GRIPPLE®

Product Guide

A complete guide to anchoring and bracing solutions engineered for erosion control and slope stabilisation applications

Contents

A range of anchoring and bracing solutions engineered for erosion control, slope stability and geomembrane anchoring applications. Achieve considerable savings in time, labour and CO_2 with systems specified to suit the geotechnical conditions of your project.

1 HPTRM with TL-100 & TL-A2

2 HPTRM utilising TL-P1

3 HPTRM with TL-406 & TL-A4

4 Transition Matting with TL-304 & TL-A3

5 ACBM secured with TL-40A & TL-A4

6 Terra-Lock Anchor available in 4 sizes

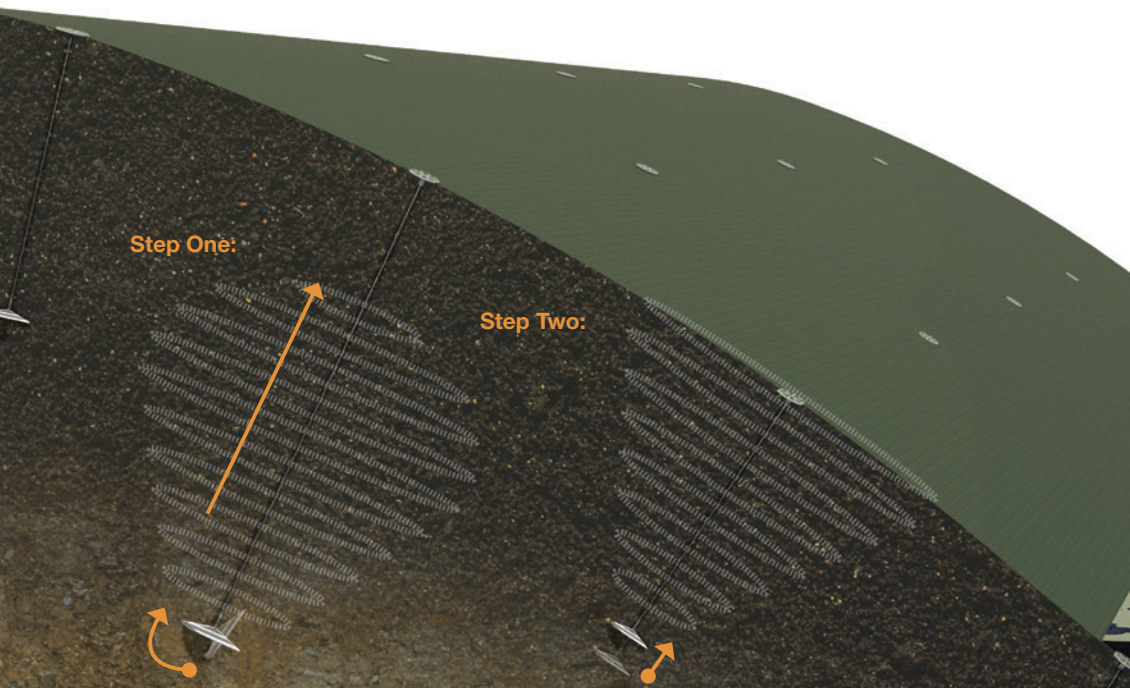
How it Works

The Terra-Lock® System gains its stability through the creation of a truncated cone of soil. This consolidated mass provides the resistive securing body and is formed in two steps:

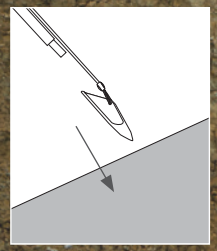
Step One: After driving to the correct depth, the wire is tightened; this rotates the anchor so that the load bearing surface is parallel to the ground surface.

Step Two: The wire is further tightened to compress the soil above the anchor's bearing surface. The compression transfers towards the surface to form a cone of soil which prevents further anchor movement.

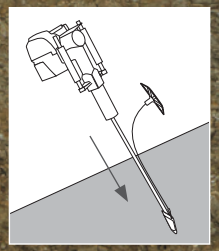
The load bearing capacity of the system is determined by: anchor size, anchor depth and soil shear angle. Due to the complex interaction between these factors, it is advisable that a geotechnical report is utilised as part of the engineering plans to ensure the appropriate anchor size and drive depth are selected.



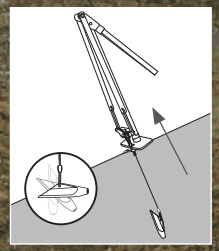
Installation



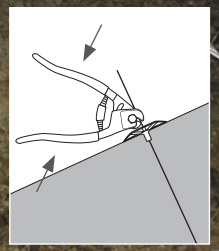
Drive:
Insert Drive Rod through the anchor and place against surface.



Use GPD to install the anchor at the required depth.



Lock:
Use JackJaw® to remove Drive Rod and load lock system.



Use Gripple Wire Cutter to cut wire below grade if required.

Technical Support

Gripple provides engineering design support to ensure you specify the optimum Terra-Lock System to meet your project requirements.

Once ground characteristics have been established, our technical team can calculate anchor loads and design performance; Whether through initial site evaluation, preparation of technical drawings, supporting submittals or on-site testing to validate designs. The Gripple Technical Support Team can work with you at every stage of a project to realise the complete turn-key solution.

Submittals **CAD** **Specifications** **Testing** **On-Site**

System Benefits

Green Solution
Makes use of on-site material, minimising material transport and related emissions.

Reinforced nature
Utilises a system which raises marts of vegetation allows the structure to 'self heal' and slow flows.

Sediment Control
Intimate contact with substrate retains soil particles, minimising erosion and downstream sedimentation.

Efficient Installation
Can be installed quickly and economically to vastly reduce time spent on-site protecting assets.

Lightweight
Adds minimal excess load to structure, reducing settlement and subsidence, especially in poor soils.

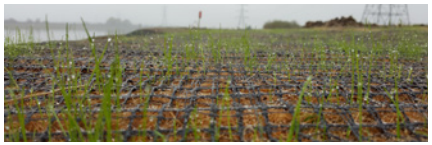
Durable
Manufactured using corrosion resistant materials to create a long term solution.

Steepened Slopes
Allows slopes and embankments to be sharply angled, reducing groundworks and maximising use of space.

Increased Factor of Safety
The installation depth of anchors is calculated based on engineering principles to guarantee the System locks into structurally sound soil.

3D Geotextiles (G-Mat)

Terra-Lock System - Turf & Earth Reinforcement Mat Solution
Terra-Lock TeRM ("Turf & earth Reinforcement Mat") combine high performance TRM's with Gripple earth anchors to provide the highest possible erosion control performance of any reinforced grass solutions available.



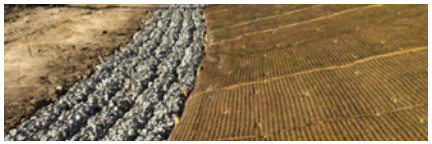
G-Mat C350
The original C-TRM (Composite Turf Reinforcement Mat). A high tensile strength, 16 mm deep high strength 3D skeleton Geomat with additional benefit of a coir fibre composite layer.

G-Mat C500
A new hybrid product with the performance of P550 but with a coir fibre core layer. A high tensile strength, 22 mm deep high strength 3D skeleton Geomat with additional benefit of a coir fibre composite layer.

G-Mat P550
A high tensile strength, 22 mm deep high strength 3D skeleton Geomat with additional benefit of a PP fibre composite layer. The 3D skeleton follows best practice thickness as concluded in CIRIA 116 Design of Reinforced Grass Waterways for enhanced reinforcement.

T50
A 3D PP Geomat, backed with a heavy duty 50kN/m glassfibre geogrid, this provides sufficient resistance to erosion while providing high strength for slope stabilisation applications.

Shear Stress Turf
Shear Stress Turf a pre-established TRM Geomat developed by Gripple, with all TRM solutions compatible to be grown off site and delivered to site fully vegetated. Ideal for projects where high flows or over topping are likely to occur within 2 years of installation (this is the time taken for grass to be fully mature) or where vegetation is likely to be slow or difficult to establish.



Pre-Filled Rock Roll Mattresses
Pre-Filled Rock Roll Mattresses are an ideal interface between hard and soft revetments and are often used in concentrated flow applications and hydraulic jump zones. The high tensile strength net tubes provide greater resistance to individual stone movement under extreme high flow conditions.

Products

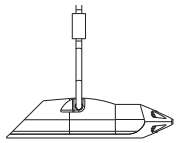
Terra-Lock® Anchors

Anchors provide drive efficiency and maximum load capacity across a range of ground anchoring solutions. Pre-assembled kits require no crimping, ensuring significant time and labour savings delivered by easy and efficient installation.

- The use of vegetation can help slow and control hydraulic flows
- Resilient and 'self healing', delivering longevity to the install sediment
- Intimate contact with substrates retains soil particles, minimising erosion and downstream sedimentation
- Manufactured using corrosion resistant materials to ensure longevity
- Allows slopes and embankments to be sharply angled, reducing groundworks and maximising use of space

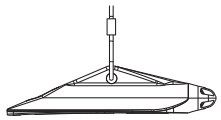
Suitable for use on:

- Cuts
- Shallow slope and stability
- Embankments



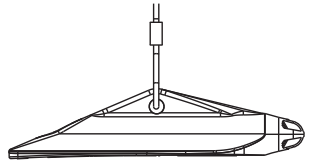
TL-A2

Surface Area - 1,940 mm²
System Working Load - 225 kg
Ultimate Load - 500 kg



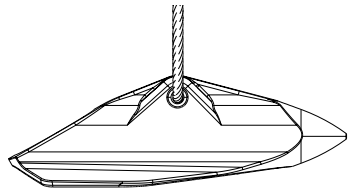
TL-A3

Surface Area - 3,870 mm²
System Working Load - 1,250 kg
Ultimate Load - 1,800 kg



TL-A4

Surface Area - 7,740 mm²
System Working Load - 1,250 kg
Ultimate Load - 2,250 kg



TL-A5

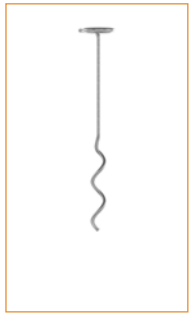
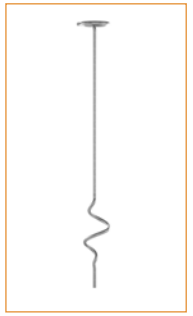
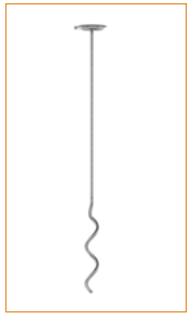
Surface Area - 21,645 mm²
System Working Load - 1,250 kg
Ultimate Load - 3,250 kg

- Channels
- Riverbanks
- Lakes and spillways

Terra-Lock® Pin Range

The high load anchoring pins are designed to hold all types of turf reinforcement matting, erosion blankets, geotextiles and landscaping fabrics.

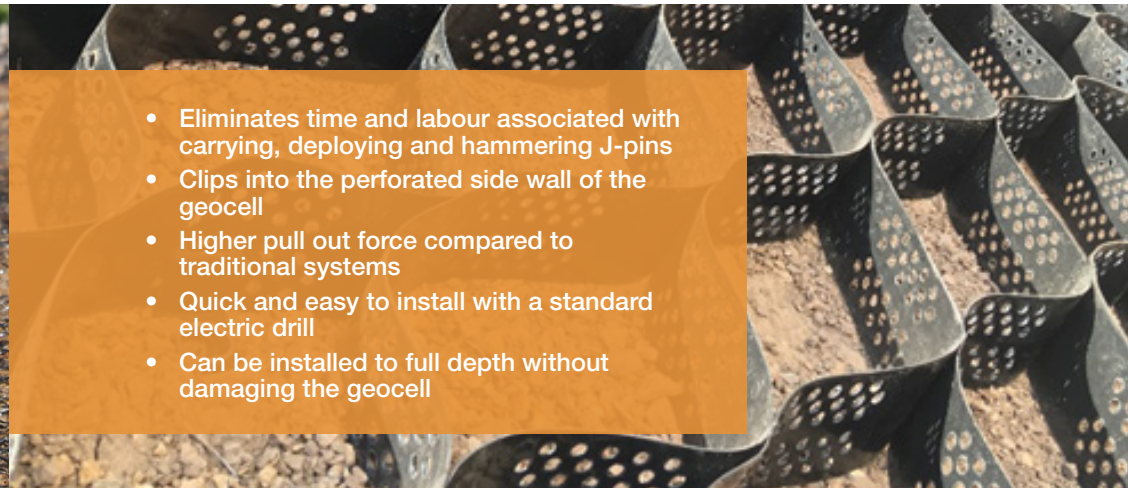
- Up to ten times quicker to install
- Reduces labour costs associated with reworking loose pins
- Superior pull out performance compared to traditional pins and stakes
- Ensures close contact between the matting and soil
- Designed to eliminate damage to the mat
- Removes the need for a separate washer
- Easy installation with standard electric drill and bespoke chuck

TL-P1	TL-P2	TL-P3	TL-P4
			
Soft Soil	Hard Soil	Soft Soil	Hard Soil
200 mm	200 mm	300 mm	300 mm

See page 23 for installation tools.

CellGrip™

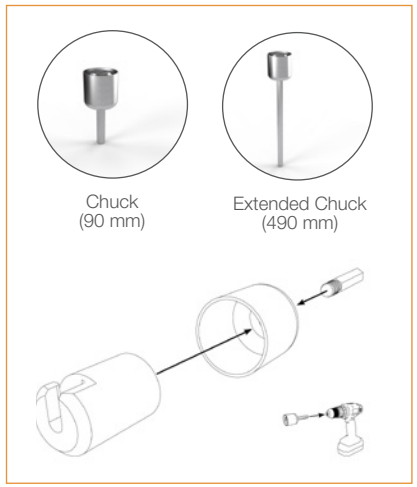
The CellGrip secures and enhances performance of geocells.



- Eliminates time and labour associated with carrying, deploying and hammering J-pins
- Clips into the perforated side wall of the geocell
- Higher pull out force compared to traditional systems
- Quick and easy to install with a standard electric drill
- Can be installed to full depth without damaging the geocell

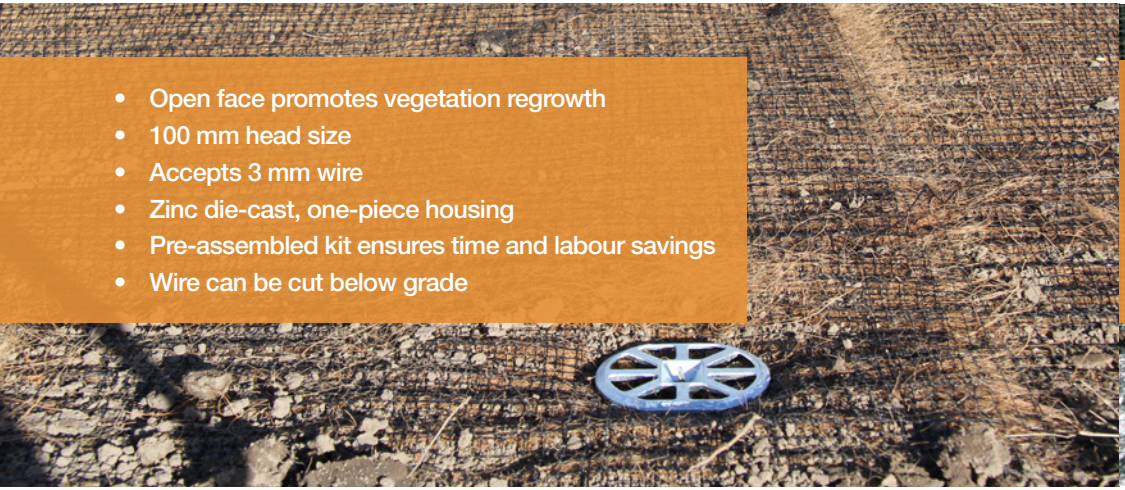
Cell Grip 1	Cell Grip 2
	
Soft Soil	Hard Soil
202 mm	200 mm

Installation Tools



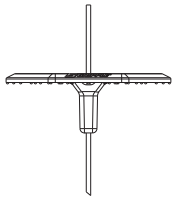
TL-100

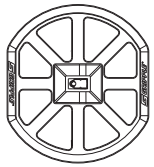
Secures TRM and HPTRM whilst promoting vegetation regrowth in erosion control and soil stabilisation applications.



- Open face promotes vegetation regrowth
- 100 mm head size
- Accepts 3 mm wire
- Zinc die-cast, one-piece housing
- Pre-assembled kit ensures time and labour savings
- Wire can be cut below grade

Specification





Top Bearing Plate (TL-100):
Head Size: 100 mm Diameter

Top Termination (TL-300):
35 mm (H) x 35 mm (W)
3 mm Head Thickness

Wire Rope Tendon:
Diameter: 3 mm

Terra-Lock Anchors

TL-100 is available with the following Terra-Lock Anchors:

TL-A2

TL-A3

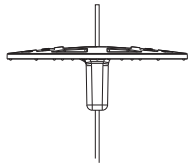
TL-A4

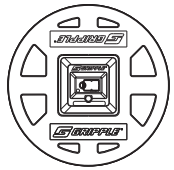
TL-304

Two-piece design incorporating patented Gripple technology with a multi-purpose injection moulded load bearing plate.

- 100 mm GF Nylon, UV stabilised, injection moulded plastic disc
- Accepts 3 mm wire
- Zinc die-cast housing
- Low profile design
- Pre-assembled kit ensures time and labour savings

Specification





Top Bearing Plate (TL-304):
Head Size: 100 mm Diameter

Top Termination (TL-300):
35 mm (H) x 35 mm (W)
3 mm Head Thickness

Wire Rope Tendon:
Diameter: 3 mm

Terra-Lock Anchors

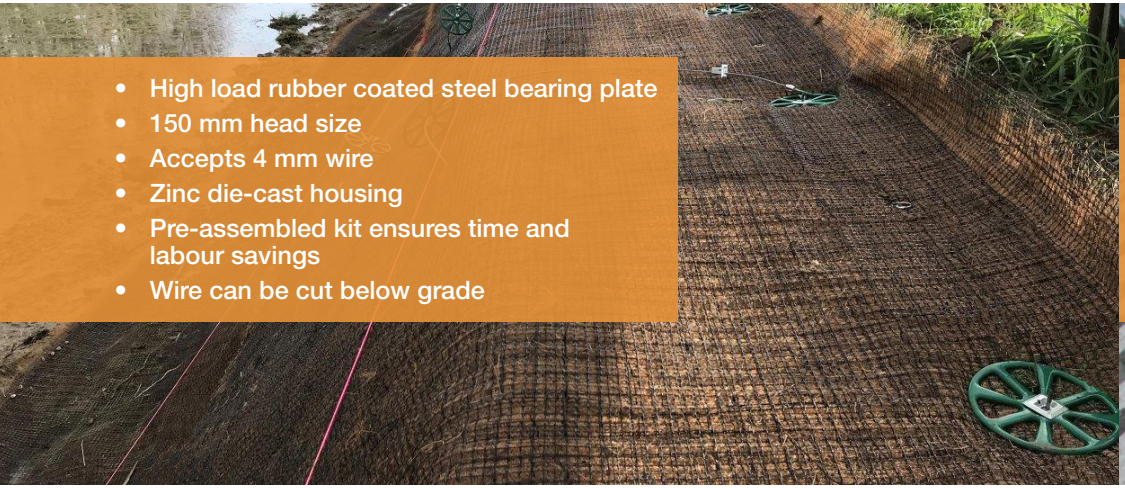
TL-304 is available with the following Terra-Lock Anchors:

TL-A2

TL-A3

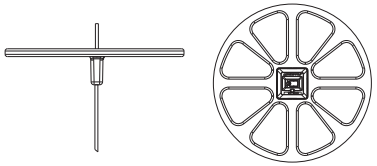
TL-406

Two piece design incorporating a rubber coated steel bearing plate and a 4 mm wire tendon for higher load applications.



- High load rubber coated steel bearing plate
- 150 mm head size
- Accepts 4 mm wire
- Zinc die-cast housing
- Pre-assembled kit ensures time and labour savings
- Wire can be cut below grade

Specification



Top Bearing Plate (TL-406):
Head Size: 150 mm Diameter

Top Termination (TL-400):
35 mm (H) x 35 mm (W)
3 mm Head Thickness

Wire Rope Tendon:
Diameter: 4 mm

Terra-Lock Anchors

TL-406 is available with the following Terra-Lock Anchors:

TL-A2

TL-A3

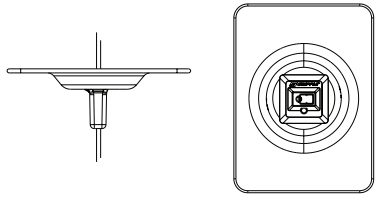
TL-A4

TL-40A

Bespoke high load design for use with Articulate Concrete Block (ACB) installations.

- Low-profile rubber coated steel bearing plate
- Accepts 4 mm wire
- Zinc die-cast housing
- Fits most common ACB apertures
- Pre-assembled kit ensures time and labour savings

Specification



Top Bearing Plate (TL-40A):
Head Size: 150 mm (H) x 100 mm (W)
Plate Thickness: 8 mm

Top Termination (TL-400):
35 mm (H) x 35 mm (W)
3 mm Head Thickness

Wire Rope Tendon:
Diameter: 4 mm

Terra-Lock Anchors

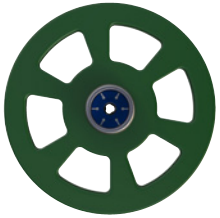
TL-40A is available with the following Terra-Lock Anchors:

TL-A3

TL-A4

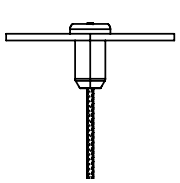
TL-808

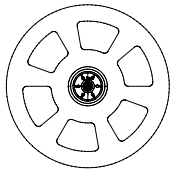
The TL-808 also helps maintain steeper cut slopes, reducing the impact on the surrounded land and lowering construction costs.



- Open face allowing for vegetation establishment
- 200 mm head size
- Accepts 8 mm wire
- Zinc die-cast housing
- Pre-assembled kit ensures time and labour savings
- Wire can be cut below grade

Specification





Top Bearing Plate (TL-808):
Head Size: 200 mm diameter
Plate Thickness: 8 mm

Top Termination (TL-800):
48 mm Head Diameter
12 mm Head Thickness

Wire Rope Tendon:
Diameter: 8 mm

Terra-Lock Anchors

TL-808 is available with the following Terra-Lock Anchor:

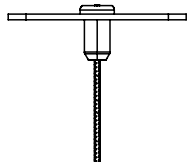
TL-A5

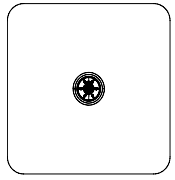
TL-80S

Designed for maximum corrosion resistance, larger surface area for higher load performance.

- Larger surface area for higher load performance
- 250 mm head size
- Accepts 8 mm wire
- Zinc die-cast housing
- Pre-assembled kit ensures time and labour savings
- Wire can be cut below grade

Specification





Top Bearing Plate (TL-80S):
Head Size: 250 mm (H)x 250 mm (W)
Plate Thickness: 8 mm

Top Termination (TL-800):
48 mm Head Diameter
12 mm Head Thickness

Wire Rope Tendon:
Diameter: 8 mm

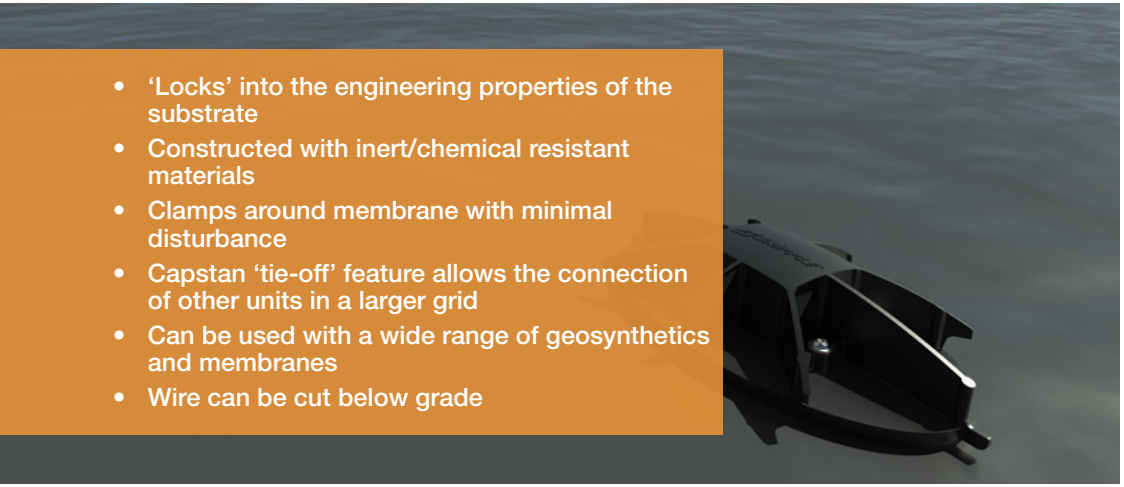
Terra-Lock Anchors

TL-80S is available with the following Terra-Lock Anchor::

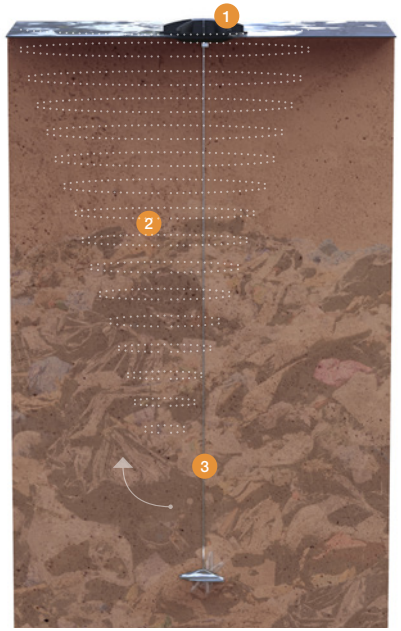
TL-A5

Liner-Lock

Self-sealing anchoring system for the security of geomembranes; prevents membrane movement in uplift or draw down applications.



- **'Locks' into the engineering properties of the substrate**
- **Constructed with inert/chemical resistant materials**
- **Clamps around membrane with minimal disturbance**
- **Capstan 'tie-off' feature allows the connection of other units in a larger grid**
- **Can be used with a wide range of geosynthetics and membranes**
- **Wire can be cut below grade**



How it Works

1. The two-part design clamps around the membrane delivering high clamping force and resistance to ingress, reducing the need for welds, trenching and sand bags
2. The Terra-Lock Anchor prevents bulk earth movement by locking into the ground beneath the potential failure planes, creating a truncated cone of consolidated waste & soil which determines the ultimate load bearing capacity of the anchor.
3. The innovative install and 'flip' of the Terra-Lock Anchor means that the ground's engineering properties can be accessed with minimal disturbance.

For more information on Liner-Lock please contact Gripple.

Installation Tools

We offer a range of tools to ensure our products are installed with ease and efficiency.

Gripple Petrol Drive (GPD)

- Gas-Powered Driver with proven reliability
- No generators, compressors, air hoses or extension cords required
- Lightweight & portable at only 15 kg (32 lbs)
- Saves time, money, and energy

EPPD-BXD (for use with drive rods)

JackJaw®

- Extracts Drive Rods and load locks
- Jaw and lever mechanism ensures ease of extraction
- Smooth extraction without bending
- Available with load cell for immediate testing

JACKJAW-226 (removes 20 mm drive rods)
JACKJAW-CIVIL (removes 32 mm drive rods)
JACKJAW-LOAD-CELL (Anchor Pull out testing)

Drive Rod

- Purpose engineered for toughness and durability
- Capable of penetrating the toughest soil
- Features specific head profiles to match anchors

DR-A2-1.5M (suitable for TL-A2 up to 1 m depth)
DR-A2-1.8M (suitable for TL-A2 up to 1.5 m depth)
TL-DTOOL-3-1200MM (suitable for TL-A3 and TL-A4 up to 1 m depth)
TL-DTOOL-3-1800MM (suitable for TL-A3 and TL-A4 up to 1.5 m depth)
TL-H34-1.8M (suitable for TL-A3 and TL-A4 up to 1.6 m depth)
DTOOL-5 (Breaker or machine tool for hire only. For use with TL-A5)

Terra-Lock Pin Range

Standard Chuck

- For use when working close to the mat
- Installs pins to full depth without damaging the mat
- Fits general purpose 18v combi drill
- Automatically disengages when pins reach full depth

TL-P1-TOOL-STD

Extended Chuck

- Designed for use where longer reach is required
- Installs pins to full depth without damaging the mat
- Fits general purpose 18v combi drill
- Automatically disengages when pins reach full depth

TL-P1-TOOL-LONG

*A square plate washer is available on request. The washer is used for preventing coir mats from being damaged by the TL-P head.

Accessories

We offer a range accessories to assist in installing.

Wire Cutters

Available in 2 sizes, purpose made for cutting wire up to 4 mm or 6 mm in diameter.

CUTTER-GRIPPLE (up to 4 mm wire)

CUTTER-6MM (up to 6 mm wire)

Workbelt

Lightweight & durable workbelt to keep tools and products handy.

WORKBELT

Torq Tensioning Tool

The Gripple Torq Tensioning Tool is a wire tensioner tool that regulates the load applied to it.

TOOL-5-SINGLE

Contractor Tool

Works on all Gripple units from 1.5 mm to 6 mm diameter wire.

TOOL-7-SINGLE

Product Performance

Plain Grass Cover Limiting Flow Velocities compared to reinforced vegetation	10 hour flow duration m/s	50 hour flow duration m/s	Tensile Strength (kN/M)
Plain grass poor cover	2	1	N/A
Plain grass good cover	3	2	N/A
G-Mat C350	6	5.6	8.7
G-Mat C500	7.6	6.9	17.8
G-Mat P550	7.6	6.9	17.8
G-Mat T50	7	N/A	50
Terra-Lock System (Turf & Earth Reinforcement)	up to 7.6	6.9 m/s	up to 50

Technical Services

Gripple is committed to delivering the best value-engineered solution to site. Our team of dedicated engineers ensure all systems are fit for purpose and delivering immediate security. Our services include but are not limited to:

Concept Generation

Site surveys and geotechnical report interpretation ensures Gripple is able to provide engineering concepts to solve geotechnical issues. Full drawings with justification can be provided for a value engineered solution.

Installation Design Service

Gripple offers a design service of site submittals including technical recommendations, calculations and drawings. Solutions are site specific and tailor-engineered to ensure input from Gripple engineers at all stages of the project.

Training

Engineering and on-site installation training ensures the system is performing to its full potential and peace of mind for the installers.

CPD

An accredited CPD course on anchoring solutions is available upon request.

Product Providers

Gripple is a world class product manufacturer with a wealth of expertise – should the requirement be bespoke, we will work with our in-house product design engineers to deliver the right solution.

Site Visits

Our engineers are characterised by their 'hands on' approach; they enjoy visiting sites and getting their hands dirty – this is how we understand the problems on site and deliver practical solutions.

Technical Submittal

All Gripple products are supplied with best practice and installation instructions – should further advice be needed, our technical team are available to provide support.

Testing

On-site and laboratory testing of the system and its components ensures the solution is fit for purpose and meets our own rigorous quality checks.

Case Study
Nenthead Car Park, Cumbria, England

Client	Coal Authority as part of the Water and Abandoned Metal Mines Programme, funded by Defra and North East Local Enterprise Fund
Main Contractor	JN Bentley
Gripple Terra-Lock® System	TL-100, TL-A4, GMAT-350 and TL-P2 installed with Gripple Petrol Driver and JackJaw®
Application	Riverbank Stabilisation

The Nenthead car park is located in Cumbria. Nenthead is one of the highest villages in the UK - approximately 457 m above sea level. Nenthead was built in the middle of the 18th century and became one of the earliest purpose-built industrial villages in Britain – it was a mining hub for lead and silver ore across the North Pennines region. The mines closed down back in 1961 but a heritage centre now exists within the village to attract tourists throughout the year. Nenthead features some of the most aesthetically pleasing mines in the UK, with several miles of underground mines still accessible to explore today.

However, the effects of metal mining have taken its toll on the surrounding landscape in Nenthead; high hydraulic flows from the River Nent led to erosion of the spoil heaps, causing contamination to the water. The high levels of pollution had a significant impact on the habitat within the river. The Coal Authority needed to urgently stabilise a riverbank of the River Nent to prevent further erosion adjacent to the car park site. Gripple was approached to provide an alternative solution to the cost and labour intensive traditional methods of stabilising riverbanks.

A Gripple engineer visited the site to perform pull-out testing, and to survey the conditions on site. Based on core civil engineering principles and the ascertained soil conditions of the site, Gripple was able to propose a value-engineered solution to stabilise the riverbank.

The Coal Authority wanted a solution that would cause minimal disturbance to the environment. The use of Gripple products on the project minimised civil engineering works associated with alternative methods. The Terra-Lock system also meant main contractor, JN Bentley, did not have to install as many gabions to reinforce the riverbank, saving tonnes of additional imported rock from being delivered, handled and installed.

Gripple's Terra-Lock system is an innovative method of geotechnical engineering for heavy erosion and slope stability – the system delivers significant time and labour savings, provides immediate security to the ground structure while also facilitating vegetation growth. The GMAT-350 is a long lasting, environmentally friendly erosion control mat which provides an effective erosion control surface and a vegetative root reinforcement layer, while the TL-100 and TL-A4 ground anchors are designed to provide efficiency, maximise load capacity and allow vegetation establishment through perforations.

Once installed, the GMAT-350 was hydra-seeded and top soiled - perforations in the TL-100 top plate are designed to facilitate vegetation regrowth, delivering a system that blends in well with the natural environment. The completed project prevents around 1 tonne of lead, cadmium and zinc from entering the river, and contributing to 60 km of polluted river. Throughout the project, Gripple provided ongoing technical onsite support, as well as a post-project delivery service that included pull-out testing to varying loads, training and sign-off.

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