment

HaTe® - wovens and nonwovens for separation, filtration, drainage and protection

SoilTain® - systems for hydraulic engineering and dewatering

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