



SEASHIELD™

LONG TERM CORROSION CONTROL FOR JETTY PILES & MARINE STRUCTURES

PROTECTION FOR:

Steel, Timber & Concrete Jetty Piles
Sheet Piling
Steel Marine Structures



SeaShield Marine Protection Systems

Introduction:

SeaShield comprise a range of systems developed to protect marine structures where corrosion is a major problem in splash zones, inter-tidal and subsea environments. These areas are extremely vulnerable due to the constantly changing mixture of air, temperature and chloride laden water, the perfect recipe for severe rusting. Once corrosion has begun, rough seas containing sand, shingle and debris coupled with infestations of marine growth, speed up the deterioration process. If nothing is done the structures can soon become unsafe and extremely costly to repair.

Important: SeaShield System Selection

To ensure that the correct SeaShield system is selected for the appropriate project, a Questionnaire is available for completion from our website, subsidiary companies or world wide agents to ensure that all of the relevant criteria are taken into consideration.

Why Use SeaShield?

- SeaShield systems have over 40 years of proven track record for steel, wood and concrete jetty piles situated in highly corrosive environments including sub-sea conditions.
- Abrasive blast cleaning is not essential for steel surfaces as SeaShield systems are extremely surface tolerant and can be applied over chloride contamination and thin layers of rust.
- Cost effective long-term protection is achievable irrespective of cylindrical, hexagonal or square section structure designs.



Marine life forms such as barnacles and algae will soon colonise any structure.



Pile Inspection:

Patented* SeaShield Inspection Ports can be installed in our SeaShield 2000 FD system jackets to allow for easy monitoring of the pile surface. See page 9.

*UK Patent GB2511553

*Patent applications pending in: Australia (2014224433), Brazil (BR112015015631.2), Chile (2015-001158), Hong Kong (1216190) and Thailand (163840) and at the European Patent Office (EP2965062)

www.seashield.com

Extremes of temperature, ice and heavy seas also take their toll on marine structures.

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SeaShield Marine Protection Systems



Berthing Dolphins with Tightly Nested Piles Situated Close to Sea Level:

In heavy seas, tremendous forces are created under these structures due to the rise and fall of the swell/wave action. A combination system comprising Rigspray and SeaShield 2000 FD has been designed to provide long term protection in such stormy conditions. Please enquire for further details.

SeaShield Systems

Overview of the Range

System Name	System Type	Description	Page
SeaShield 70	Petrolatum Inner Layer and Glass Outerwrap	A medium duty system for the protection of steel, timber or concrete piles for uneven and complex shapes	6
SeaShield 80	Petrolatum Inner Layer and Bitumen Outerwrap	A light duty system for the protection of cylindrical steel, concrete or timber piles	6
SeaShield 100	Petrolatum Inner Layer and HDPE Jacket	A medium duty system for the protection of cylindrical steel, concrete or timber piles	7
SeaShield 2000 FD	Petrolatum Inner Layer and HDPE Jacket	A heavy duty system for the protection of cylindrical, square and hexagonal steel, concrete or timber piles	8-9
SeaShield 500	Epoxy Grout and GRP Jackets	An extra heavy duty system for the protection of steel, timber and concrete piles	10
SeaShield 400	Epoxy or cementitious grout, C-Grid™, GRP Jacket	An ultra heavy duty system for the protection and reinforcement of timber piles	11
SeaShield Fiber-Form	Custom fabricated GRP Jackets	An ultra heavy duty system for the protection and rehabilitation of steel, concrete and timber piles	12
SeaShield Pile Cap	GRP Cap and Expanding Marine Foam	A heavy duty system for protecting the area between the pile top and the underside of the jetty deck	12
SeaShield Rigspray	Single coat glass flake reinforced resin	A medium duty liquid coating system or the protection of cylindrical, square and hexagonal steel piles and steelwork	13

*System variations are available on request.

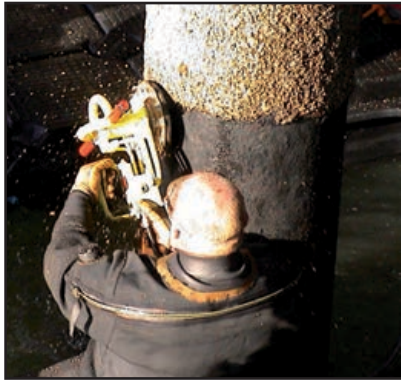
SeaShield Paste S105 + Double Wrap of SeaShield Marine Piling Tape = Petrolatum Inner Layer

The Petrolatum Inner Layer provides optimum corrosion control for the pile surface.

The use of surface tolerant petrolatum products for the inner layer means that the substrate needs only hand or power tool cleaning to remove loose rust, loose coating and marine growth.

High pressure water jetting can be used to speed up the cleaning process.

Surface Preparation and Application of the Petrolatum Inner Layer:



Cleaning with a power tool.



Cleaning with a hand scraper.



Cleaning using a high pressure water jet.



Cleaned piles ready for the application of the Petrolatum Inner Layer.



High pressure water jet under water.



Applying SeaShield Marine Piling Tape.

SeaShield Systems that use the Petrolatum Inner Layer:

- SeaShield Series 70
- SeaShield Series 80
- SeaShield Series 100
- SeaShield Series 2000 FD

The Petrolatum Inner Layer Components:

SeaShield Paste S105

A VOC free, soft petrolatum paste that contains water displacing additives and corrosion inhibitors.

SeaShield Marine Piling Tape

A thick, heavy duty tape made from a non-woven synthetic fabric impregnated and coated with a petrolatum compound containing inert fillers and water displacing agents.

The tape has a HDPE backing film. It is also specially formulated for application under water, or to wet surfaces. When applied spirally under tension it will displace water and develop a water resistant bond to metal surfaces.



Divers fitting a 2000 FD Jacket over the Petrolatum Inner Layer on a 1.3m diameter pile.

SeaShield Series 70

Medium Duty Outer Layer

Petrolatum Inner Layer + SeaShield Glass Outerwrap = SeaShield Series 70

Description:

SeaShield Series 70 is a durable tape wrap system that is comprised of an inner layer of Petrolatum Paste and Tape with a Moisture Cured Urethane Impregnated Tape outer layer.



SeaShield 70 one year after application.



Advantages:

- Easy and fast application
- Can be applied to damp and immersed surfaces
- Environmentally friendly
- Can be used on pipe joints
- Suitable for a range of shapes
- Can be used on sea outfall pipes.

Uses:

The system offers excellent protection for wood, steel or concrete piles that are an unusual shape or that vary in diameter.

SeaShield Series 80

Light Duty Outer Layer

Petrolatum Inner Layer + SeaShield Bitumen Outerwrap Tape 80 = SeaShield Series 80

Advantages:

- Easy and fast installation
- Basic economical protection
- Can be applied to damp and immersed surfaces
- Easily removed for inspection
- Can be used as a soffit
- Environmentally friendly

Description & Uses:

Seashield Series 80 comprises the application of a double outer layer wrap of SeaShield Bitumen Outerwrap Tape 80 over the Petrolatum Inner Layer. The system offers basic economical protection for wood, steel or concrete piles. It is most suitable for use in sheltered areas away from heavy seas and strong currents.



Application of Bitumen Outerwrap Tape 80 over the inner petrolatum tape layer.



Cleaned pile ready for the application of the Seashield Series 80 System.

Petrolatum Inner Layer + HDPE Jacket + Fastening Bands = SeaShield Series 100

Advantages:

- Proven long-term corrosion prevention
- No need for abrasive blasting
- Can be applied to damp and immersed surfaces
- Easy and fast installation
- No drying or curing time between layers
- Environmentally friendly

Description:

A tough, ultraviolet-resistant jacket that provides protection to the Petrolatum Inner Layer against abrasion, wave action and accidental impact. The size and thickness of the jacket are customised to meet application requirements. SeaShield jackets are secured by a 19mm banding system selected for the intended environment.



19mm band fixing.

Uses:

SeaShield Series 100 can be used to encapsulate jetty piles, offshore riser pipes and exposed piping in the splash and intertidal zones. It can accommodate cylindrical piles as well as support members and bracings.



Installing the SeaShield 100 Jackets over the Petrolatum Inner Layer.

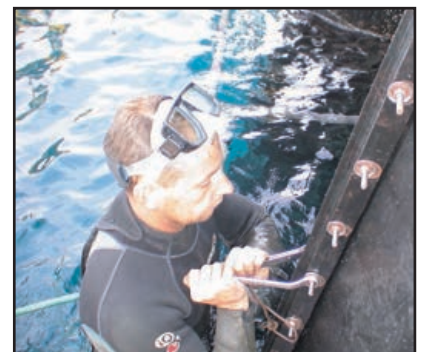
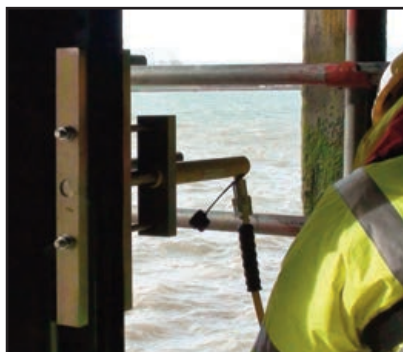
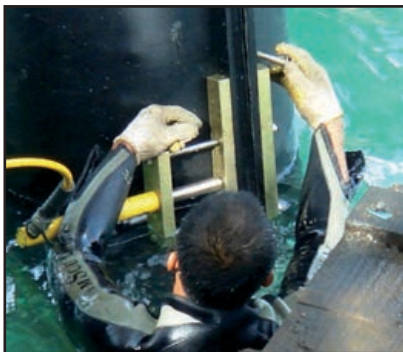
Petrolatum Inner Layer + HDPE Jacket + Marine Grade Fasteners = SeaShield Series 2000 FD

Description:

A tough, ultraviolet-resistant jacket that provides protection to the tape inner layer against abrasion, wave action and accidental impact. The jackets are secured with 316 stainless steel fasteners.

Uses

SeaShield Series 2000 FD heavy duty system provides protection for steel, concrete and timber structures in the splash and intertidal zones. Series 2000 FD can be used to encapsulate jetty piles, offshore riser pipes and exposed piping. It can accommodate piles with cylindrical, square and hexagonal sections as well as support members and bracings.



The Fastening Method

The jacket joint is drawn together using a specially developed clamping system, allowing for easy fastening of the 316 stainless steel fasteners. The tension created by closing the jacket around the pile in this system is such that it pushes out any air between itself, the Petrolatum Inner Layer and the pile surface making it an exceptionally good seal between all of the system layers.



Cathodic protection systems are easily integrated into the SeaShield 2000 FD system.

SeaShield Series 2000 FD

Heavy Duty Outer Layer

Petrolatum Inner Layer + HDPE Jacket + Marine Grade Fasteners = SeaShield Series 2000 FD

Advantages:

- Proven long-term corrosion prevention
- No need for abrasive blasting
- Can be applied to damp and immersed surfaces
- Easy and fast installation
- Increased hoop tension gives better surface contact
- One piece jackets
- Environmentally friendly



Cross section showing the system on a hexagonal pile. The picture shows the inner tape layer and outer jacket conforming tightly under pressure to the pile's profile.

SeaShield Series 2000 FD

Inspection Port

Description:

As an optional extra, inspection ports can be installed in the SeaShield 2000 FD jackets during manufacture. These ports can be opened when required to check the surface condition of the pile beneath and easily re-fitted, restoring the SeaShield system back to its full integrity.

After removing the inspection port cover (1) the Marine Piling Tape is carefully cut and peeled back to observe the pile surface (2). To reinstall the hatch just push back the peeled tape adding Primer S105 to seal the tape down (3) and then push in a plug of SeaShield Mastic to fill the void and finish the seal (4) before replacing the port cover.



Pile Inspection Port

*UK Patent GB2511553

*Patent applications pending in: Australia (2014224433), Brazil (BR112015015631.2), Chile (2015-001158), Hong Kong (1216190) and Thailand (163840) and at the European Patent Office (EP2965062)

GRP Form Jacket + 550 Epoxy Grout = SeaShield Series 500



Advantages:

- Total encapsulation
- Easy to install with a range of readily available pumping equipment
- Outstanding abrasion resistance
- Optimum maintenance free service life
- Translucent GRP Forms enable internal grout level to be easily monitored
- UV resistant
- Environmentally friendly

Description and Uses:

This robust, heavy duty encapsulation system has been designed specifically for the protection of coastal marine structures with moderate corrosion without requiring the addition of steel rebars. Jetty piles, bridge supports, offshore risers, conductors, pipework, jacket legs and structural member supports can all be protected with it.

To overcome the difficulty of working in a tidal or splash zone environment the systems can be applied in a series of stages.



The Epoxy Grout only requires basic pumping equipment.

Series 500 comprises translucent GRP Forms which are secured around the suitably cleaned substrate of the structure to be protected. Working from the bottom upwards, SeaShield 550 Epoxy Grout is then injected by pump, through special entry ports in the Forms until it completely fills the internal space between the Form and the substrate. When cured, the SeaShield 550 Epoxy Grout bonds exceptionally well to the substrate and the Forms which remain in place as a tough outer layer giving additional impact and abrasion resistance.



GRP Forms are also available for H section piles.

SeaShield 500 Components:

GRP Form Jacket:

High quality glass reinforced polyester outer jacket.

Stand-offs:

Non-corrosive grout spacers are used inside the jacket to maintain proper spacing around the piling when pumping or pouring the Epoxy Grout.

SeaShield 550 Epoxy Grout:

A three component water displacing epoxy resin/aggregate formulation with excellent flowability for easy application.



Pumping the 550 Grout. Note the visible rising level seen through the Form.

GRP Form Jacket + C-Grid™ + Epoxy or Cementitious Grout = SeaShield Series 400



Advantages:

- Can significantly increase the strength of the original timber pile
- Non-corrosive reinforcement
- Reduced weight when compared to steel reinforced repairs
- Lightweight and easy to install
- Requires inexpensive pumping equipment
- Optimum maintenance free service life
- Translucent GRP Forms enable internal grout level to be easily monitored
- UV resistant
- Environmentally friendly

Uses:

This revolutionary encapsulation system not only protects timber piles from aggressive saltwater environments and marine borers, but also strengthens deteriorated piles. With its durable, lightweight and non-corrosive reinforcement, the complete system doubles the strength of the original timber pile.

SeaShield 400 Components:

The SeaShield Series 400 System is comprised of a SeaShield Fiber-Form Jacket, C-GRID™ 450, and either SeaShield 510 UW Grout or SeaShield 550 Epoxy Grout.

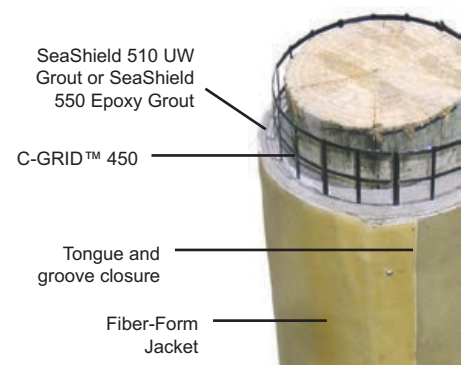
Description:

The C-GRID™ 450 should be unrolled and cut to size (1). The next step is to locate the C-GRID™ 450 between the elevations indicated in the specification and drawings (2). Then, the SeaShield Fiber-Form Jacket (3) is installed around the pile and C-GRID™ 450. A foam seal should be installed at the bottom of each jacket to prevent any grout from leaching out of the bottom of the jacket during installation. Once the jacket is in place, grout is injected into the bottom port and allowed to



cure before proceeding with subsequent lifts (4). The injection process should be continuous, except when the injection hose is moved from port to port.

SeaShield 400 requires much less grout when compared to steel reinforcement repair and is lightweight and easy to install.



SeaShield Fiber-Form

Heavy Duty Pile Restoration

GRP Fiber-Form Jackets + Steel Rebars + Standard Marine Grout = SeaShield Fiber-Form

Description and Uses:

This extremely robust, extra heavy duty system is designed to be used on very badly corroded concrete piles where the use of steel rebars to reinforce the void between the pile and the Fiber-Form is essential. The void containing the steel rebars is then filled with standard marine grout to complete the system.



After fitting the Fiber-Forms the standard marine grout is injected by pump.



Placing the standoffs around the steel rebars before fitting the Fiber-Forms.

SeaShield Pile Cap System

Pile Top To Jetty Deck Seal

Description:

A tough, ultraviolet-resistant pre-moulded sectional cap that provides protection to the vulnerable area between the top of the pile and the underneath of the jetty platform.

After any structural repairs have been carried out, the Pile Cap is bolted to the underside of the jetty deck and the bottom of the cap overlaps onto the chosen SeaShield system which has previously been applied to the pile.

The overlapping section of the Pile Cap onto the SeaShield Jacket is securely fastened with a 19mm band fixing. The void area within the Pile Cap is then sealed with an expanding marine foam system.



The Pile Cap is bolted to the underside of the jetty deck.



A 19mm band fixing is used to get a good seal over the existing SeaShield system.

Advantages:

- Long-term corrosion prevention
- Environmentally friendly
- Protects a vulnerable area which has previously been difficult to protect



Single coat Glass Flake reinforced Resin = SeaShield Rigspray

Description:

SeaShield Rigspray is a 2-component medium duty brush or airless spray applied coating formulated from an isophthalic Polyester resin. The dry film thickness is normally 0.8 to 1mm. More than one coat can be applied if required.

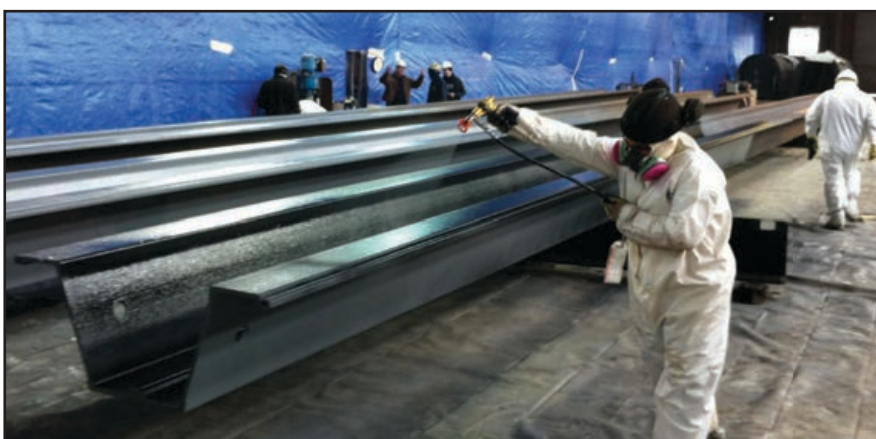
Advantages:

- Excellent corrosion resistance
- Very good abrasion and erosion resistance
- Good chemical resistance
- Very low permeability
- Single coat application up to 1mm D.F.T.
- Excellent undercutting resistance
- Rapid cure
- Excellent reparability



Uses

Rigspray is widely used for the protection of steel structures subject to the most aggressive marine environments, where abrasion and erosion are also a problem, i.e. splash zones, under-deck areas, helidecks, and main deck surfaces.



Sheet piling is coated with Rigspray prior to being driven into the ground .



Since 1966 - Some Completed SeaShield Projects:



Above: Yingkou Port, China - SeaShield Series 2000FD.



Above: Oil Rigging Point, Bahamas - SeaShield Series 2000FD.



Above: Coogee Jetty, Western Australia - SeaShield Series 100.



Above: Santa Marta, Colombia - SeaShield Series 2000 FD.



Above: Sugar Loading Jetty, Australia - SeaShield Series 2000 FD.

For more information visit www.seashield.com or call us on +44 (0) 208 670 7511

Since 1966 - Some Completed SeaShield Projects:



Outfall joint protection

Above: Sea outfall pipe joints, Isle of Man, UK - SeaShield 80.



400 piles protected

Above: LNG Jetty, Libya - SeaShield Series 2000 FD.



4 piles protected

Above: Bridge supports in a river, UK - SeaShield System.



Timber pile protection

Above: Dunoon Pier, Scotland, UK - SeaShield Series 500



www.seashield.com

1000 piles protected

Above: The Ford Island Bridge, Pearl Harbour, Hawaii - SeaShield Series 2000 FD.

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