



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

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.

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 a track record of over 40 years proven protection 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.



PILE INSPECTION:

Patented* SeaShield Inspection Ports can be installed in our SeaShield 2000FD 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)

EXTREMES OF TEMPERATURE, ICE AND HEAVY SEAS ALSO TAKE THEIR TOLL ON MARINE STRUCTURES.

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 SeaShield Rigspray™ and SeaShield 2000FD™ 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 Tape	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 2000FD™	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 for 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 70™ System
- SeaShield 80™ System
- SeaShield 100™ System
- SeaShield 2000FD™ System

THE PETROLATUM INNER LAYER COMPONENTS:

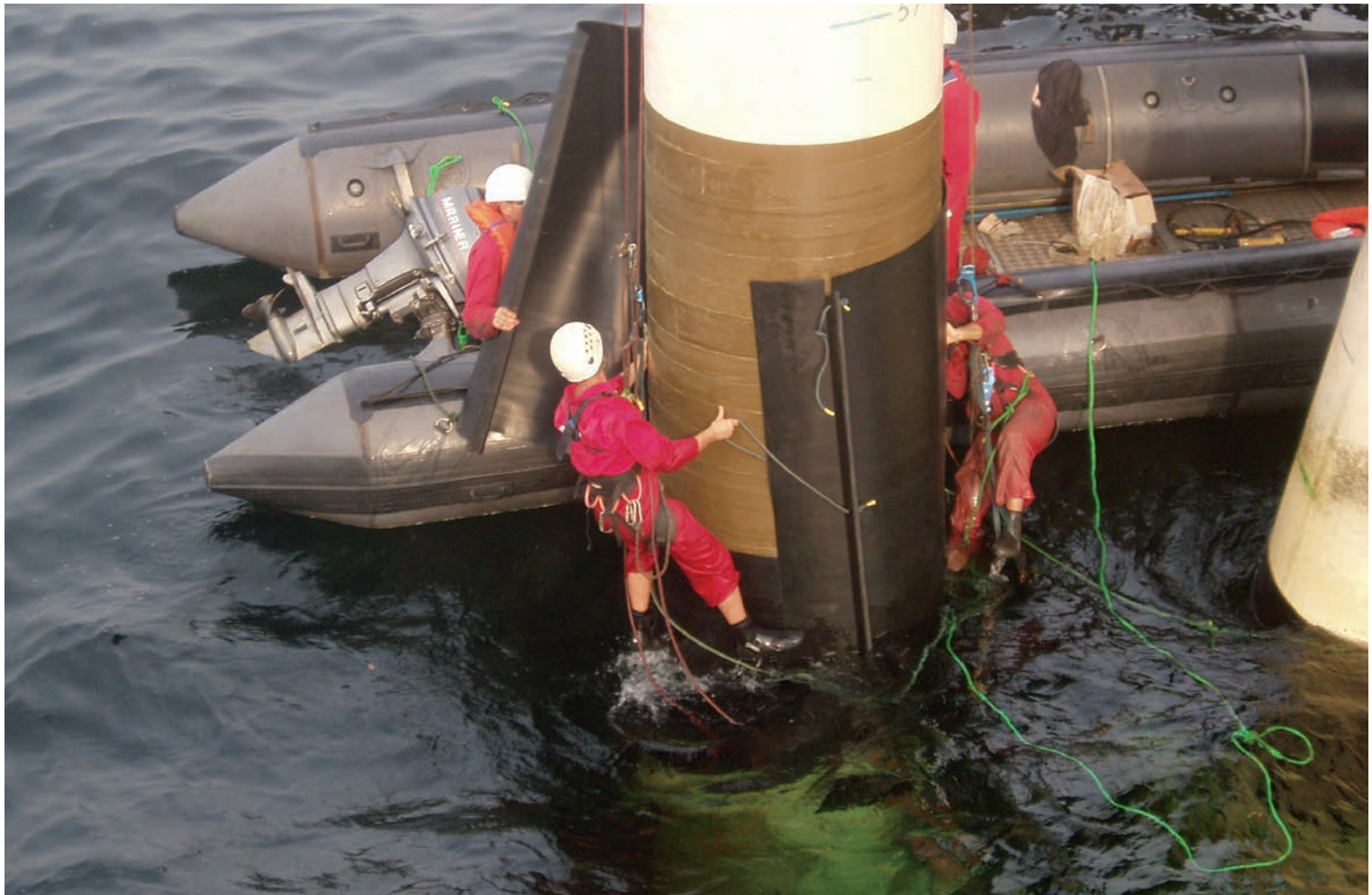
SeaShield Paste S105:

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.



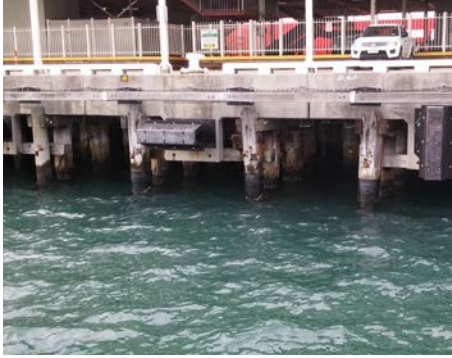
Divers fitting a SeaShield 2000FD Jacket over the Petrolatum Inner Layer on a 1.3m diameter pile

SEASHIELD 70™ SYSTEM

MEDIUM-DUTY OUTER LAYER

Petrolatum Inner Layer + SeaShield Glass Outerwrap™ = SeaShield 70™ System

The SeaShield 70™ System 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 System one year after application



Uses:

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

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

SEASHIELD 80™ SYSTEM

LIGHT-DUTY OUTER LAYER

Petrolatum Inner Layer + SeaShield Bitumen Outerwrap 80™ = SeaShield 80™ System

The SeaShield 80™ System 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.

Advantages:

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



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



Cleaned pile ready for the application of the SeaShield 80 System

Petrolatum Inner Layer + HDPE Jacket + Fastening Bands = SeaShield 100™ System

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.

Uses:

The SeaShield 100™ System 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.

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



19mm band fixing



Installing the SeaShield 100 Jackets over the Petrolatum Inner Layer

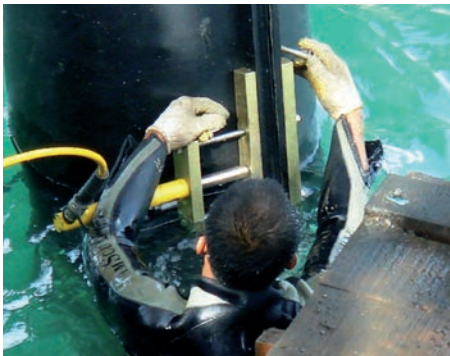


Petrolatum Inner Layer + HDPE Jacket + Marine Grade Fasteners = SeaShield 2000FD™ System

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:

The SeaShield 2000FD™ System is a heavy-duty system provides protection for steel, concrete and timber structures in the splash and intertidal zones. It 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 2000FD System

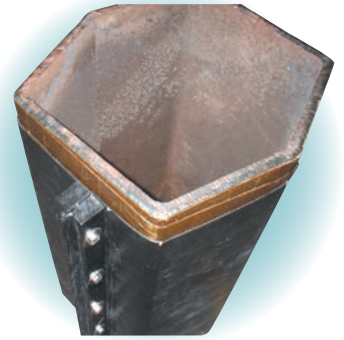
SEASHIELD 2000FD™ SYSTEM

HEAVY-DUTY OUTER LAYER

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

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



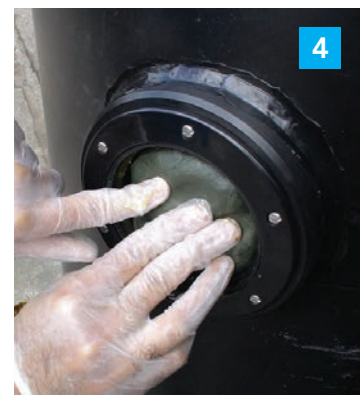
Cross section showing the system on a hexagonal pile. The picture shows the inner tape layer and outer jacket conforming tightly under pressure to the pile's profile.

SEASHIELD 2000FD™ SYSTEM

INSPECTION PORT

As an optional extra, inspection ports can be installed in the SeaShield 2000FD 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:

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

*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 500™ System



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

Uses:

The SeaShield 500™ System is a robust, heavy-duty encapsulation system, which 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



GRP Forms are also available for H section piles



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

The SeaShield 500™ System 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.

SeaShield 500 System 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.

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



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

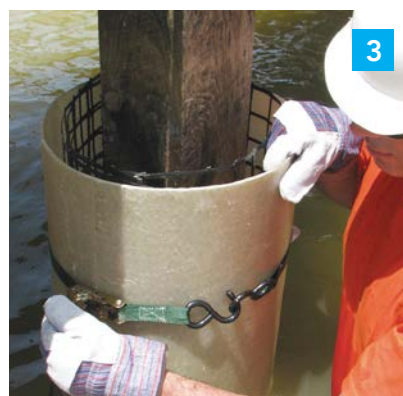
Uses:

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.

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.

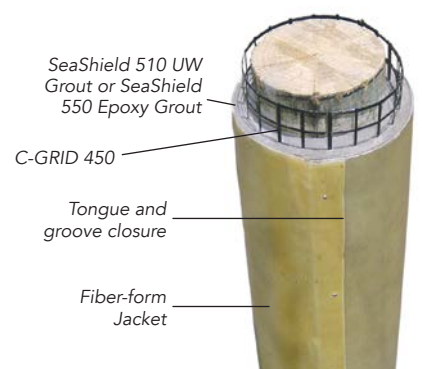
A foam seal should be installed at the bottom of each jacket to prevent any grout from leaching out of the bottom of the jacket during installation. Once the jacket is in place, grout is injected into the bottom port and allowed to cure before proceeding with subsequent lifts (4). The injection process should be continuous, except when the injection hose is moved from port to port.

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



SeaShield 400 System Components:

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



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

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

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™

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.

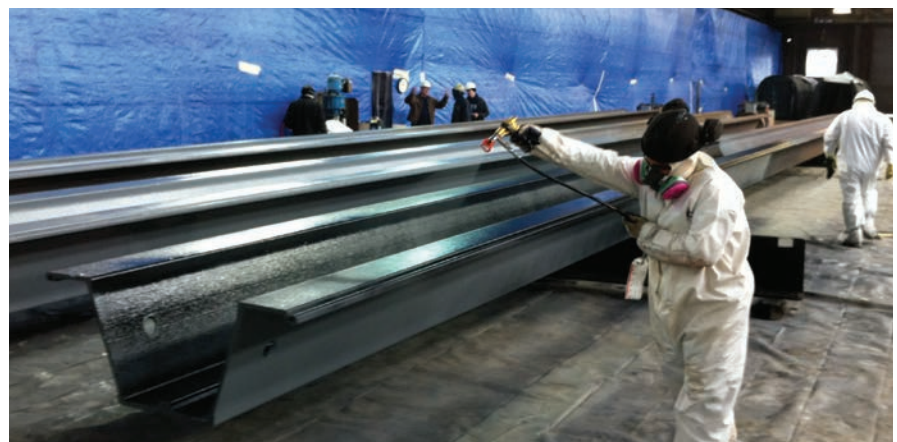
Advantages:

- 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 repairability



Uses:

SeaShield 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 SeaShield Rigspray prior to being driven into the ground



SINCE 1966 - COMPLETED SEASHIELD™ PROJECTS



2,500 PILES PROTECTED

Above: Yingkou Port, China - SeaShield 2000FD System



165 LINEAR METERS PROTECTED

Above: Oil Rigging Point, Bahamas - SeaShield 2000FD System



74 PILES PROTECTED

Above: Coogee Jetty, Western Australia - SeaShield 100 System



300 PILES PROTECTED

Above: Santa Marta, Colombia - SeaShield 2000FD System



LARGE DIAMETER PILES PROTECTED

Above: Sugar Loading Jetty, Australia - SeaShield 2000FD System

SINCE 1966 - COMPLETED SEASHIELD™ PROJECTS



OUTFALL JOINT PROTECTION

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



400 PILES PROTECTED

Above: LNG Jetty, Libya - SeaShield 2000FD System



4 PILES PROTECTED

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



TIMBER PILE PROTECTION

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



1000 PILES PROTECTED

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



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