



TenCate Solutions for Infrastructure





Polyfelt® Nonwoven Geotextiles

Subgrade separation

Case Study

project	Coastal Road Subgrade Separation
location	China

Part of the Yingkou Coastal Highway in Liaoning Province is constructed over tidal flats. Initially, an embankment was constructed to raise the road level above long term tidal flood levels. Polyfelt® TS60 geotextile was used as a separation layer between the embankment fill and the pavement structure. The embankment fill consists of cohesive granular material with a high degree of fines. During a raining day the embankment fill can be softened due to rainwater soaking and infiltration. The function of Polyfelt® TS60 geotextile separator is to prevent the intermixing of the softened embankment fill and the crushed rock subbase material.

A geotextile separator prevents the intermixing of two contrasting layers of material in road construction e.g. aggregate base course material and soft fine grained subgrade material. Without a geotextile separator the aggregates will punch into the soft subgrade; the net result being the compaction of the aggregates to achieve a target CBR value may not be achieved and additional base thickness is required to compensate for the loss of good aggregate into the subgrade. An effective geotextile separator also requires high permeability to allow rapid dissipation of excess pore pressures built up during transient wheel load passes. Polyfelt® nonwoven geotextiles are robust geotextile separators with high permeability to allow rapid dissipation of any excess pore pressures that built up during the course of construction and over the service life.



TenCate Polyfelt® TS & KET *nonwoven geotextile.*

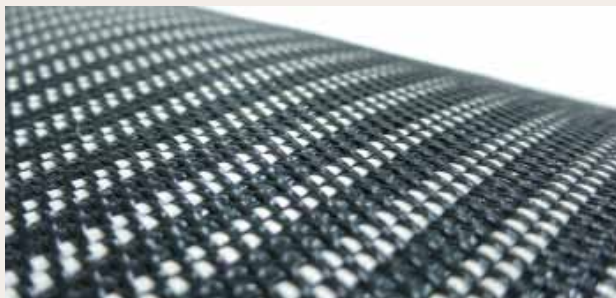


Mirafi® HPa Geotextiles

Subgrade stabilization and basecourse reinforcement

Mirafi® HPa geotextiles is a specially developed class of geotextiles that combines all the critical performance functions for optimum subgrade stabilization design of roadway systems. Besides having the basic properties for separation performance with high permeability to allow rapid dissipation of excess pore water pressure that usually develops in the subgrade when wheel loads are induced, Mirafi® HPa geotextiles also have high tensile modulus at 2% elongation and high interface interaction coefficient with granular material for aggregate confinement and reinforcement performances.

Mirafi® HPa geotextile is an excellent product for pavement structures, combining all the critical functions that contribute towards subgrade stabilization. The use of Mirafi® HPa geotextile in a pavement design can save cost by allowing a reduced base course thickness to be adopted or alternatively extending the service life of the pavement. Mirafi® HPa geotextile is also a green solution. By allowing a thinner base course layer to be constructed, a pavement designed with Mirafi® HPa geotextile has a lower carbon footprint when compared with one designed with no inclusion.



TenCate Mirafi® HPa geotextile.



Case Study

project	Container Yard Area Stabilization
location	Malaysia

Pulau Indah is home to Westport, Malaysia. The general subsoil consists of very soft marine clay to depths of more than 30 m. Water table is almost at ground level and the subgrade is a dessicated crust layer of the marine clay formation. Due to increase in container handling and storage demand, additional load supporting platform area has to be constructed. The ground basically consists of clayey silt with high water table. About 1 m of base course material was needed to raise a stable looking platform. Despite that, heavy rutting was encountered when machinery started operation on the platform. Alternative of using Mirafi® HP380a with a reduced base course thickness of 500 mm was adopted after initial construction without use of geotextile proved costly and unsatisfactory. This solution provided a stable load supporting platform for container handling and stacked storage as well as cost saving for the client.





Polyfelt® Nonwoven Geotextiles

Subsurface drainage

Case Study

project	Sports Field
location	Malaysia

High rainfall in Malaysia can be a nuisance especially when the accumulated water is not able to drain quickly. This is especially true in sports fields where puddles form as a result of rainwater, bringing disruptions to sports events. To prevent the problem, TenCate Polyfelt® TS nonwoven geotextiles are used as a filter in the drainage system below the sports field. The drainage system usually consists of aggregates placed in dug trenches. To prevent the erosion of adjacent soil into the aggregates and thus clogging the drainage system, TenCate Polyfelt® TS nonwoven geotextiles have been used as a filter. TenCate Polyfelt® TS has high permeability and optimum opening size to ensure the quick discharge of water which helped maintain the integrity of the drainage system and keep the field dry.

Drainage system failure occurs most often from system clogging when the drainage aggregate and pipe becomes contaminated with the surrounding soil. This clogging can result in failure of the structure.

To prevent clogging, Polyfelt® nonwoven geotextiles can be placed between the drainage aggregate and the soil to be drained. The geotextiles act as a filter and separator, retaining the natural soil while allowing water to pass into the drainage system. The gradation of the soil to be filtered must be compatible with the pore size distribution of the geotextile. The manufacturing process used by TenCate allows the formulation of an ideal pore size distribution in the geotextile for optimum soil filtration.

Polyfelt® nonwoven geotextile filters are robust to withstand installation stresses and rough backfilling procedures. Typical applications of Polyfelt® nonwoven geotextiles include road edge drains; filters behind gabions and retaining walls; sports field drainage filters; drainage of golf course greens and sand bunkers; architectural and landscape drainage; and agricultural drains.

The excellent filtration properties and robust, yet flexible, behaviour makes Polyfelt® nonwoven geotextile the ideal material to be used for subsurface drainage filters.



Polyfelt® PGM and PGMG Geotextiles

Pavement overlays

Increased traffic frequency and axle loads combined with changes in pavement temperature exert stresses on asphalt pavements. These stresses induce the formation and propagation of cracks in the asphalt pavement, allowing precipitation and oxygen to penetrate into the underlying structure, thus accelerating the deterioration of bitumen binders. The end results are cracked pavement layers and stripping of the asphalt surface.

Polyfelt® PGM and PGMG are paving geotextiles specially manufactured for pavement rehabilitation to extend the life span of stressed pavements. Polyfelt® PGM is designed to provide optimum absorption of bitumen that effectively bonds the new asphalt overlay to the old pavement providing a waterproof layer within the pavement structure. It is suitable for applications on low to moderate trafficked roads. Polyfelt® PGMG is a pavement reinforcement composite utilizing fibreglass yarns and is ideal for use in airport runways, highways, container yards, cracked concrete pavements, and for cement-treated subbases.



TenCate Polyfelt® PGM.



TenCate Polyfelt® PGMG.



Case Study

project	Airport Runway Rehabilitation
location	Thailand

The resort island of Phuket receives huge tourist inflows annually. The major gateway to the island was served by a small airport with one over-used runway. The authority decided to rehabilitate the airport and strengthening of the runway was one of the main improvements. The old pavement was planed down by about 100mm, cleaned and sprayed with a coat of pure bitumen. Then high strength TenCate Polyfelt® PGMG paving geotextile was laid using special laying equipment. Finally a new asphalt overlay was placed over the geotextile and compacted. In critical areas along the runway, several layers of TenCate Polyfelt® PGMG were used. The construction activity took place at night due to the heavy aircraft traffic during the day. By dawn the runway was ready to receive the first flight of tourists.





Polyfelt® Alidrain Prefabricated Vertical Drain

Accelerated consolidation

Case Study

project	Airport Expansion
location	Malaysia

To cope with the increased flight and passenger activities, replacement of the present budget airport terminal was required. The main challenge for the new facilities was that they had to be constructed over soft foundation soils to tight deadlines. Having considered all design options, it was decided that the use of prefabricated vertical drains (PVD) was the most viable solution. For this solution to work, TenCate Polyfelt® Alidrain PVDs had to perform to ensure continuous high flow of fluid in the core even under high soil compression or extreme construction conditions. The result was that the foundation soil was consolidated in a short time period for subsequent construction activities. In total, nearly 60 million linear meters of TenCate Polyfelt® Alidrain PVDs were used for this project.

To prevent later problems of excess settlement, it is important that excess pore pressures be removed from soft foundation soils within a short time frame. This ensures that foundation shear strength is increased quickly to support embankment and fill loadings. However, soft compressible foundation soils have a low hydraulic conductivity and it takes a long time for excess pore pressures to dissipate and the soil to consolidate. To reduce consolidation time, Polyfelt® Alidrain prefabricated vertical drains (PVD) are installed to provide a shorter and easier drainage path for the pore water to drain. This speeds up consolidation and the soft foundation gains in shear strength quickly.

Polyfelt® Alidrain PVD comprises a synthetic drainage core wrapped with a durable fabric of excellent filtration properties. The vertical drain is designed to allow free flow of water in all directions and to ensure the integrity of the drainage system when subjected to tensile, compressive and buckling forces as the soft soil deforms and consolidates.

Once the vertical drains have been installed, fill is placed over the top of the site in order to generate excess pore pressures in the soft foundation soil. The excess pore pressure enables the pore water to drain out of the foundation soil and up the PVD where it is dissipated into a surface drainage blanket, beneath the placed fill. Once the desired consolidation has been achieved, construction continues. A site can be completed in a number of months rather than a number of years if PVDs are not used.



During the consolidation process, lateral soil displacements can cause drains to elongate while vertical soil compression may cause drains to fold and buckle. Drain performance under both conditions must be considered when selecting a PVD as drain failure can jeopardize the construction schedule of the project and the stability of any structures built above it. The complete range of Polyfelt® Alidrain PVD has been specifically designed to ensure that adequate drainage capability is maintained at all times, even under the most severe soil conditions.

TenCate has the capability to supply large quantities of Polyfelt® Alidrain PVD to fast-paced projects that require the delivery of the drains within a tight schedule. Its track record in high profile projects is a testament of its reliability to supply high quality and cost effective PVDs for soft soil consolidation projects.



TenCate Polyfelt® AD.



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

TenCate Geosynthetics Asia Sdn Bhd

Registration No. 199301009495 (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

TenCate Geosynthetics North America

365 South Holland Drive

Pendergrass

Georgia 30567

United States of America

Tel: +1 706 693 2226

Fax: +1 706 693 4400

Email: spec@tencategeo.com

TenCate Geosynthetics Austria GmbH

Schachermayerstrasse 18

A-4021 Linz

Austria

Tel: +43 732 6983 0

Fax: +43 732 6983 5353

Email: service.at@tencategeo.com