

TENAX

GEOSYNTHETICS

**TENAX GEOSYNTHETICS:
SERVING UP SOLUTIONS**

AN ESSENTIAL
INGREDIENT FOR
COST EFFECTIVE
ENVIRONMENTAL
AND GEOTECHNICAL
APPLICATIONS

REINFORCING SOLUTIONS USING TENAX TT MONO-ORIENTED GEOGRIDS



TENAX TT geogrids are certified for the reinforcement of the soil mass by major international organisations. Soil and aggregate elements interlock within the geogrid openings, which confine the soil, limit its relative displacements and increase the soil's shear stress resistance. The now composite soil/geogrid structure takes advantage of the fill soil's high compressive strength and the geogrid's tensile strength, thus creating a material having greater rigidity and stability than the aggregate alone and improving the structure's resistance to static and dynamic loads.

TENAX RIVEL is an advanced reinforced slope technology using HDPE mono-oriented geogrids within fill soils to create low, or zero environmental impact structures.

TENAX T-BLOCK is a soil reinforced block wall system that makes use of concrete blocks at the face and incorporates TENAX TT mono-oriented geogrids as reinforcing elements.

Products

- ▶ TENAX TT
- ▶ TENAX RIVEL
- ▶ TENAX T-BLOCK
- ▶ TENAX FLEXA

Applications

- ▶ Road and Rail embankments.
- ▶ Landfill side slopes.
- ▶ Landscaping bunds.
- ▶ Noise Barriers.
- ▶ Rockfall protection Barriers.
- ▶ Reinforced soil retaining walls with modular concrete blocks.

Advantages

- ▶ Ability to construct steeper slopes with same soil.
- ▶ Reduced footprint for reinforced soil structures.
- ▶ Protection against progressive landslip failure.
- ▶ Cost effective when compared to using traditional solutions.
- ▶ Cost effective retaining wall foundation requirements.
- ▶ Better performance in earthquake regions.



35m high reinforced soil embankment constructed to retain future waste fill in NENT landfill, Hong Kong.

South Korea, Chunsugyo Saebeari Highway - Geoblock segmental retaining wall System.



Lake of Como, Italy - Rockfall barriers to protection the historical village of Varenna

STABILISATION SOLUTIONS USING TENAX BI-ORIENTED GEOGRIDS



There are several methods to improve the bearing capacity of a soft soil. One of these, ancient yet effective, consists of reinforcing the soil through lateral confinement of the soil particles and improved resistance to tensile stresses.

Traditionally these effects were obtained by using fascines of braided branches or by laying tree trunks in perpendicular directions. The present technology, instead, allows the use of synthetic products, specifically engineered, to obtain the same effects of lateral confinement and tensile resistance. TENAX synthetic products have been designed to work with soils creating a soil-synthetic composite in order to increase resistance to compression and shear.

Products

- ▶ TENAX LBO
- ▶ TENAX 3D GRIDS
- ▶ TENAX GT
- ▶ TENAX HM GRIDS

Applications

- ▶ Paved and unpaved roads permanent and temporary.
- ▶ Railway construction layers and airport runways.
- ▶ Foundations in areas of soft or saturated soils.
- ▶ High load platforms for drilling rings and cranes.
- ▶ Stabilisation and separation functions offered using

Advantages

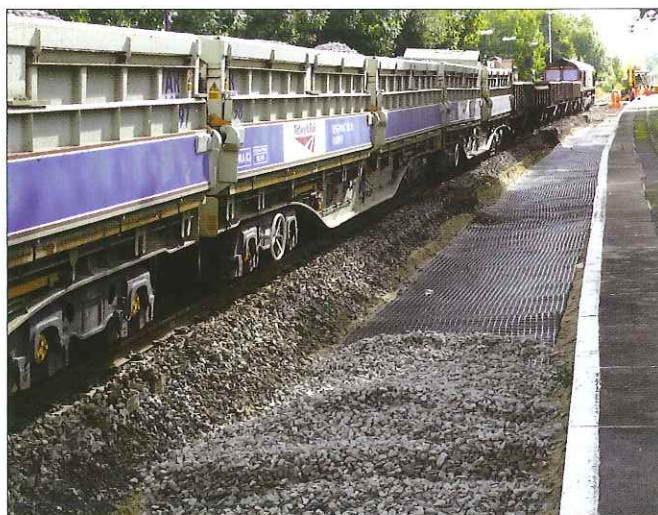
- ▶ Ability to reinforce road bases and limit the horizontal and vertical movements of gravel.
- ▶ Considerable improvements to the bearing capacity of bases for the same thickness or reduce the base thickness for the same bearing capacity.
- ▶ Increase in the lifetime of structures.



Pisa airport, Italy - Ground stabilisation with TENAX GT geocomposite

Abraham Darby Academy, Telford, UK - Control of differential settlements using 3D Grids

Below: Midgham, UK - The TENAX RailGrid installed to increase ballast performance and reduce maintenance frequencies.



DRAINAGE SOLUTIONS USING TENAX GEONETS AND GEOCOMPOSITES



TENAX geonets and geocomposites are now widely used in landfills as mechanical protection for membranes as well as for the safe drainage of gases and liquid resulting from the waste. The material from which they are made (HDPE) has excellent chemical resistance, is very durable and has good tensile, compression, heat and thermal shock properties. The liquids and gas flow inside thin "channels" that form the structure of these particular products, even when there is a minimal slope. Furthermore, the economic benefits are significant when compared to the purchase and installation of traditional drainage sand and gravel.

TENAX geocomposites can also be installed between the foundation soils and the upper layers of inert material providing a stiff separating function capable of supporting high compressive loads whilst preventing the accumulation of water thus achieving a well-drained, dry base with an increased design life.

Products

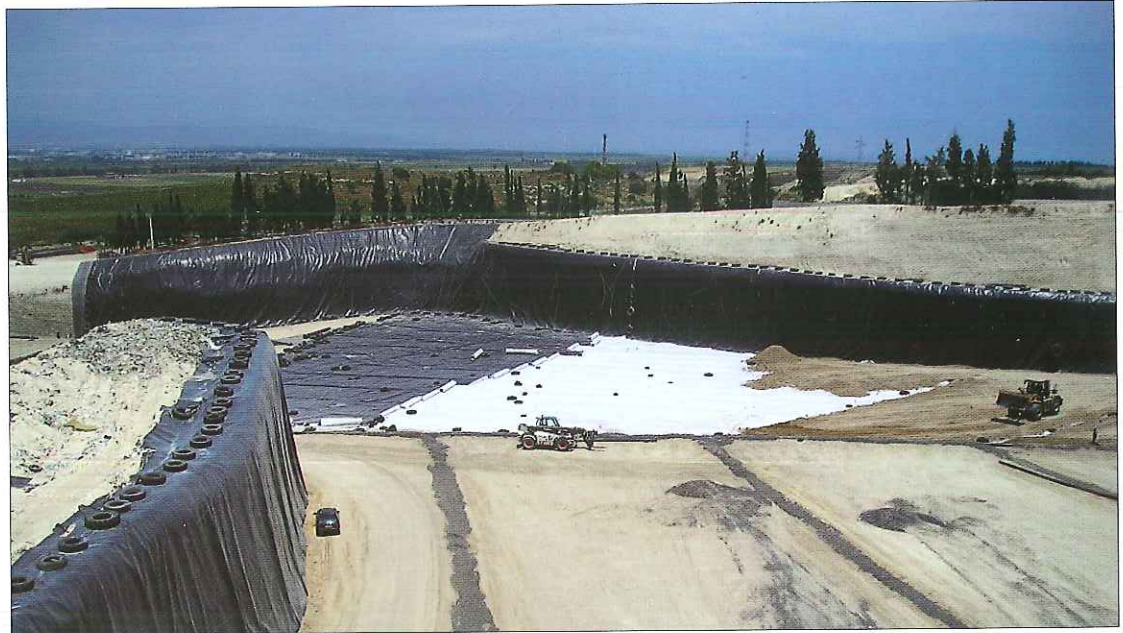
- ▶ TENAX TN/TNT
- ▶ TENAX TENDRAIN
- ▶ TENAX CE
- ▶ TENAX GNT
- ▶ TENAX TDP / TENFLOW
- ▶ TENAX HF

Applications

- ▶ Road and Railway construction layers.
- ▶ Landfill bases, side slopes and capping areas.
- ▶ Protection systems for membrane liners.
- ▶ Tunnel walls, when integrated with tunnel wall lining systems.
- ▶ Roof gardens and concrete retaining structures.
- ▶ Gas management.

Advantages

- ▶ Provision of drainage and separation functions in one product.
- ▶ Time and costs saving due to ease of installation instead of the installation of expensive granular layers to facilitate drainage.
- ▶ Improved stiffening and overall strength of sub-base layers due to better control of water.
- ▶ Reduced potential for hydraulic pumping of fine soils from the subgrade soils up into the upper construction layers.
- ▶ Reduced potential of excess pore water pressure build-up under cyclic loading if present.

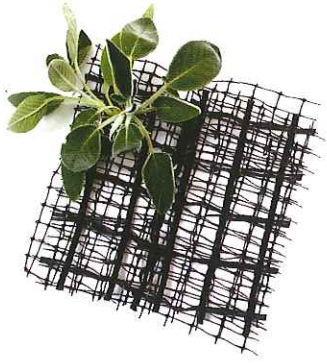


Catania landfill, Italy - Drainage of the base and the walls of a landfill site.

Padova-Mestre, Italy. Capillary break layer under the new high speed train line Milan-Venice in the Venice-Mestre area.



EROSION CONTROL USING TENAX GEOCELLS AND GEOMATS



Surface run-off and the erosion of slopes caused by weather and water flow on the surface, can be prevented by the application of three dimensional geomats or geocell containment, which protect and contain the topsoil, allowing for vegetation to establish easily.



Below and on the right : Hong Kong - Erosion control and vegetation establishment on newly constructed slopes (during and after construction).

Products

- ▶ TENAX MULTIMAT
- ▶ TENAX MULTIMAT P
- ▶ TENAX TENWEB

Applications

- ▶ Landfill capping areas.
- ▶ Containment of topsoil on steep slopes.
- ▶ Vegetation establishment on rocky or arid slopes.
- ▶ River and channel bank protection.
- ▶ Reservoir bases and slopes.
- ▶ Golf course landscape structures.

Advantages

- ▶ TENAX geomats protect the bare, arid soils, preventing the formation of superficial, deep furrows. They interact with the plant roots to ensure rapid growth of vegetation.
- ▶ TENAX MULTIMAT geomats minimise channel erosion on banks compared to un protected surfaces. Its high tensile strength can with stand water flows of 4m/s in hydraulic applications, thereby reducing risks of transportation of soil particles.
- ▶ The TENAX TENWEB geocells help to reduce erosion of slopes used on the banks of reservoirs and watercourses, by the action of containment. The cells can be filled with a suitable concrete at the base and granular/topsoil mix on the slopes.



Below: Carezza Lake, Italy - Facing of the walls to protect the PVC waterproofing.

Modena landfill , Italy - Construction of embankment alongside high-speed railway line.



TENAX: MAN, TECHNOLOGY, ENVIRONMENT

TENAX is an International Group of Companies with headquarters based in Viganò - Italy. It is a worldwide leader in the manufacture of extruded polymers, producing a wide range of plastic nets and highly engineered grids for soil reinforcement, drainage and ground stabilisation solutions. Due to a thorough understanding of all extrusion processes, TENAX has the flexibility and capability of adapting existing production systems to manufacture products to suit customers' specific requirements.

During the last 30 years attention has been focused on the development of thermoplastic polymers for use in civil engineering structures incorporating geosynthetics that have very high technological characteristics, specifically designed for use in environmental and geotechnical engineering projects. These new products are now successfully providing solutions to many environmental problems which, if tackled with traditional methods, would have remained unsolved.

The TENAX Geosynthetics Division has a broad commercial network with local Agents and Distributors positioned in over 30 countries worldwide. This world network ensures the best technical and commercial assistance at a local level, ensuring TENAX Geosynthetics are designed and installed to the highest standards.



TENAX Quality

For over thirty years, TENAX has been one of the leading companies in the extrusion of thermoplastic polymers and is continuing to develop new and innovative products to the highest quality standards.

The TENAX Quality Assurance System ranges from the rigorous control of purchased raw materials to the control of the manufacturing process, on-line product quality control and final inspection up to storage and shipping.



Research and Development

Modern testing instrumentation and highly specialised personnel together form the TENAX Laboratory, making it one of the most advanced facilities of its kind in the world.

It is renowned not only for its excellence in product development, but also in design support testing, the development of new testing methods, and in basic and applied research.

The TENAX Laboratory constantly works together with universities, research centres, and other specialised laboratories (e.g. ISO, CEN, ASTM, DIN, BSI, UNI) to consistently guarantee the highest levels of professionalism.

Geosynthetics Division

The TENAX Geosynthetics Division and the TENAX GTO (Geosynthetics Technical Office), team of qualified Civil Engineers, provide solutions for environmental and civil engineering applications by cooperating with consultants and assisting with the preparation of complete design packages. The TENAX Geosynthetics Division provides field and laboratory testing, construction, quality control and engineering analysis. Moreover, TENAX offers local support and services through its worldwide office network.

TENAX has built up a worldwide reputation for its excellence in the following areas:

- state-of-the-art geotechnical engineering services from field and laboratory testing to engineering analysis and construction procedures;
- engineers, geologists and environmental experts provide a balanced solution to any environmental project;
- educational seminars, design workshops and customized "in-house" training;
- specific software for designing Civil Engineering applications with TENAX geosynthetics.

In order to solve engineering problems, the TENAX Geosynthetics Technical Office (GTO) will assist you in selecting, designing and developing technically appropriate and cost effective solutions.

TENAX GTO can assist Engineers in their assessment of the proposed structure ensuring consideration is given to the drainage pathways (in and around the structure) and any additionally applied external loads including checks for the overall global stability of the structure.



Catering to

all your needs



THE RANGE OF GEOSYNTHETICS FOR ENGINEERING

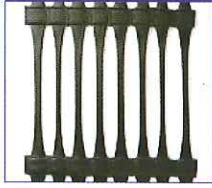
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MONO-ORIENTED GEOGRIDS FOR WALL AND SLOPE REINFORCEMENT

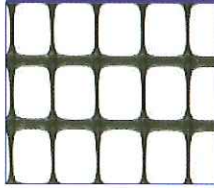
TENAX FLEXA



TENAX TT



TENAX LBO



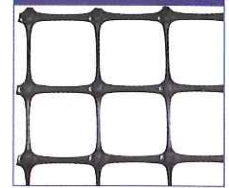
TENAX GT



TENAX 3D GRID MS



TENAX 3D GRID XL

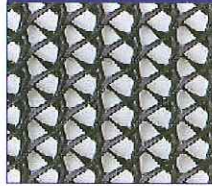


GEONETS AND GEOCOMPOSITES FOR DRAINAGE

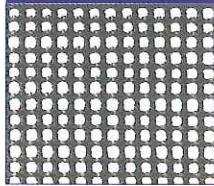
TENAX CE



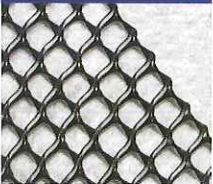
TENAX GNT



TENAX NDP



TENAX HF



TENAX TNT



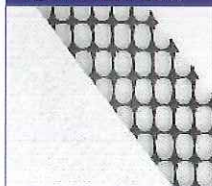
TENAX TENDRAIN



TENAX HD



TENAX TENFLOW



TENAX TENSEAL



GEOCELLS AND GEOMATS FOR EROSION CONTROL

TENAX MULTIMAT



TENAX MULTIMAT R



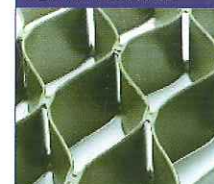
TENAX MULTIMAT LIGHT



TENAX MULTIMAT P



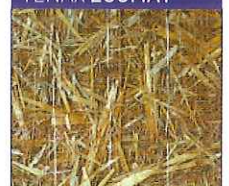
TENAX TENWEB



TENAX FVP



TENAX ECOMAT



TENAX

GEOSYNTHETICS

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