

GEOSYNTHETIC PRODUCTS

FOR ADVANCED ENGINEERING APPLICATIONS



THRACE GROUP: A GLOBAL FRONTRUNNER IN GEOSYNTHETICS



16
MEMBER
COMPANIES

1.600
EXPERIENCED
PROFESSIONALS

80
COUNTRIES
SALES NETWORK

1.500
CUSTOMERS
WORLDWIDE

100.000
TONS OF PP/PE/PET
CONVERTED
ANNUALLY

28
STATE-OF-THE-ART
TECHNOLOGIES

• PRODUCTION/DISTRIBUTION FACILITIES

INTERNATIONAL GEOSYNTHETIC BRANDS BY THRACE GROUP

THRACE LINQ

THRACE NG

LOTRAK

Polybrane

THRACE Eurobent

Converting polypropylene to performance materials since 1977, Thrace Group is one of the top producers of Technical Fabrics & Packaging Solutions in the world, providing a World of Materials and Solutions. Thrace Group member companies operate in **Europe, Asia, Australia and the Americas** with a workforce of 1600 specialised professionals, serving over 1500 customers in a global network of more than 80 countries.

With 28 high-end technologies, vertical integrated production, exhaustive quality control testing and a specialized staff focused on customer care, **Thrace Group is the “one stop” geosynthetic partner**, offering high quality products at the most competitive prices for a wide variety of applications.

A FULL RANGE OF GEOSYNTHETIC PRODUCTS, FOR ALL CONSTRUCTION NEEDS

- Nonwoven Geotextiles
- Woven Geotextiles
- Biaxial Geogrids & Geocomposites
- Drainage Geonets & Geocomposites
- Geosynthetic Clay Liners (GCLs)
- Geobags
- Mini Rolls
- Specialty Geotextiles (Asphalt Retention/High Strength/High Water Flow)

THRACE GROUP TECHNICAL FABRICS PRODUCTION FACILITIES



Thrace Nonwovens & Geosynthetics
(Xanthi, Greece)



Lumite
(Yonah, Georgia, USA)



Thrace LINQ
(Charleston, South Carolina, USA)



Don & Low
(Forfar, Scotland, UK)

QUALITY CONTROL

All products are manufactured under a quality management system which is certified in accordance with **the most comprehensive standards set by the International Organization for Standardization**, namely ISO 9001:2008. This has been implemented **throughout our business procedures** to give our customers greater reliability and an improved product quality. The Group also complies with the Environmental Management System EN ISO 14001:2004.

ACCREDITATION

All products are CE marked to demonstrate **conformity to the Construction Products Regulation** (CPR 305/2011). The CE marking also indicates the stringent testing and certification of Factory Production Control (FPC) that Thrace Group has gone through to meet **the highest European Standards**. Our geosynthetic products are also certified in many countries: USA (NTPEP), France (ASQUAL), Scandinavian countries (Norgeospec 2012), Germany (IVG) and Russia (GOST).

LABORATORIES

Thrace Group products are tested at modern in-house laboratories as well as at well-known European and American Institutes. Our geosynthetics are **carefully monitored from the raw material stage to the final product stage** by qualified and experienced personnel in accordance with the **European (EN), American (ASTM), Australian (AS), British (BS) and International (ISO) standards**.

RESEARCH & DEVELOPMENT

A primary focus of Thrace Group is to **continuously enhance and adapt its product portfolio** so as to ensure that our customers maintain their competitive advantage. The accomplished experts of our Research & Development departments around the world are dedicated in designing and developing new materials to satisfy today's and tomorrow's markets needs.

THRACE GROUP COMPETITIVE ADVANTAGES

INNOVATION

Having control over the entire manufacturing process enables us to intervene at various production phases and come up with innovative products that fulfill special customer requirements.

FLEXIBILITY

With the strategic geographic dispersion of our member companies, we secure enhanced logistics and improved lead times, to ensure fast and reliable product deliveries even for smaller order quantities.

COST-EFFECTIVENESS

Converting over 100.000 tons of PP, PE and PET polymers through a vertically integrated business model, we attain unique cost advantages that are passed over to our customers through our value-for-money products.

PERSONALISED ATTENTION

Our highly experienced staff follows a one-to-one relationship approach with the customers in order to understand their geosynthetic project needs and provide them with customised solutions backed up with technical support.



REINFORCEMENT

The **good tensile mechanical properties** of Thrace Group geotextiles, in conjunction with the soil's good compressive but poor tensile properties, improve the total system's strength interaction and are ideal for **reinforcing embankments of roads, slopes and retaining walls**. Geogrids increase the underlying soil's bearing capacity and offer cost and construction time savings.



DRAINAGE

The hydraulic properties of Thrace Group geotextiles establish **structural stability by controlling excess amounts of water** during and after construction, allowing for adequate liquid flow while maintaining limited soil loss within the plane of the geotextile. Thrace Group drainage geonets and geocomposites allow **proper in the plane waterflow under high supercharge loads** such as those experienced in landfills, eliminating the need for thick gravel bases thus offering cost and construction cost savings.



SEPARATION

The placement of Thrace Group flexible and porous geotextiles between dissimilar earth materials allows for the **integrity and functioning of both materials** so that they can be improved or remain intact.



FILTRATION

Thrace Group geotextiles work in equilibrium with the soil to allow for **adequate liquid flow with limited soil loss** across the plane of the geotextile, while avoiding pore clogging.



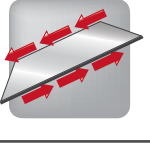
PROTECTION

Thrace Group geotextiles offer **perfect damage protection to geomembranes and other coated materials** that may occur from contact with sharp soil surfaces such as stones or subgrade unevenness. The geotextiles' thickness and mass are directly proportional to the amount of protection that they can offer.



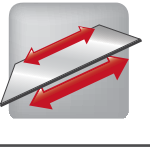
EROSION CONTROL

Thrace Group nonwoven geotextiles can be used independently or in conjunction with Thrace Group woven geotextiles for **creating geobags** that can be utilized for **erosion control of slopes, shoreline protection and river bank flood control**.



BONDING

Certain Thrace Group geotextile series **act as a bonding surface** between an old road surface and a new asphalt overlay.



STRESS RELIEF

Thrace Group geotextiles with special properties allow for the **delayed progress of differential stresses** between a new asphaltic overlay and an old road surface. This translates to **reduced reflective cracking and crack propagation** between old and new road surfaces.



CONTAINMENT

The bentonite material present in Thrace Group geosynthetic clay liners (GCLs) acts as a **hydraulic barrier** by containing the leachate material and preventing its seepage to the underlying soil.



ROADS

The road subbase section can include layers of sand and gravel. Such layers should not be intermixed during installation and compaction operations, while proper filtration between them reduces the build-up of hydraulic pressures. Specially designed geosynthetics ensure all of the above while guaranteeing an improved road bearing capacity, reduction of rutting, and significantly reduced costs as a result of material and labour cost savings.



RAILWAYS

Railroads transfer heavy traffic loads to the underlying sleepers which in turn rest on a compacted ballast layer. The latter needs to be separated from the underlying soil layer, to avoid eventual breakdowns and soil intermixing while allowing water to pass through. Thrace Group geosynthetics safeguard proper separation and filtration as well as improved bearing capacity, offering an improved performance and extended project lifetime with considerable cost savings.



DRAINAGE SYSTEMS

To ensure the original design conditions in a construction project, a proper drainage system has to be maintained to relieve extra hydrostatic water pressure by allowing the water to be removed successfully. Thrace Group geotextiles (woven and nonwoven series) as well as drainage geonets and geocomposites are the proven solution for drainage systems, providing improved drainage capacity under heavy loads and a prolongation of the drainage systems' life cycle.



EMBANKMENT EROSION

In order to prevent soil erosion in embankments built at road and highway intersections, the soil layer needs to be reinforced while also allowing for vegetation to grow so as to keep the surface of the embankment intact. Thrace Group erosion control solutions offer excellent soil reinforcement, protecting from sudden settlements, decreasing soil losses and maintaining road structure until repair measures are taken, in case of damage.



LANDFILLS

The impermeable layers (i.e. geomembranes), that are usually placed at the base of landfills to prevent soil contamination, are prone to installation damage which translates to leakage. By cloaking the geomembrane with high performance needlepunched nonwoven geotextiles, the soundness of the construction is secured and the geomembrane installation is enabled in all conditions. Geosynthetic clay liners (GCLs) work independently or in conjunction with geomembranes to prevent/slow down the seepage of leachate out of the landfill for environment purposes. Furthermore, geocomposite drainage products serve to offer drainage passage for deposited landfill leachate and transport it away from the landfill site.



TUNNELS & UNDERGROUND

Due to the existence of ground water, tunnels & underground walls are typically lined with waterproof membrane layers which require high protection from potential damage. Thrace Group needlepunched nonwoven geotextiles are ideal to be used as protective layers for lining systems, offering superior mechanical properties of tensile strength/elongation, static puncture & perforation resistance as well as long-term resistance to alkaline media.



PIPELINE PROTECTION

In big pipeline construction projects, it is of primary importance to secure backfilling operations. Thrace Group nonwoven geotextile series aimed for pipeline protection offer superior mechanical properties of tensile strength/elongation, static puncture as well as perforation resistance, to thoroughly absorb any impact forces resulting from the placement and compaction operations.



SHORE & RIVER LINE PROTECTION

To prevent erosion damage and protect the construction projects that are close to riverbanks or shorelines, the use of geotextiles either as separating layers or in the form of geobags is highly advisable.

NONWOVEN GEOTEXTILES



Thrace Group Nonwoven Geotextiles are produced from 100% polypropylene or 100% polyester, and are specially designed to provide **Reinforcement, Separation, Filtration, Drainage, Protection** and **Erosion Control**. Depending on their special mechanical and hydraulic properties, they are suitable for being used as:

- **separators**, to prevent the intermixing of the different soil layer types
- **filters**, to allow the flow of fluids while preventing the passage of soil particles
- **protective layers** for geomembranes in landfills

The main difference between nonwoven and woven geotextiles is that nonwoven geotextiles are more likely to stretch under the same conditions and have the ability to let water flow along the plane of the geotextile more effectively. Thrace Group Nonwoven Geotextiles are **produced with the latest state-of-the-art fibre extruders and needle punching lines**. The vertical integrated production not only guarantees quality consistency, but also allows to provide lead times that satisfy customers' needs. Thrace Group produces various series depending on the desired functions and applications, as shown below.

SNW Series

UV stabilised, mechanically and thermally bonded needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres.

FUNCTIONS: filtration, separation, erosion control
APPLICATIONS: roads, railways & drainage projects

PNW Series

UV stabilised, needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres.

FUNCTIONS: filtration, separation, protection & erosion control
APPLICATIONS: roads, railways & drainage projects

CNW Series

UV stabilised, coloured needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres.

FUNCTIONS: filtration, separation & erosion control
APPLICATIONS: roads, railways & drainage projects

NWR-100 Series

UV stabilised, needlepunched nonwoven geotextiles, produced from 100% polyester staple fibres.

FUNCTIONS: filtration, separation & erosion control
APPLICATIONS: roads, railways & drainage projects

ARNW Series

UV stabilised, coloured needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres offering optimum bitumen retention and enhanced mechanical properties.

FUNCTIONS: sealing, bonding, stress relief, reflective cracking control
APPLICATIONS: asphalt overlays and pavements

FR NW Series (ASQUAL)

UV stabilised, needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres that carry the ASQUAL certification and intended for the French market.

NW Series (NorgeoSpec 2012, GRK, Australia/New Zealand)

UV stabilized, needlepunched nonwoven geotextiles, produced from 100% polypropylene staple fibres that carry the NorgeoSpec 2012 certification, German GRK classification and Australian/New Zealand classification.



APPLICATIONS

- **Roads**
- **Railways**
- **Drainage projects**
- **Asphalt Overlays**
- **Landfill Projects**

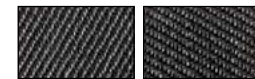


WOVEN GEOTEXTILES



APPLICATIONS

- Roads
- Railways
- Geobags
- Drainage projects
- Geotubes



Thrace Group Woven Geotextiles are produced from 100% polypropylene and are specially designed to provide **Reinforcement, Separation, Filtration, Drainage** and **Erosion Control**. Depending on their special mechanical and hydraulic properties, they may act as:

- **separators**, to prevent the intermixing of the different soil layer types
- **filters**, to allow the flow of fluids while preventing the passage of soil particles
- **reinforcement** for weak soils, to increase the load bearing capacity

Thrace Group woven geotextiles are **highly durable and resistant to installation damage**. When compared to nonwoven geotextiles, they provide higher tensile strength and CBR puncture resistance for the same mass per unit area. Their weave patterns come in a virtually unlimited variety, affecting in turn certain properties of the woven geotextile. However, the latter is not specified by its weave pattern but by properties such as porosity, strength, and elongation. In general, woven geotextiles are less likely to stretch under the same load conditions and do not let water flow as freely as nonwoven geotextiles.

WG Series

UV stabilised, high strength, black woven geotextiles, produced from 100% polypropylene tapes.

FUNCTIONS: filtration, reinforcement, separation

APPLICATIONS: roads, railways & geobag applications

WG-HF Series

UV stabilised, high strength & high water flow black woven geotextiles, produced from 100% polypropylene tapes.

FUNCTIONS: filtration, reinforcement, separation

APPLICATIONS: roads, railways, geobags and dewatering & geotextile tube applications

WMT Series

UV stabilised, woven geotextiles, produced from 100% polypropylene tapes and 100% polyethylene monofilament.

FUNCTIONS: filtration, roofing, dewatering, erosion control

APPLICATIONS: filters, geobags and dewatering & geotextile tube applications

WMM Series

UV stabilised, woven geotextiles, produced from 100% polyethylene monofilaments.

FUNCTIONS: filtration, dewatering, erosion control

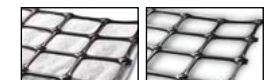
APPLICATIONS: filters, geobags and dewatering & geotextile tube applications

BIAXIAL GEOGRIDS AND GEOCOMPOSITES



APPLICATIONS

- Roads
- Railways
- Embankments



Thrace Group Biaxial Geogrids are manufactured from polypropylene (PP) sheets using the extrusion method of punching a pattern of holes, followed by stretching under controlled temperature in both directions in order to reach the material's tensile characteristics. The geogrid geocomposites are produced by heat bonding the geogrids with any type of Thrace Group nonwoven geotextiles.

Biaxial geogrids are used to **decrease the fill material thickness while increasing the bearing capacity of the underlying soil**, whereas geocomposite geogrids provide **additional separation from underlying soils thus reducing construction time and cost**.

The apertures of the biaxial geogrids (small or large) **aid in aggregate interlock** thus allowing for effective reinforcement and soil confinement. Geogrids can also be used to construct mattresses to be placed on soft soils.

They are **easy to install**, offering further **construction cost savings** due to reduced labour time.

TG Series

Extruded biaxial geogrids manufactured from polypropylene (PP) sheets with various tensile strengths from 15kN/m to 45kN/m and in both small and large aperture sizes.

FUNCTIONS: reinforcement

APPLICATIONS: roads, railways & embankments

TGC Series

Extruded biaxial geogrids manufactured from polypropylene (PP) sheets with various tensile strengths from 15kN/m to 45kN/m and in both small and large aperture sizes combined with nonwoven geotextiles customized to the clients' requests.

FUNCTIONS: reinforcement, filtration, separation

APPLICATIONS: roads, railways & embankments

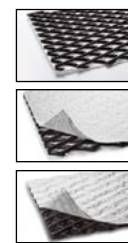


DRAINAGE GEONETS & GEOCOMPOSITES



APPLICATIONS

- Landfill leachate collection
- Foundation wall drainage
- Roadway drainage



TDN Series: Bi-planar and Tri-planar

TDN_B is the typical bi-planar geonet that consists of two strands of extruded 100% polyethylene sheets intersecting at different spacing and angles. TDN_T is the tri-planar geonet that consists of three strands of extruded 100% polyethylene sheets intersecting at different spacing and angles that provided channelized flow.

FUNCTIONS: drainage

APPLICATIONS: leachate and gas collection in landfills, vertical drainage in foundations and road & pavement drainage

TDC Series: Bi-planar and Tri-planar

Thrace Group drainage geocomposites (TDC) are composed of either bi-planar (TDC_B) or tri-planar (TDC_T) geonets combined with a layer of nonwoven geotextile either on one or two faces or with a nonwoven geotextile on one side and a waterproofing film on the other side.

FUNCTIONS: drainage

APPLICATIONS: leachate and gas collection in landfills, vertical drainage in foundations and road & pavement drainage



GEOSYNTHETIC CLAY LINERS (GCLs)



APPLICATIONS

- Landfills
- Canals & storage reservoirs
- Tunnel & building seals



Thrace Group Geosynthetic Clay Liners (GCLs) are rolls of factory fabricated thin layers of bentonite clay (a mineral which expands when wet) sandwiched between two layers of geotextiles, the base of which is made from a woven geotextile and the top layer from a nonwoven geotextile.

Through the process of needle punching, the top and bottom geotextile layers are structurally connected. In certain cases the GCL layer is bonded to a geomembrane sheet. Bentonite **absorbs water from the surrounding soil and creates an impermeable lining material that serves as a containment barrier**. GCLs replace the need to use all other traditional mineral sealants, they offer better sealing performance, they are more eco-friendly and cost-effective.

GCL Series

A bentonite layer sandwiched between a nonwoven geosynthetic textile as a cover layer and a woven geosynthetic textile as a carrier and reinforcement bottom layer and connected through the process of needle punching.

FUNCTIONS: containment

APPLICATIONS: landfills, canals & storage reservoirs, tank storage, tunnel and building seals, run-off basins, roads in environmentally sensitive areas

GCL CS Series

Consists of a geomembrane layer as a geosynthetic barrier with high tensile strength and thickness, adhered to a typical geosynthetic clay liner.

FUNCTIONS: containment

APPLICATIONS: landfills, canals & storage reservoirs, tank storage, tunnel and building seals, run-off basins





GEOBAGS

APPLICATIONS

- Shore & riverbank protection
- Offshore breakwater construction

Thrace Group produces sewn bags of various sizes, constructed from woven or nonwoven geotextile material of various specifications, which are aimed for filling with material such as sand. They are primarily used to **easily transport fill material** in hard to reach construction areas and to allow the deposit of fill material on weak soils.

Geobag series

Available in various geotextile specifications and various sizes, based on project requirements.

FUNCTIONS: erosion control

APPLICATIONS: riverbank and beach protection, offshore breakwater construction



MINI ROLLS

Thrace Group woven and nonwoven geotextiles are also available in the form of mini rolls, **suitable for small construction projects or for Do It Yourself (DIY) home use.** They are available with or without core.

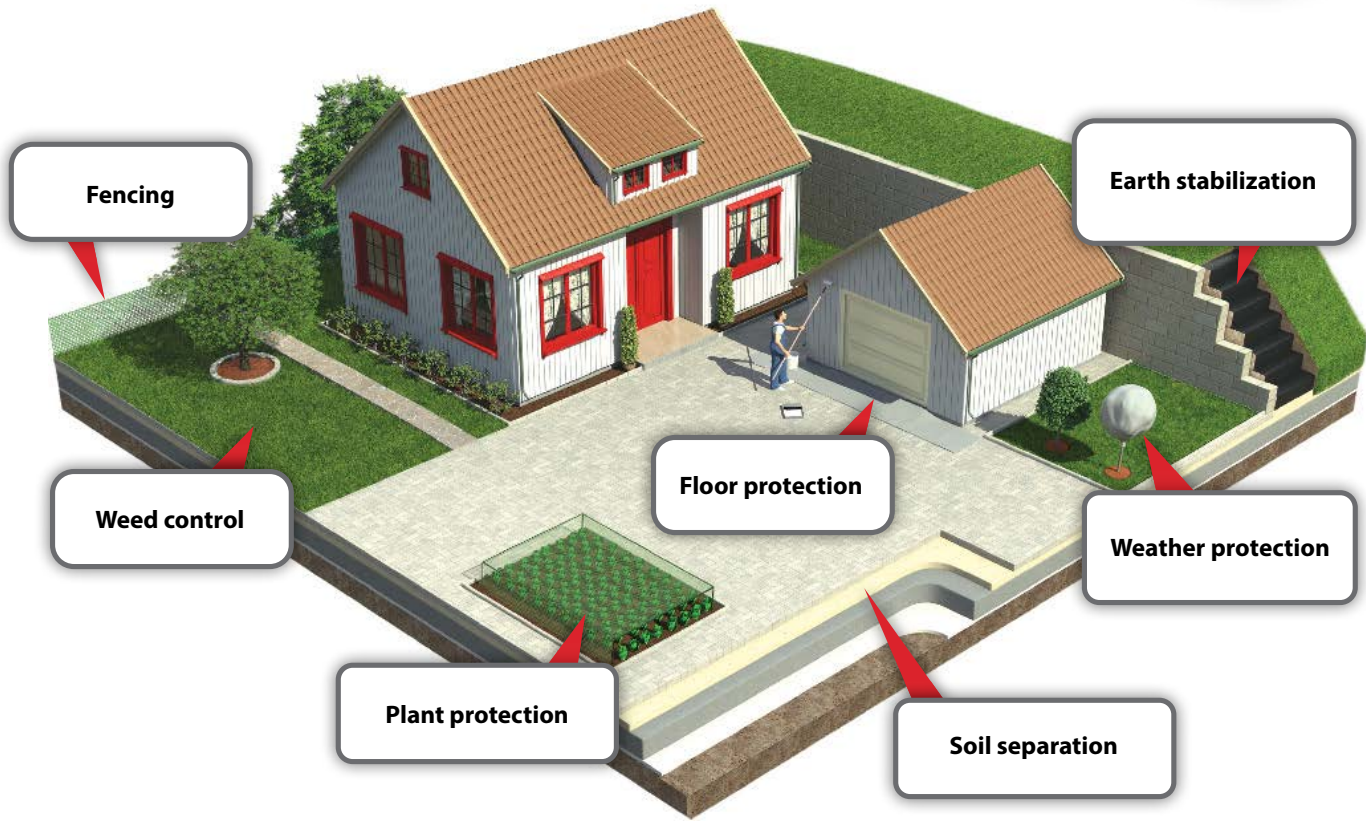
Width: 0.60 - 2.10 m (unfolded), 2.00 - 4.20 m (folded)
Length: various lengths depending on the type of fabric
Wrapped in film, with or without labels
Packed on pallets or carton boxes

Mini roll series

FUNCTIONS: reinforcement, separation, filtration, drainage, protection, erosion control

APPLICATIONS: small scale construction projects and DIY use

Also available for private label



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