TENCATE Mirafi®

INSTALLATION GUIDELINES

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

TENCATE GEOSYNTHETICS

TENCATE Mirafi®

INSTALLATION GUIDELINES

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

CONTENTS

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

1. General

This document is prepared to help ensure that the filter geotextile, once installed, will perform its intended design functions. To do so, the product must be identified, handled, stored and installed in such a way that its physical property values are not affected and the design conditions are ultimately met as intended. This document does not account for every possible construction scenario. This document contains information consistent with generally accepted practices of identifying, handling, storing and installing filter geotextiles for most basal filtration applications. Failure to follow these guidelines may result in the unnecessary failure of the geotextile in an otherwise properly designed application.

2. Product and Application

Mirafi® FM filter geotextiles are manufactured using highly UV stabilized polypropylene yarn which are woven into a stable network such that the yarns retain their relative position. It is also manufactured with in-woven loops to facilitate the fabrication of fascine mattress for easy launch and installation in the marine and hydraulic environment. The in-woven loops are strong and spaced at convenient grid intervals to provide tie-up points to attach fascine material (see Figure 1).

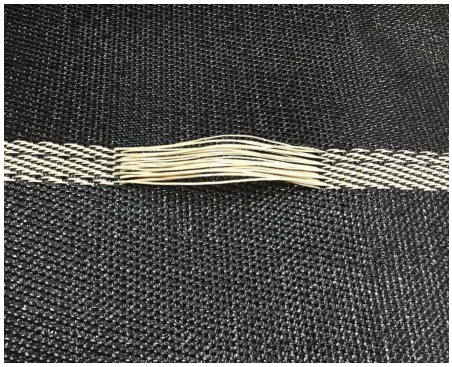

Figure 1. Mirafi® FM filter geotextile

Mirafi® FM filter geotextile function as a filter, reducing the traditional requirement of multiple granular filter layers.

The filter geotextile located across the base of the breakwater or containment dyke to prevent erosion and scour of the sand and silt foundation which might lead to undermining and instability of the structure (see Figure 2). Depending on the location of the dyke or breakwater, the filter geotextile may need to be installed at appreciable water depth and in diverse water current and wave condition. To facilitate this, the filter geotextile is normally fabricated on-land by connecting it to a fascine material (typically brushwood or bamboo). This facilitates the transportation of the geotextile fascine mattress by increasing its buoyancy and preventing it from folding. After positioning, the geotextile fascine mattress is sunk by dumping light armour stone onto it.

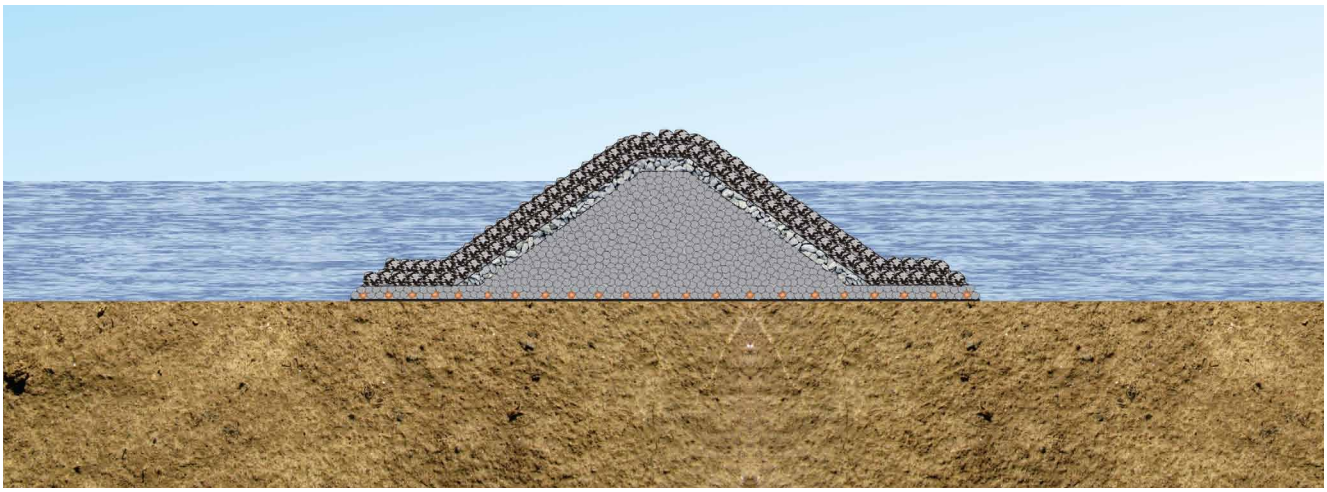

Figure 2. Typical cross section showing the Mirafi® FM filter geotextile

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

3. Material Identification, Storage and Handling

The geotextile shall be rolled on cores having strength sufficient to avoid collapse or other damage from normal use. Each roll shall be wrapped with a plastic covering to protect the geotextile product from damage during shipping and handling. Each roll shall be identified with a durable gummed label or the equivalent, clearly legible on the outside of the roll wrapping. The label shall indicate the manufacturer's name, the style number and the roll number.

Upon delivery, check the roll labels to verify that the correct geotextile product has been received. Immediately inspect the geotextile rolls to ensure it is free of any flaws or damage that might have occurred during shipping or handling. While unloading or transferring the geotextile from one location to another, care should be taken to prevent damage to the wrapping, core, label or the geotextile itself.

If the geotextile is to be stored for an extended period of time, the geotextile shall be located and place in a manner that ensures the integrity of the wrapping, core and label as well as the physical properties of the geotextile product. This can be accomplished by elevating the geotextile rolls off the ground on dunnage (see Figure 3).

Care should be taken to ensure that the geotextile rolls are adequately covered and protected from ultraviolet radiation, chemicals that are strong acids or strong bases, fire or flames including welding sparks, temperatures in excess of 60°C, and human or animal destruction.

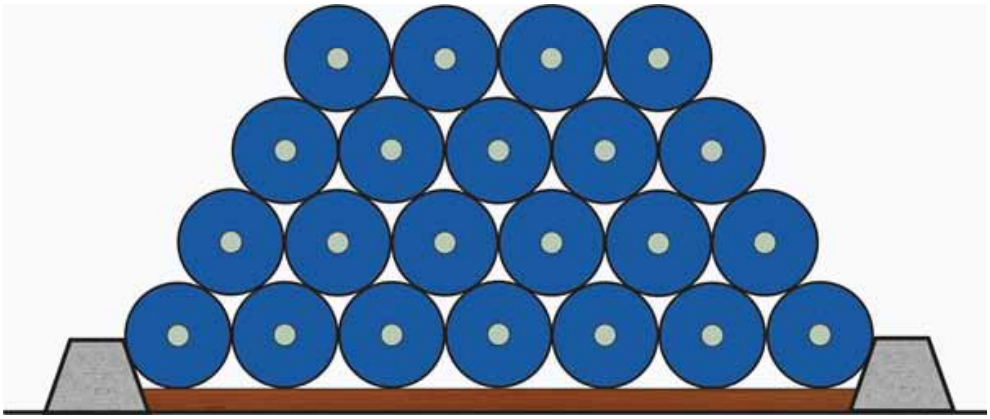

Figure 3. Recommended setup for safe onsite stacked storage of Mirafi® FM filter geotextile rolls

4. Fabrication of Geotextile Fascine Mattress

The geotextile fascine mattresses are fabricated on-land, preferably near the project site. The fabrication site should be clear of obstacles, trim or remove any large roots or sharp objects that might puncture or tear the geotextile at the site.

Mirafi® filter geotextiles are supplied generally in standard rolls of specific roll length and width. Before unrolling the geotextile, verify the roll identification, length, and installation location with the contract drawings. While unrolling the geotextile, inspect it for damage or defects. Discard or repair any damage that occurs during storage, handling or installation as directed by the Engineer.

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

Prepare and cut the geotextile to proper width prior to the installation of the geotextile fascine mattress. Several pieces of the geotextile can be combine to a larger dimension through double stitch J-Seam. The in-woven loops should be facing upwards to ease the attachment of fascine material.

Fascine material such as brushwood or bamboo can be attached to the filter geotextile with the aid of the in-woven loops. The fascine material can be tied in a grid pattern to provide stiffness properties to the completed geotextile fascine mattress (see Figure 4).

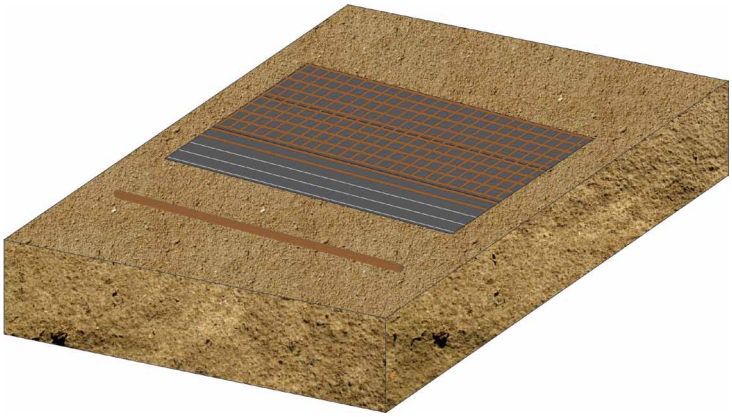

Figure 4. Fabrication of geotextile fascine mattress using Mirafi® FM filter geotextile

5. Installation of Geotextile Fascine Mattress

Option 1 - One Pontoon and One Stone Dumping Vessel Method

To facilitate the transportation of the geotextile fascine mattress from the fabrication site, a sinking beam is used to distribute the pulling forces uniformly. The sinking beam is attached to the pontoon at one end while the other end is attached to the mattress using ropes. The mattress is then pulled out from the fabrication site carefully by the pontoon. After the positioning, the mattress is sunk by dumping light armour stones on to it through the stone dumping vessel as per the Engineer's design and drawing.

Option 2 - Two Pontoon and One Stone Dumping Vessel Method

To achieve an evenly spread armour stones, tail pontoon can be used to stabilize the geotextile fascine mattress during sinking with the aid of tailing beam. Same process as in the above option 1, but an additional pontoon (tail pontoon) is used to attached to the other end of the mattress through tail beam. The mattress is then maneuvered with the aid of front and tail pontoon to the required position. When in the position, the sinking beam is lowered down to create a space for the stone dumping vessel to move in. The front part of the mattress is kept in position on the seabed by the sinking beam while the stone dumping vessel will start dumping the stone to sink the mattress. The movement of the stone dumping vessel between the two pontoons must be controlled such that constant thickness of the armour stone is formed while the mattress is under tension.

Option 3 - One Pontoon and One Stone Dumping Vessel with Winches Method

This method is same as option 2 but the function of front pontoon and stone dumping vessel are merged together. A stone dumping vessel that is equipped with winches is required. When the mattress is in position, the sinking beam will be lowered down to the seabed using the winches on the stone dumping vessel. After this, the stone dumping vessel will move towards the tail pontoon and dump the armour stone while the tail pontoon keeps the mattress in tension (see Figure 5).

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

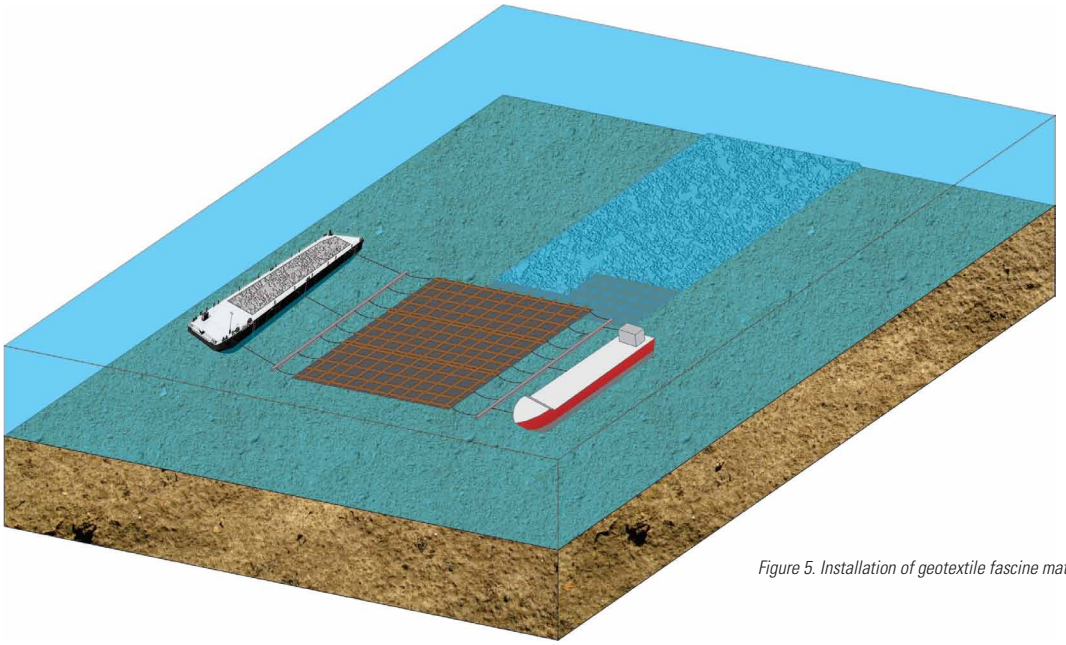

Figure 5. Installation of geotextile fascine mattress

6. Jointing

During the fabrication of geotextile fascine mattress on-land, several pieces of geotextile can be combine to a larger piece through double stitch J-seam. When installing the mattress underwater, a nominal geotextile edge overlap of 1.0 m is generally sufficient to prevent formation of filter discontinuity (see Figure 6).

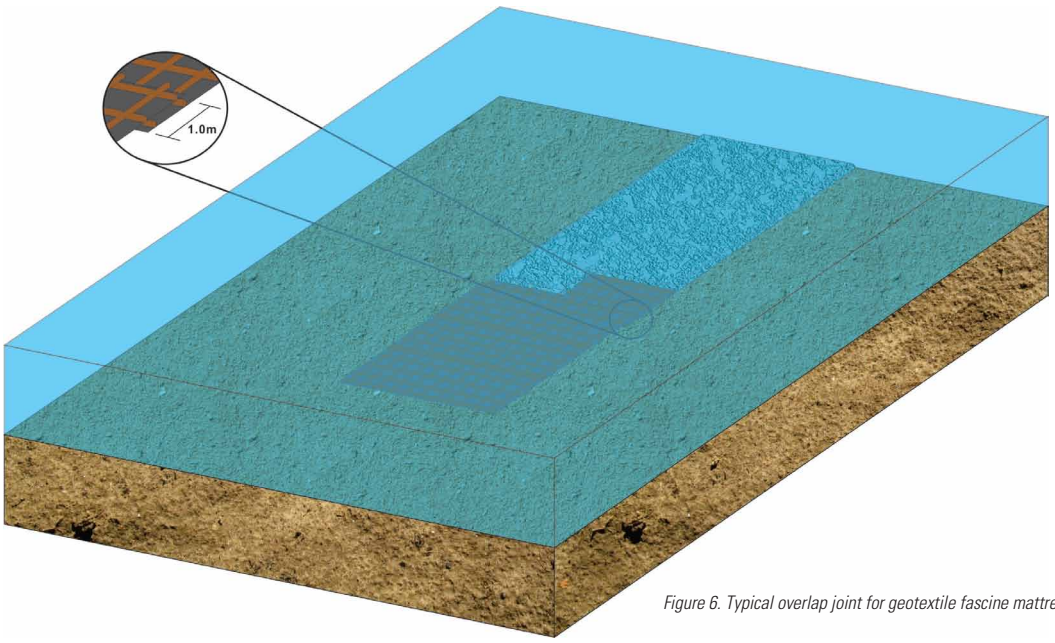

Figure 6. Typical overlap joint for geotextile fascine mattress for basal filtration application

Mirafi® FM Filter Geotextiles for Basal Filtration Applications

7. Rock Placement

The rock placement shall be done according to design drawings and/or the Engineer's instruction. To prevent damage to the geotextile, light armour stones (typically 1-10 kg or 5-40 kg) are used to sink the mattress and to form bedding layer above the mattress. It is important for the structure founded on the seabed to have proper toe scour protection, the detailing of which may follow the toe protection as shown in Figure 7. The figure is adapted from "The Rock Manual. The use of rock in hydraulic engineering (2nd edition)"; CIRIA, CUR, CETMEF(2007).

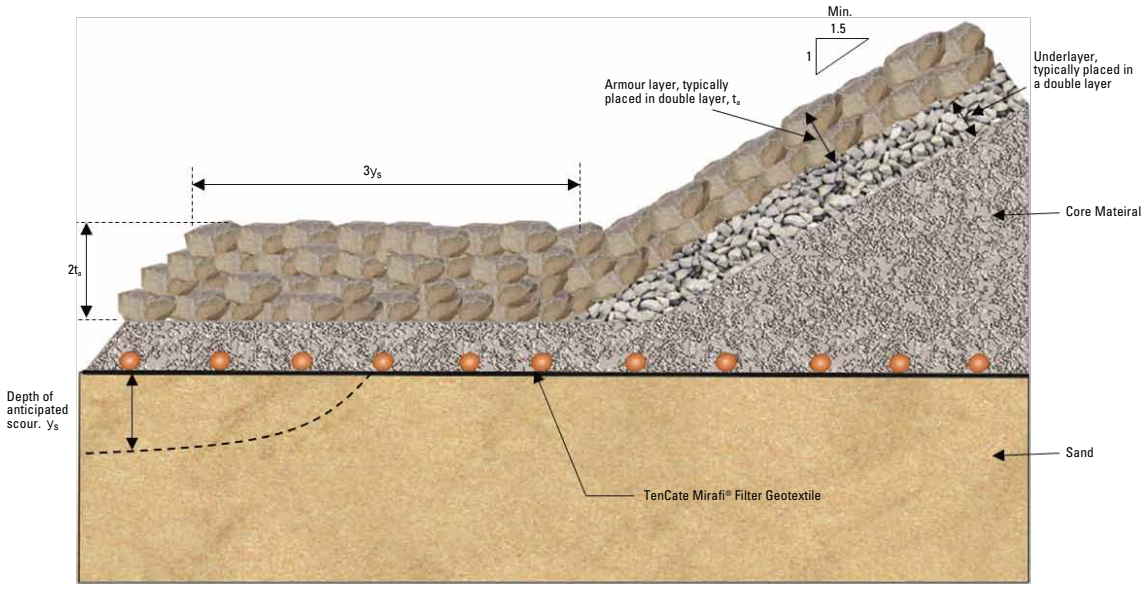

Figure 7. Typical scour protection at toe

TenCate Geosynthetics Asia Sdn. Bhd. (264232-U)
14, Jalan Sementa 27/91, Seksyen 27,
40400 Shah Alam, Selangor Darul Ehsan, Malaysia.
Tel: +60 3 5192 8568 Fax: +60 3 5192 8575
Email: info.asia@tencategeo.com www.tencategeo.asia