

GEOSYNTHETICS

Our solutions for the infrastructure in mining



Protective Fabrics
Outdoor Fabrics
Advanced Composites
Advanced Armour

Geosynthetics
Grass

 **TENCATE**
materials that make a difference

OUR ECONOMIC SOLUTIONS FOR THE MINING INDUSTRY

TENCATE
Bidim[®]

TenCate Bidim[®] S



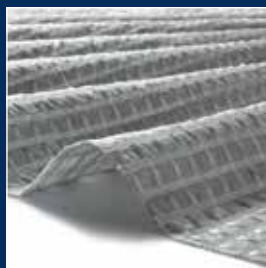
TENCATE
Polyfelt[®]

TenCate Polyfelt[®] TS



TENCATE
Rock[®]

TenCate Rock[®] PEC



TENCATE
Miragrid

TenCate Miragrid GX



TenCate Geosynthetics offers efficient and economical solutions which cover different applications:

PORT EXPANSION

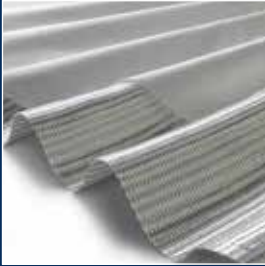
ROADS & RAILROAD TRACKS

DUMPWALL



TENCATE
Geolon®

TenCate Geolon® PET



TENCATE
Geolon®

TenCate Geolon® PP



TENCATE
Bidim®

TenCate Bidim® AR



TENCATE
GeoDetect®

TenCate GeoDetect® S-BR



WORKING PLATFORMS

TAILING PONDS



HAUL ROADS AND WORKING PLATFORMS

Your quick and safe access to the mine

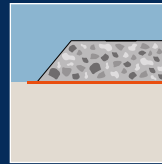
Access roads, railway tracks and platforms are crucial for the mining activities as all heavy plant and machinery are required to access the mine.

Geosynthetics from TenCate have been used over 40 years to stabilise temporary and permanent road constructions, showing significant benefits:

- Cost saving and lower environmental impact by the reduction of granular layer thickness to stabilize the platform
- No mixing between the granular materials of the road construction and the subgrade leading to an improved bearing capacity and performance
- Stronger platforms over time due to the reinforcement.

TenCate Geosynthetics offer a complete range of products and solutions to fulfil the different functions involved in the construction of trafficked areas.

Depending on the subgrade properties and the traffic, the stabilisation of the structure may require separation / filtration or separation / filtration with reinforcement.

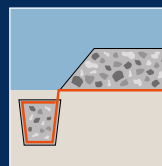


Separation

Geosynthetics prevent upper granular layers penetrating soft subgrades beneath, so reducing the amount of granular material required to stabilize a structure.

Our solutions:

TenCate Bidim® S and TenCate Polyfelt® TS

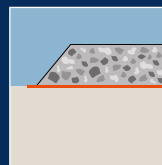


Filtration

When used as filters, geotextiles permit the free flow of water from a soil mass, while inhibiting fine particle movement from the soil, thus stabilising the overall structure.

Our solutions:

TenCate Bidim® S and TenCate Polyfelt® TS

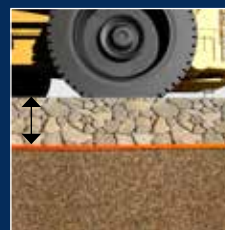


Separation / filtration and reinforcement

Geosynthetics are used to improve the bearing capacity of a structure. They limit the deformation and restrain lateral movement of granular material thus reducing settlement and improving load distribution.

Our solutions:

TenCate Rock® PEC and TenCate Geolon® PP



With geosynthetics



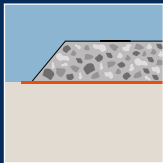
Without geosynthetics



RAILWAYS

On the right track for safety

For more than 4 decades, since the early 1970s, geosynthetics have been successfully used for railway construction. Safety and stability are of vital importance in railway construction, as demands made on materials are extremely high in rail tracks. A deviation of just a few millimetres may be critical and give rise to serious risk of derailment



Separation

Geosynthetics prevent mixing of different soil layers.

Our solutions:

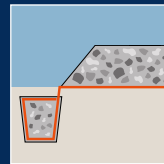
TenCate Bidim® AR , TenCate Polyfelt® TS and TenCate Bidim® S

Increasing traffic on old lines, which have problems with bearing capacity may mean the railway needs refurbished.



To avoid the full renewal of the structure, which may cause delays and reduce traffic on the existing lines, an existing solution would be to install a Geosynthetic such as TenCate Bidim AR20 directly under the ballast.

TenCate Bidim® AR20 has a very high abrasion resistance, which has been proven to be effective for at least 20 years. Rapid installation of the TenCate Bidim® AR20 ensures the railway is reopened with limited closures and delays.



Filtration

Fine soil particles which are pumped up due to the high dynamic stresses induced by rail traffic cannot penetrate into the subgrade-protection and ballast layers, but remain in the subgrade. Filter blanket and ballast remain clean.

Our solutions:

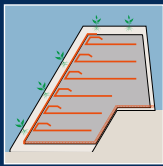
TenCate Bidim® S, TenCate Polyfelt® TS



TAILING PONDS

Act in protecting your environment with performance materials

Confinement of the sludge is a major environmental issue in mines. It may consist of a permanent or temporary liquid waste disposal if a treatment of the polluted material is considered. TenCate Geosynthetics are ideal solutions either to build and reinforce the structure of the basin such as the peripheral dikes or to avoid any leakage by insuring a strong watertight system.

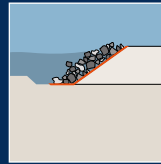


Reinforcement

Reinforcement of the base and the core of the structure minimize the quantity of granular material and insure the stability.

Our solutions:

TenCate Geolon® PET, TenCate Rock® PEC, TenCate Miragrid GX

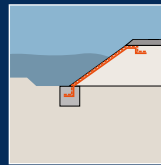


Filtration

Geosynthetics filter the fine soil particles and stabilize the upstream face of the dams (under riprap for example).

Our solutions:

TenCate Bidim® F / TenCate Polyfelt® F

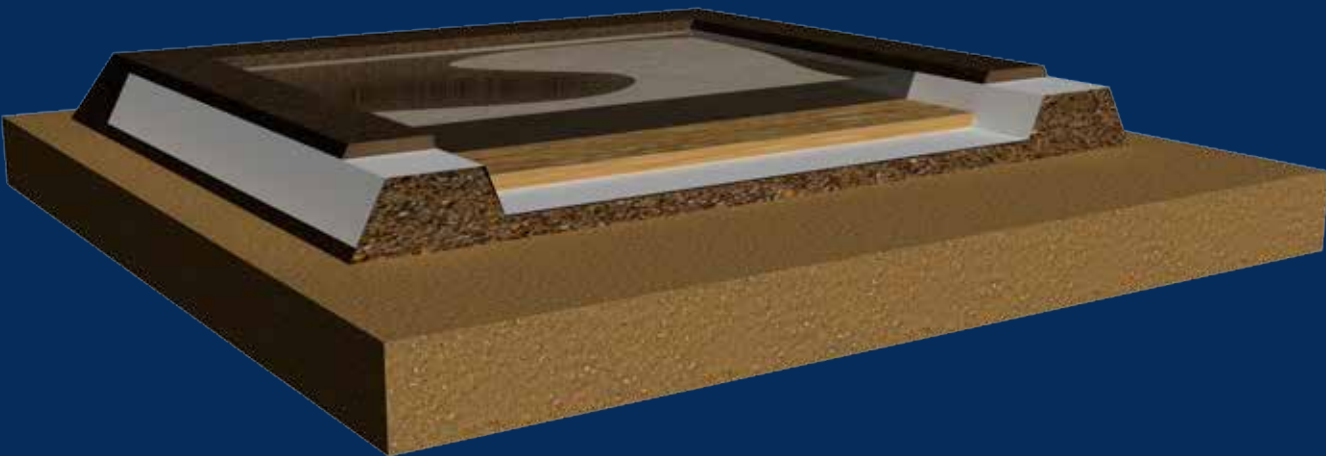


Protection

Geotextiles protect the watertight system from the puncturing and avoid the leakage of polluted material in the environment.

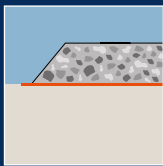
Our solutions:

TenCate Bidim® P / TenCate Polyfelt® P



Tailing ponds closure

In most cases, the polluted sludge cannot be removed from the site and the closure of the ponds is the only cost-effective solution. Depending on the final structure to be installed on the ponds, TenCate Geosynthetics offer different solutions:

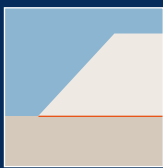


Separation / filtration and reinforcement

Wide geosynthetic panels placed directly on the sludge allow the installation of fill material and the traffic during construction. Chemical resistance of the geosynthetic against substances existing in the pond is fundamental.

Our solution:

TenCate Geolon® PP

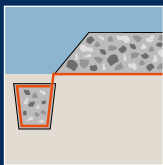


Reinforcement

High-strength geosynthetics as a basal reinforcement will support the loads of the final structure, insuring the stability, minimizing differential settlement and avoiding failure of the embankment.

Our solution:

TenCate Geolon® PET.



Separation/ filtration

Geosynthetics prevent the mixing between soil layers, so reducing the amount of granular material required to stabilize a structure.

Our solutions:

TenCate Bidim® S and TenCate Polyfelt® TS

CASE STUDY

Application: Mine tailing pond closure

Location: Spain



The Sotiel Coronada mining complex is located at Calanas in the province of Huelva (Andalucia), Southwest Spain.

Following completion of mining and processing activities in the area, the reclamation and closure of the large pyrite tailing ponds (surface area around 35 ha) was decided.

Due to the extensive area to be reclaimed, the large volumes of fill to be moved, and the tight time schedule, large volume, heavy earth moving equipment had to be used. This posed a major technical problem as the heavy equipment had to traffic over the very soft tailings extended to a depth approximating 18m. The solution was to construct a 1m thick stone-fill working platform over a layer of TenCate Rock® PEC 400 composed of high modulus polyester yarns in a composite structure and having an initial tensile strength of 400 kN/m in both longitudinal and cross directions.

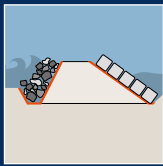
TenCate Rock® PEC also acts as a geotextile separator preventing the intermixing of the soft tailings with the stone fill. Then, the stone fill was back-dumped from the earth moving equipment and then bulldozed over the top of the geocomposite reinforcement to ensure there was minimal disturbance of the soft tailings below.



PORT EXPANSION

Higher traffic, quicker earthworks, increased efficiency

Increased traffic may require port facilities to be redeveloped and enlarged, potentially requiring land reclamation and large hydraulic structures such as dykes, embankments and platforms on top of subgrade consisting of very weak materials such as mud, sludge, saturated silts or clays.

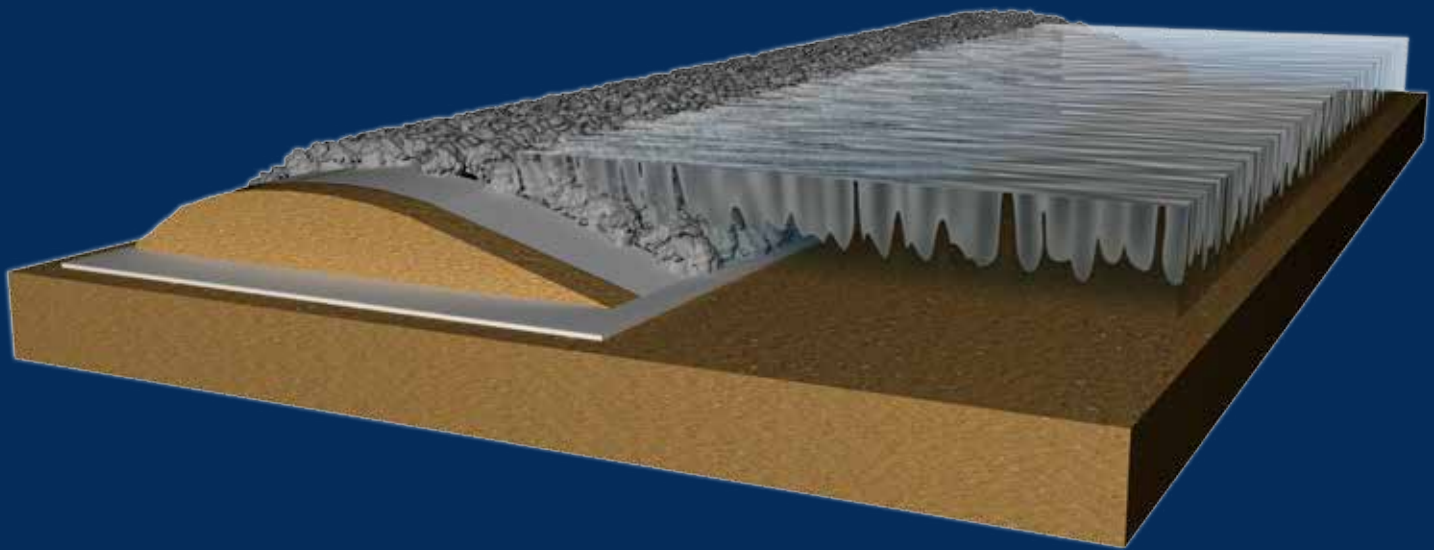


Filtration

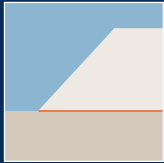
Geotextiles filters are used in coastal protection and stabilise the slopes of the dykes. Under rip-rap and other protection system, they maintain the fine soil layer in place.

Our solution:

TenCate Bidim® F, TenCate Polyfelt® F



TenCate Geosynthetics used as basal reinforcement offer solutions that fit technically, economically and environmentally with the importance of these structures:

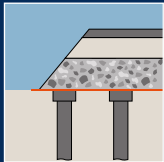


Reinforcement

Directly placed over soft soil TenCate Geosynthetics enable the embankment to be constructed quickly, directly over the mud foundation, without soil replacement.

Our solutions:

TenCate Geolon® PET, TenCate Rock® PEC



Reinforcement

Associated to other soil improvement techniques, like piles or stone columns, TenCate Geosynthetics insures a better load transfer to the firm subground.

Our solutions:

TenCate Geolon® PET, TenCate Rock® PEC

CASE STUDY

Application: Brisbane Port expansion
Location: Australia



The Port of Brisbane is located at the mouth of the Brisbane River, and rapid development is expected to continue in the future. The Port expansion Project has the ultimate objective of allowing the Port to expand by reclaiming and developing an additional 230 ha of port land.

The first stage of this process involved the construction of a 4.6 km long and up to 7.5 m high perimeter seawall in order to contain the reclamation fill in an environmentally friendly and controlled manner.

The use of high strength geotextile as the basal reinforcement for the seawall was ultimately assessed to be the most cost effective solution, and having the least associated risk.

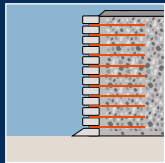
The final seawall design required the use of TenCate Geosynthetic basal reinforcement with tensile strength ranging between 400 kN/m and 850 kN/m, depending on the location and water depth. The geotextile reinforcement was sewn offsite to form panels up to 42 m wide by 100 m long.



DUMP WALLS AND RETAINING STRUCTURES

Build locally, extract locally and act globally

Dump walls are required to support very high stresses from the heavy trucks emptying their loads close to the face from the upper platform.



Reinforcement

Building vertical walls with TenCate geosynthetics is the most effective and economical solution.

Our solutions:

TenCate Polyslope®, TenCate Miragrid GX, TenCate Rock® PEC, TenCate GeoDetect®

TenCate walls and slopes solutions are performing and economical allowing safe and resistant artworks.

- TenCate Geosynthetics solutions are very easy to install and require no specific apprenticeship for set up
- No maintenance is needed
- The use of local fill material, same material used for fill and backfill in retaining structures reinforced by TenCate Geosynthetics is more economical and more environmental friendly
- Monitoring of reinforced earth structures with TenCate GeoDetect® system provides more safety and performance control.

CASE STUDY

Application: Coal mine dump wall
Location: Indonesia



PT Kaltim Prima Coal located at Sangatta, on the East coast of Kalimantan, has been extracting coal in this location since the early 1990's, and is today one of the largest coal mining companies in Indonesia. The coal at the Sangatta mine is delivered to the coal crushing plant where it is crushed, screened and washed at the coal washing plant before it is placed onto a 13km long overland conveyor belt for transportation to the shipping terminal.

To minimize earthworks, the vertical dump wall was constructed by the excavating into a hill slope.

The fill material containing a significant fine fraction, a geocomposite TenCate Rock® PEC was chosen due to its better performance with residual soil. A rock filled gabion was installed at the facing.

The geocomposite reinforcement was laid at 0.5 m vertical spacing throughout the height of the wall, wrapped around the face and anchored back into compacted fill.



MINE PROCESSING

Maintenance, prevention, ensuring security for men and environment

TenCate GeoDetect[®], sensing solution for soil structures

TenCate, the world leader in geosynthetic solutions, has developed a revolutionary combination of geotextile performance and fiber optic technology to provide actionable information related to soil strain and temperature of geostructures.

Monitoring and warning : the sensible structures under control

The heterogeneous nature of soil creates significant variability in geotechnical design. The TenCate GeoDetect[®] system offers owners and design engineers insight into the performance and sustainability of soil structures. This additional reliability and integrity can assure the appropriate performance of a geostructure leading to:

- Warning against unexpected events : sinkholes, landslides, dike failures leakages
- Increased factors of safety
- Better land use
- Longer lasting structures
- Lower overall project costs.

For more information please visit our website on www.tencategeodetect.com



One total solution for Mining And Mineral Processing

TenCate Geotube[®] dewatering technology provides a simple and cost effective way of dewatering large and small volumes of Mining and Mineral wastes. This proven technology can accommodate dewatering and containment in one, cost-effective operation.

Utilizing TenCate Geotube[®] containers is an effective alternative to mechanical processing that enables the capture of precious metals and the efficient management of mine waste streams. With volume reduction as high as 90%, high solids levels make removal and disposal easy.

For more information please visit our website www.geotube.com



GEOSYNTHETICS

For further information on pre-design, installations and cost savings contact:

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