Geosynthetic Sandmats

as a Filter and Foundation on a River Bed

River Bed Stabilisation on the Elbe near Torgau

In the summer of 1994, work was carried out to improve the navigability of the Elbe immediately downstream from the Torgauer Rocks. Preparatory work was undertaken to remove the middle pier of the old road bridge and to maintain the water level in view of further widening of the navigation channel in the rock area at a later date.

The major work comprised infilling of extensive scoured areas by constructing ground sills and then placing material in the intermediate sections of the river bed between km 154.62 (end of the rock bed) and km 155.70 (below the railway bridge). According to the project description of the Department for Waterways and Shipping, Dresden, the following work was required:

- 2.000 m³ dredging
- 14.600 m³ geosynthetic sandmats
- 12.300 m³ rock fill
- 560 m³ sand bag placement
- 23.000 m³ fine gravel, supplied and placed.

The Construction Process

The eleven ground sills were put into place working upstream without disrupting river traffic.
The sill construction consisted of:

1. Dredging using a multi-bucket dredger to prepare the foundation surface for the geosynthetic sandmats
2. Laying the geosynthetic sandmats to stabilize the river bed and the immediate placing of sand bags or bulk rock fill to hold the sandmats in position.
3. Constructing the ground sills.

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The river bed was brought up to height and stabilized sector by sector, immediately following the construction of each sill. The zone up to 0.40 m below the new bed level was filled in with 8/120 mm gravel. Subsequently, the loose gravel bed was covered with a 20 cm layer of 50/150 mm rock fill. As the final stage of the stabilisation process, a 2/8 mm gravel mixture was spread into the rock base.

Geosynthetic Sandmat Requirements

For the geosynthetic stabilisation work the Department for Waterways and Shipping in Dresden specified the use of a two-ply, sand-filled geosynthetic mat with steel strip reinforcements and chain weights. The mechanically bonded nonwoven geosynthetics had to be capable of maintaining filter stability for soil types 1-4 and have a fibre content of at least 1000 g/m^2 with a total filled weight of $\geq$ 6000 g/m^2. Both geosynthetic layers (carrier and cover) had to be firmly joined to each other through the ballast layer to prevent sand displacement.

The nonwoven carrier acts as the filter, while the sand fill, by acting as ballast, assists the installation process without the need for extra weighting. In addition, each sandmat (3.6 m wide x either 12.0 m or 18.0 m long) is reinforced with three flat steel strips and two scour protection chains. The joining overlap of the mats is at least one metre.

The J.V. company, made up of Reinhold Meister Bau-GmbH and Domarin GmbH, commissioned the construction and delivery of the mats from HUESKER Synthetic. Using the already accepted hydraulic engineering nonwoven filter HaTe® K 251 as the carrier layer, HUESKER designed a three-layer composite fabric, which was held together by seams at 25 mm spacing. All geosynthetic components were made of polyester.

We would be pleased to give you advice on this product and the rest of the HUESKER's geosynthetic range and their diverse applications.

Technical Specifications

Carrier Layer	mech. bonded nonwoven	$\geq$ 750 g/m^2
Cover Layer	stitch bonded nonwoven	$\geq$ 250 g/m^2
Ballast Layer	silica sand	$\geq$ 5000 g/m^2
Total Weight		$\geq$ 6000 g/m^2
Tensile Strength	(DIN 53854)	
at break*	length	$\geq$ 25 k/Nm
	width	$\geq$ 45 k/Nm
Strain at break*	length	$\geq$ 85 %
	width	$\geq$ 55 %
Filter Stability*	(BAW test)	soil types 1-3
Permeability k* (Δ h = 25 cm)	(DIN E 53935)	$\geq$ 1 • 10^{-3} m/s
Roll Dimensions	width	3,60 m
	length	$\leq$ 30 m

* Test results without sand fill

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