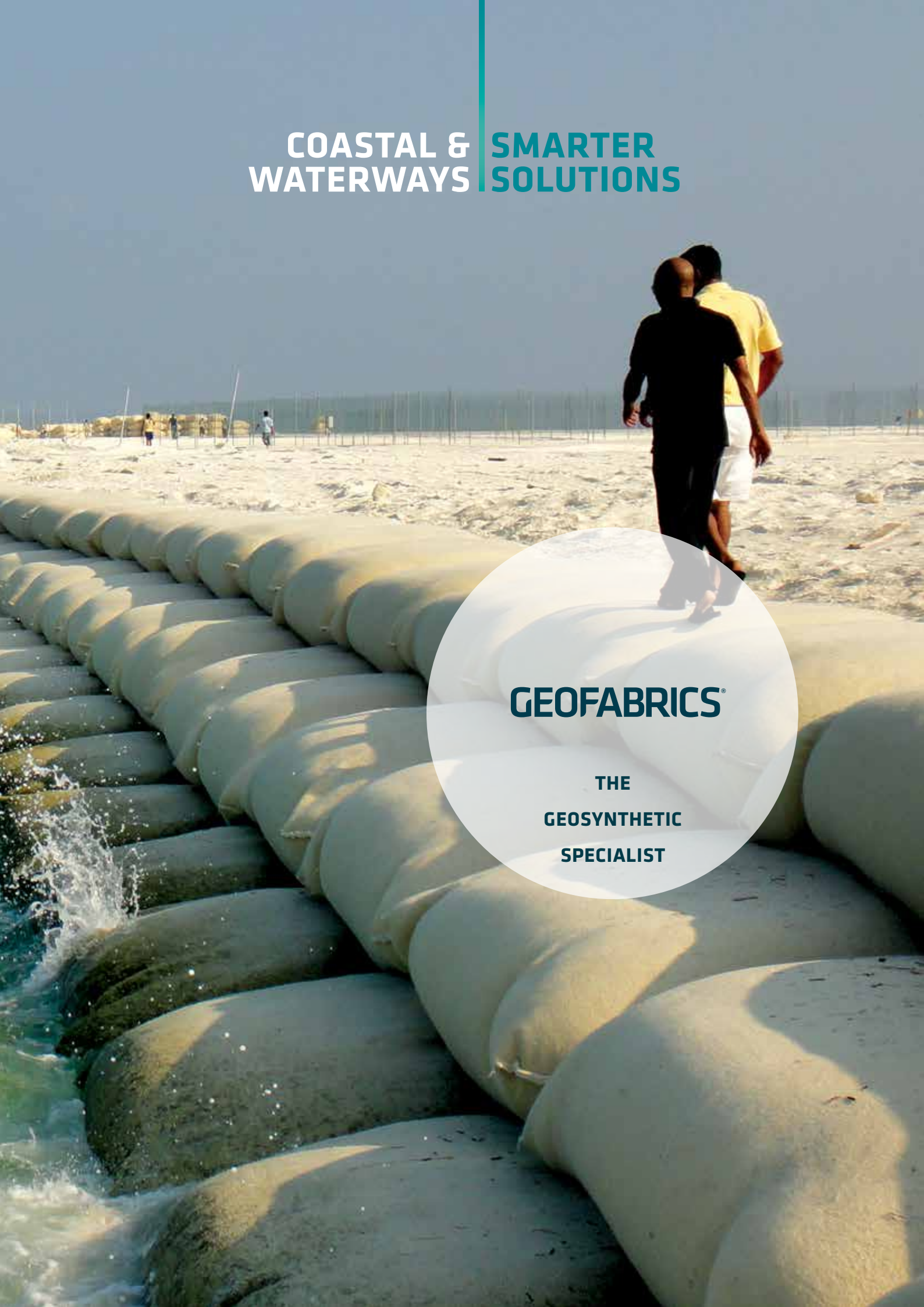
COASTAL & WATERWAYS | SMARTER SOLUTIONS



GEOFABRICS®

THE GEOSYNTHETIC SPECIALIST

COASTAL OVERVIEW

Elcorock is a geotextile sand filled container used in harsh coastal environments for controlling shoreline erosion utilizing several different proven techniques.

Geosythetic Sand Containers (GSC) have a long history in Australia, New Zealand, the Pacific and around the world as a cost-effective alternative to rock, concrete, steel and timber.

Structures such as breakwaters, revetments, groynes, artificial reefs and land reclamation projects have successfully been constructed using the Elcorock system.

Elcorock is fabricated from Texcel, Geofabric's new generation of marine grade non-woven geotextiles.

Texcel has been developed and tested in accordance with Australian Standards, as well as regular on-site product exhumation which has provided analysis of the material's durability in a "real life" scenarios of over 20 years. Manufactured from a unique staple fibre blend of polyester and polypropylene the Elcorock system has inbuilt flexibility allowing the product to resist the natural forces of the marine environment.

Texcel geotextiles, which are manufactured in Australia are highly resistant to abrasion, hydrocarbon, impact damage and UV degradation also providing superior filtration and separation for coastal and marine environments.

Our state of the art manufacturing plant offers our clients the opportunity to have products manufactured to meet their specific site requirements, including precise Elcorock container sizes and shapes, specific weights of the Texcel and vandal deterrent options.

The Elcorock and Texcel products are manufactured, tested and released according to Australian and International geosynthetic standards under an ISO 9001:2015 certified quality management system.

Geofabrics has created a range of standard Elcorock size containers which have been tested for durability in certain conditions. However, it is always recommended to consult a coastal engineer to ensure the correct size container and design configuration is used.

ELCOROCK APPLICATIONS

The ELCOROCK shoreline protection system has been proven through over 20 years of use in harsh coastal environments and is a cost-effective alternative to traditional coastal erosion protection systems made from concrete, rock armour, steel or timber.

SEAWALLS AND REVETMENTS

The use of Elcorock geotextile sand containers in sloping protective structures such as seawalls and revetments has been used as an alternative to hard structures for many years. The flexibility of a soft engineering product such as Elcorock has been proven to reduce the force of reflective wave energy more so than hard structures.

As well as protecting an embankment from erosion, the Elcorock system will increase the public amenity through improved public access and lower safety risk.

GROYNES AND BREAKWATERS

The durability and stability of Elcorock containers provide an ideal solution for marine structures such as groynes and breakwaters. These structures extend out into the wave zone and provide marina and beach protection as well as sand movement control and river training. Wave climate and other environmental conditions will dictate the size of the container to ensure stability in these dynamic zones.

RIVER AND ESTUARY WORKS

Damage to vegetated river banks and tidal riparian zones is predominantly caused by tidal movements, boats wake and other causes of water movement in river and estuary zones. The Elcorock system has been designed with the river system in mind, aimed at improving river bank stability, minimizing future erosion and improving amenity and access. Elcorock containers ranging from the 40 kg to 0. 75 m^3 in size are ideal for river and estuary works.

ARTIFICIAL REEFS

Artificial reefs are effective in reducing the full force of wave action and mitigate coastal erosion problems. Elcorock Mega Containers have been used around the world for this purpose. Ranging from 6 m to 20 m in length and heights of up to 2.0 m when filled they make an ideal structure to rest on the ocean floor. Generally filled with dredge pumps the large containers help to create a diverse marine environment which has significant value both environmentally and for recreation in the forms of diving, surfing and fishing.

CUSTOM STRUCTURES

Geofabrics are the manufacturers of the material used in Elcorock called Texcel. This allows us the ability to manufacture the material to meet specific site requirements including specific weights as well as custom roll sizes.
As Geofabrics also fabricate the Elcorock product in house, this allows us the capability to build different shape and size containers dependent on the clients requirements.

The Elcorock system consists of sand filled geotextile containers built to form a stabilising, defensive barrier against coastal erosion.

The geotextile containers are made from Texcel, a durable staple fibre geotextile. It's a versatile system ranging from hand filled 40 kg containers to hydraulically filled 1,000 tonne mega sand containers and tubes.

ELCOROCK SYSTEM DETAILS

The Elcorock geosytnhetic sand container standard product range covers a range of sizes and systems ranging from hand filled 40kg containers to hydraulically filled Mega containers and tubes. Specialist filling and placement equipment is available for most container sizes to provide both a consistent, stable and aesthetically pleasing finish.

40 kg to 100 kg .30 m³ Containers

These containers are the smallest of the Elcorock sand containers. Generally used on inland protection works, stream protection and small on shore structures in very mild conditions. Easily filled with little mechanical equipment required for installation and filling makes the containers suitable for community groups or land owners.

	40 KG SAND BAG	100 kg SAND BAG	.30 m³ CONTAINER
WIDTH (Flat/ Filled)	600 mm/550 mm	600 mm/550 mm	850 mm/750 mm
LENGTH (Flat/ Filled)	500 mm/450 mm	1,000 mm/900 mm	1,500 mm/1,350 mm
APPROX. FILLED HEIGHT	150 mm	200 mm	350 mm
MATERIAL	Marine grade		
CLOSING SYSTEM	Pillow slip/velcro	On site sewn	On site sewn
FILL FRAME AVAILABLE	No	No	Yes
DRY SAND FILLED	Yes	Yes	Yes
ORDER CODES	SB40VELCRO	ER100	ER030
PALLET QUANTITY	300	180	72

Installation

Containers should be placed on a firm level surface. Open the top of the container as wide as possible. Slowly tip sand into the container ensuring the bottom corners are full of sand and not folded or creased. Fill the container to approximately 100 mm from the top ensuring both sides of the top of the container can be pushed together. The container should stand on its own at this point.

To close 40 kg containers simply pull the pillow slip over and press the Velcro together.

The 100 kg and 0.3 m³ containers should be stitched closed using an industrial sewing machine. The sewing machine along with the thread can be supplied by Geofabrics. Using the sewing machine, sew a straight line across the top of the container, ensure there are no folds in the fabric as this will jam the machine. Then with the next seam, use a sine wave or zig zag pattern crossing the initial seam 3-4 times.

0.75 m³ Containers

These medium sized sand containers are used typically in sea walls and groyne structures where sites experience mild conditions. Also often used in emergency works and temporary structures. Although the product is available in both standard and vandal deterrent materials, it is highly recommended where there is public interaction or chance of impacting debris that the vandal deterrent material is selected. Scour flap containers are also available in this size.

WIDTH (Flat/Filled)	1,500 mm/1,350 mm			
LENGTH (Flat/Filled)	2,000 mm/1,800 mm			
FILLED HEIGHT	400 mm			
MATERIAL	Marine grade & composite marine grade			
FILLED WEIGHT	1,400 kg			
CLOSING SYSTEM	Laced close on site			
FILL FRAME AVAILABLE	Yes			
DRY SAND FILLED	Yes			
ORDER CODES	ER075NS	ERO75VNS	ERO75VFNS	ERO75FNS
PALLET QUANTITY	30	18	16	20

Installation

This size container is filled using dry sand poured into the hopper system on the Geofabrics filling frame. The hopper funnels the sand into the Elcorock container.

Before placing the container on the hopper ensure the trunk located inside the container opening is pulled out.

The geotextile loops on the exterior of the container attach to hooks on each side of the fill frame to suspend the container at the correct height for filling. Slide the trunk over the base of the hopper. Slowly pour sand into the hopper. Ensure the bottom corners are full of sand and not creased or folded.

Once the container is full and bulging on both sides, it's imperative that the top corners of the container are filled with sand. This may mean over filling the container and then moving sand into the top corners by hand. Ensuring the opening can be closed tight, lace close the opening using the supplied cord, ensuring a double reef knot is used to tie off the cord.

1.2 m³ Containers

Due to the increased fill port on these 1.2m³ containers, they tend to be quicker to fill which makes them ideal in emergency or temporary type structures.

Used in sites that experience moderate wave action, these containers can be suited to sea walls and groyne structures.

This product is available in both standard and vandal deterrent materials.

WIDTH	1,700 mm/1,500 mm			
LENGTH	2,200 mm/1,950 mm			
FILLED HEIGHT	500 mm			
MATERIAL	Marine grade & composite marine grade			
FILLED WEIGHT	1,800 kg			
CLOSING SYSTEM	Laced close on site			
FILL FRAME AVAILABLE	Yes			
DRY SAND FILLED	Yes			
ORDER CODES	ER0140NS	ERO140VNS	ERO140VFNS	ERO140FNS
PALLET QUANTITY	26	16	13	16

Installation

This size container is filled using dry sand poured into the hopper system on the supplied Geofabrics filling frame. A brace is used to secure the trunk to the hopper and the container is also suspended via geotextile loops. These loops are connected to the fill frame at the correct height ensuring the container is hanging approx. 100 mm off the ground.

This ensures the bottom corners of the container do not crease which restricts correct fill quantity.

Once the container is full and bulging on both sides, it's imperative that the top corners of the container are filled with sand. This may mean over filling the container and then moving sand into the top corners by hand. Ensuring the opening can be closed tight, lace close the opening using the supplied cord, ensuring a double reef knot is used to tie off the cord.

2.5 m³ Containers

These large hopper filled sand containers are used in revetments and groynes, due to their large size and high stability, even under the harshest of conditions.

Filling and placement of these heavy (approx. 4.5 tonne filled) and very large containers is achieved using specialized hydraulic filling apparatus and placement cradles provided by Geofabrics to ensure complete filling and a consistent finish.

Scour flap containers are available in this size.

WIDTH	2,200 mm/1,800 mm			
LENGTH	2,750 mm/2,300 mm			
FILLED HEIGHT	600 mm			
MATERIAL	Marine grade & composite marine grade			
FILLED WEIGHT	4,500 kg			
CLOSING SYSTEM	Laced close on site			
FILL FRAME AVAILABLE	Yes			
DRY SAND FILLED	No - hydraulically filled			
ORDER CODES	ER250	ER250V	ER250VF	ER250F
PALLET QUANTITY	18	12	8	13

Installation

To ensure safe and effective filling of these large containers Geofabrics provided filling equipment which consists of filling apparatus, J bins and other associated equipment.

Other equipment requirements include:

- 35 tonne or similar excavator for placement of sand containers;
- 13 tonne or similar excavator for filling sand containers;
- 2” high pressure water/pump supply.

Once the filling and placement apparatus is assembled, a sand container is placed into a J bin with the two trunks pulled out, the sand container is then winched into position. The trunks are then braced onto the funnels on the filling frame. Water is fed into the funnels through the apparatus manifold. Sand and water is used to fill the container with the water passing through the geotextile. Once filled the two trunks are rolled into the container and the container openings are then laced close.

The sand container is now ready to be lifted into place with use of the J bin.

The back of the J bin can be used to maneuver and tap the container into position.

Additional filling advice and documentation is available from Geofabrics.

Mega Containers

Elcorock Mega containers are engineered sand filled tubes that offer excellent performance in durability, robustness and usability providing the designer, contractor and end user a product that is capable of withstanding some of the harshest conditions.

A large range of standard sizes are available along with customised sizes.

CIRCUMFERENCE	4 m to 12 m
LENGTH	Up to 20 m
FILLED HEIGHT	Up to 2 m
MATERIAL	Marine grade & composite marine grade
FILLED WEIGHT	Up to 1,000 t
CLOSING SYSTEM	Lid
FILL FRAME AVAILABLE	No - dredge filled
DRY SAND FILLED	No - hydraulically filled
ORDER CODES	T1, T1V, T2, T2V, T3, T3V, T4, T4V

Installation

Experience and good organisation is critical when installing Mega containers. Aspects such as weather, tides, location, equipment and site access should all be considered to ensure your project runs smoothly and the desired out come is achieved.

Deployment, alignment and installation of anchor points for Mega containers should be planned well in advance. There are several options for anchor points dependent on the application ranging from posts to concrete blocks.

Elcorock Mega containers are delivered rolled up and on a pipe core and should be handled on site using a carpet prong or lifting slings. Plant equipment used to maneuver the container should be rated for the weight of the container, which could exceed 450 kg.

When the container is in position and secured, a dredge line must be securely fastened to the ports.

Filling of the container with a typical slurry mix of at 15% solids can now commence. Filling of a standard 20 m container should take between 40 minutes and 2 hours depending on the dredge size and fill material quality. Measure level of fill material within the mega container by pushing firmly against the side or top of the container. The Mega container is full when solid and unyielding under foot.

The final step in the process is to seal the mega container to prevent material escaping. This is done by firstly rolling up the trunk and inserting into the container, then using a factory supplied cover which is glued and screwed into place.

Additional filling advice and documentation is available from Geofabrics.

Bespoke Containers



Working closely with clients to ensure we produce solutions that are not only offer the most robust products on the market but are also tailor made to clients specific requirements.

Geofabrics Australasia has recently built a state of the art manufacturing facility which ensures we are able to manufacture outside of our standard range of products.

Projects including artificial reefs, bunds, scour protection, working platforms as well as landscaping features are made possible by our up to date fabrication process.

WHY IS ELCOROCK THE WORLD'S BEST?

Rather than rely upon accelerated laboratory testing to prove the durability of our system we have exhumed containers installed between 2001 and 2003 along the east coast of Australia, from arguably some of the World's harshest marine environments, to undertake controlled laboratory testing to prove the system's long term performance. No other Geosynthetic Sand Container system in the World is backed by this kind of performance data, and we believe this, along with the unique features of Elcorock that set it apart.

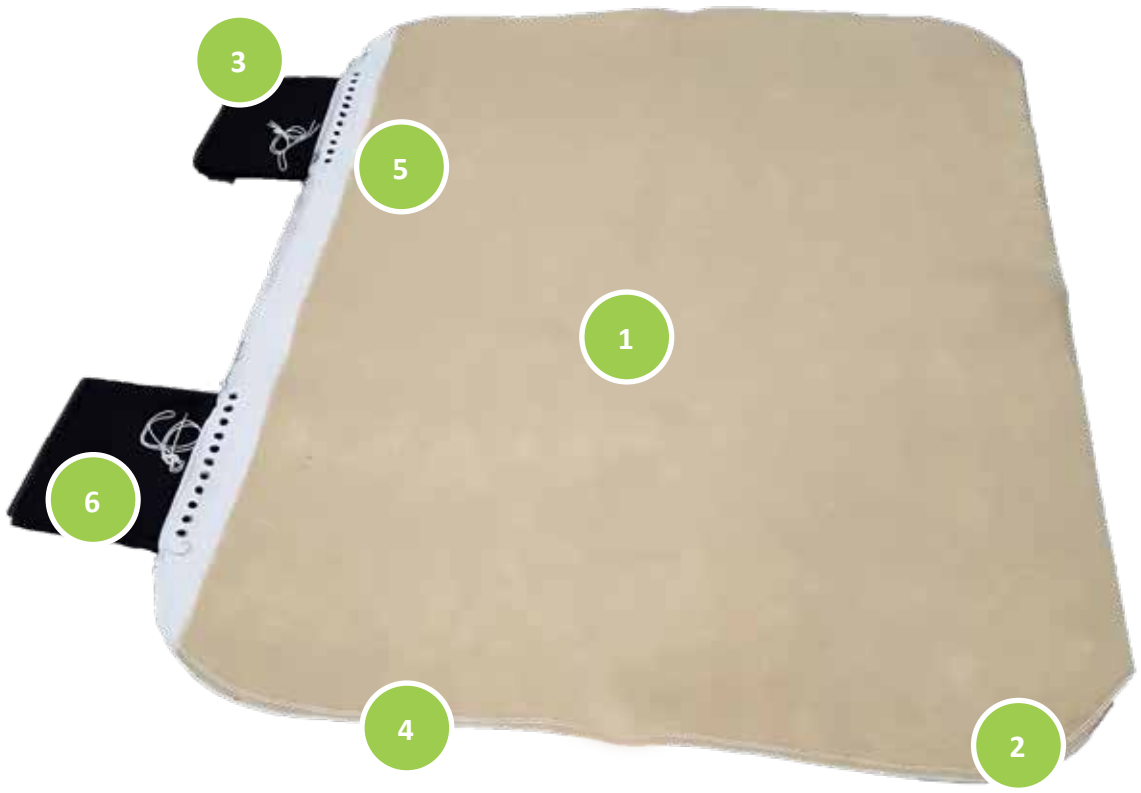
Our testing facility, Geofabrics Centre for Geosynthetic Research Innovation and Development (GRID), has undertaken extensive testing of the exhumed Elcorock containers with tests including abrasion resistance, seam strength, UV resistance, puncture resistance and sand entrapment.

Exhumation Data

Property	Units	Test Method	Supplied Material 2001-2003 (MARV)	Exhumed Material 2017 (ACTUAL)	
				Covered	Exposed
Mass	g/m^2	AS 3706.1	1,911	6,739	5,551
Thickness	mm	AS 3706.1	9.10	11.6	11.4
Wide Width Tensile Strength (MD)	kN/m	AS 3706.2A	39.8	35.2	24.4
CBR Strength	N	AS 3706.4	11,694	10,989	6,890
Seam Strength (MD)	kN/m	AS 3706.6	39.8	32.8	37.0
Index Puncture	N	ASTM D4833	2,129	2,090	1,569

ELCOROCK PERFORMANCE FACTORS

There are a range of performance factors that contribute towards the impressive durability of the Elcorock system. These include:



1. UV STABILISED VIRGIN POLYPROPYLENE FIBRES

Geofabrics utilises the highest quality, virgin polypropylene fibres which have a unique stabiliser and anti-oxidant package applied to them during extrusion which gives them the long-term outdoor durability necessary in exposed applications. We have carried out several exhumations on products using these types of fibres which have been fully exposed for >10 years, with test data demonstrating long term performance.

The base material of polyester that forms the 1,200 gsm primary geotextile has been successfully used in major Australian coastal projects since 1978. The combination of this polymer material has proven beyond doubt to be an exceptional performer.

2. ROUNDED CORNERS

When filling a sand container it is crucial that there are minimal voids. It is our experience that square corners are almost impossible to load with sand. An empty corner on a sand container will flap in wave action and eventually the material will fatigue in this area which could result in reduced performance.

According to the environment this failure can be quite rapid where container corners have square profiles.

*rounded corners are a standard feature on our 2.5 m^3 containers.

3. GEOTEXTILE FILLING & CLOSURE TRUNK

The ELCOROCK filling trunk was developed in 2000 utilising a composite woven and non-woven polyester fleece material needled into the woven scrim. This produces a product with strength of 28kN/m as well as plastic deformation properties. High strength combined with elongation in this component is important to initial filling when the container is suspended by this trunk; if the trunk isn't strong enough to bear the weight of the container and sand during filling it can tear away from the container, creating a safety risk as well as causing delays in the project.

4. RECESSED DOUBLE CHAIN STITCH

An integral element of any sand container is the durability of the stitching. Due to the abrasive action that can occur along the edge of a container, our experience has shown that any stitching that overlaps this edge will eventually degrade and become ineffective as indicated by the below picture.

The Elcorock double chain stitch is recessed into the container by 5-10 mm ensuring the seam is protected from the threat of edge abrasion. The seam also sinks into the material creating a channel in which becomes covered with entrapped sand creating further protection for the seam.

Abraded overlock seam

The Elcorock double chain stitch

5. SINGED EYELETS

The supplied double braided marine grade cord is passed through eyelets when closing the container. These eyelets are singed which in turn melts the fibres together providing a tough eyelet surface preventing tearing of the eyelet.

6. MARINE GRADE CORD

An integral component of the closing system is the cord strength and durability. The 4 mm double braided marine grade cord used in the Elcorock product has been proven over 20 years of insitu life as well as testing we have undertaken in our facilities.

ELCOROCK PROJECTS

The ELCOROCK shoreline protection system has been proven through over 20 years of use in harsh coastal environments and is a cost-effective alternative to traditional coastal erosion protection systems made from concrete, rock armour, steel or timber.

ETTALONG POINT, NSW

Ettalong Point is located approximately 50 km North of Sydney on the New South Wales Central Coast. After a major storm event in 2015, erosion threatened to undermine the beachfront road, forcing its closure.

A 100 m length of Geosynthetic Sand Container wall was constructed using 2.5 m3 Elcorock units by council crews. The Water Research Laboratory of UNSW Sydney designed the wall and implemented a comprehensive monitoring program.

SOLOMON ISLANDS

In May 2014 a major storm event battered the coast line adjacent to the capital of The Solomon Islands, Honiara.

Extreme coastal erosion occurred in and around the National Health Referral Hospital. Fears a similar storm would severely impact on the Hospital infrastructure a coastal defence revetment wall was built in early 2016 using a single layer of 2.5 m^3 sized Elcorock Containers. To this day the structure has provided the protection required for this valuable asset for the peoples of the Solomon Islands.

COLLAROY BEACH, NSW

An East Coast low combined with a king tide hit Sydney's Northern Beaches leaving a number of coastal properties teetering on the brink in June 2016.

An emergency request from the local council to Geofabrics for the supply of 300 sand containers was made. The 2.5 m^3 Elcorock containers were on site within days and the protective barrier was installed.

NARROWNECK REEF, QLD

The Narrowneck artificial reef was constructed in 1999 and was designed to reduce the high-level of erosion during storms along the narrow stretch of foreshore.

400 Elcorock Mega Containers were filled with sand and dropped into position using a drop bottom barge. In late 2017 a further 85 Elcorock Mega Containers were used to top up the reef's height.

MAROCHYDORE GROYNES, QLD

A series of Groynes were constructed in 2006 at Maroochydore, Queensland to combat the ongoing erosion affecting the Cotton Tree Caravan park.

The Groynes have been highly effective in the build up of sand creating a buffer for the Caravan Park.

Exhumation of several containers were carried out in 2016 showing the material had lost only 10% of strength over 10 years.

This project and Narrowneck Reef were designed by International Coastal Management: www.coastalmanagement.com.au

KEY FEATURES & BENEFITS OF ELCOROCK

1 DURABILITY
Elcorock is proven through over 20 years of insitu installation in Australia and around the World under some of the highest UV concentration levels.

2 FLEXIBLE STRUCTURE
The nature of Elcorock creates a durable, pliable product.

3 PUBLIC AMENITY
Unlike rock or concrete structures, Elcorock is a soft engineered solution suitable for public sites.

4 ENVIRONMENTALLY SENSITIVE
Delivery of Elcorock to site has a dramatically smaller carbon footprint than hard structure alternatives.

5 IN-HOUSE MANUFACTURED
Aside from prompt supply timelines Geofabrics can tailor make Elcorock containers to suit specific conditions including size and various material grades.

6 TESTING & TRACEABILITY
Texcel & Elcorock range of products are thoroughly tested and tracked to ensure our product exceeds our standard specifications.

7 INSTALLATION
We provide comprehensive installation guidance and support to ensure a high level and quality project.

Geotube dewatering tubes, sometimes known as geobags, are used for sludge dewatering projects of all sizes and there is good reason - simplicity and low cost.

There are no belts, gears, or complicated mechanics. Geotube containers use an engineered textile that is designed for dewatering of high moisture content sludge and sediment. They are available in many sizes, depending on your volume and space requirements.

CONTAINING SEDIMENT USING GEOTUBE DEWATERING TUBES

Geotube technology helps to dewater and contain contaminated sediment in rivers, bays, harbors, marinas, ports, dock facilities and other waterways. In many cases the buildup of these sediments pose significant environmental hazards and remediation is a difficult task.

Once dredged, marine sediments can be contained and dewatered easily with Geotube dewatering technology. The dredged solids consolidate within the tube creating a solid mass, reducing their volume dramatically, which can then be easily removed and used in another location or dumped.

When filled, Geotube units can also function as bund walls, containment dykes, as well as forming the core of large rock covered groynes and breakwaters.

There are many examples of Geotube dewatering units being used around the world in challenging environments where conventional methods are too costly or fill materials are less than ideal.

Making use of the dredge spoils presents engineers with a number of cost effective design alternatives for the marine environment.

For more information see our Tencate Geotube brochure.

Ports & Wharves

Land Reclamation

Working Platforms

Dredged Soil Structural Core

Contaminated Sediment Removal

TEXCEL MARINE GRADE GEOTEXTILES

Texcel geotextiles are a new generation of nonwoven staple fibre geotextiles which have been developed to stabilise coastal structures. Manufactured from either Polyester fibres, they have a unique staple fibre blend and an inbuilt flexibility to allow Engineers to specify mechanical and hydraulic criteria to suit tough environmental conditions.

Texcel geotextiles, which are manufactured in Australia by Geofabrics, are high quality, isotropic, nonwoven staple fibre geotextiles which are supported by 25 years of research, development and testing. They are abrasion and UV-resistant and provide superior filtration for coastal and marine applications. Texcel geotextiles also have high elongation and abrasion properties minimising installation damage and ensuring effective soil contact, interaction and stability.

Geofabrics provide a high level of technical support for Designers and Engineers to make sure your project is implemented effectively and efficiently using the correct type and grade of geotextile. Continuous Research & Development is carried out at the 'Geosynthetic Centre of Excellence' on the Gold Coast in Queensland including a full scale, specially designed, rock/boulder dropping apparatus for Texcel products.

REDUCE RISK

The Texcel R range of geotextiles are produced to strict Manufacturing Quality Assurance ensuring consistent quality for the entire project. Rolls are numbered individually and traceable back to the actual QA test results. Laboratory support is provided for the construction QA process for Texcel geotextiles.

ENHANCED PERFORMANCE & RELIABILITY

The Texcel R range of UV stabilised geotextiles are manufactured in Australia to meet Australian and New Zealand specifications and conditions.

The use and effectiveness in a large range of applications can be supported by laboratory testing and ongoing field performance.

COST BENEFITS

Texcel R range geotextiles can serve as a direct alternative to granular filter material. This allows for significant savings in both material costs and installation times. Tightly rolled rolls, up to 6 m wide, provide additional transportation and installation cost savings.

DESIGN & INSTALLATION SUPPORT

The Texcel R range of geotextiles are supported by technical assistance from our Geofabrics engineers. Installation equipment is also available to help ensure efficient and correct installation.

Texcel geotextiles are available in four strength grades:

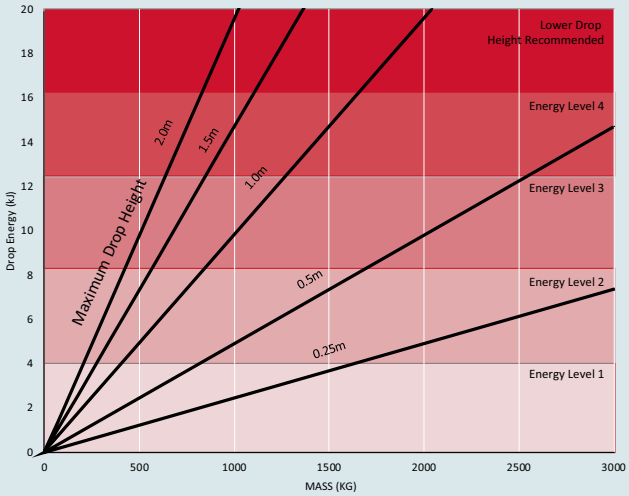
TEXCEL GRADE	400R	600R	900R	1200R
ROLL WIDTH OPTIONS (M)	2, 4, 6	2, 4, 6	4, 6	4 ,6
STANDARD ROLL LENGTH (M)	50, 100	50	50	50
MATERIAL	Polyester			

We can produce custom roll lengths to suit project requirements.

SURVIVABILITY BEYOND INSTALLATION

Geotextiles are a very cost effective alternative to graded granular filtration systems underneath armour rock in hydraulic applications. Many applications call for revetment geotextiles to be installed under large and often angular rocks. Surviving installation without puncture is key to maintaining the long term performance of the geotextile in these critical hydraulic applications.

Following Geofabrics' investment in a state of the art staple fibre manufacturing facility at Ormeau, Queensland and the introduction of the Texcel R range of polyester geotextiles, a comprehensive research and development programme for the revetment applications for these products geotextiles was undertaken. Based on the results of this research, a geotextile design and selection method based on installation testing using full-scale testing of rocks with Texcel R geotextile revetment applications has been created. This can be downloaded from the Geofabrics website.



Test	Units		Energy Level			
			Level 1	Level 2	Level 3	Level 4
CBR Burst Strength (AS 3706.4)	N	MARV	2,750	4,360	6,140	8,850
CBR Toughness (AS 3706.4)	kJ/m²	MARV	2.7	5.6	8.1	9.3
Wide Strip Tensile Strength MD[1]/XMD (AS 3706.2)	kN/m	MARV	14.8/15.6	21.2/26.6	30.4/38.9	45.5/57.2
Wide Strip Toughness MD/XMD (AS 3706.2)	kJ/m²	MARV	5.5/5.8	10.2/12.7	14.6/18.6	21.7/30.0
Grab Tensile Strength MD/XMD (AS 3706.2)	N	MARV	820/870	1,250/1,440	1,790/2,160	2,800/3,260
Abrasion Resistance MD/XMD (BAW Rotating Drum)	kN/m Strength Retained	Typical	7.5/6.9	17.3/17.3	22.7/26.2	34.2/40.5

Ref: P. Kendall, R.A. Austin, C. Cheah, 2014a. *Installation Durability Testing of Revetment Geotextiles*, 7th International Congress on Environmental Geotechnics, Melbourne Australia

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