HCL Smart Products Presentation

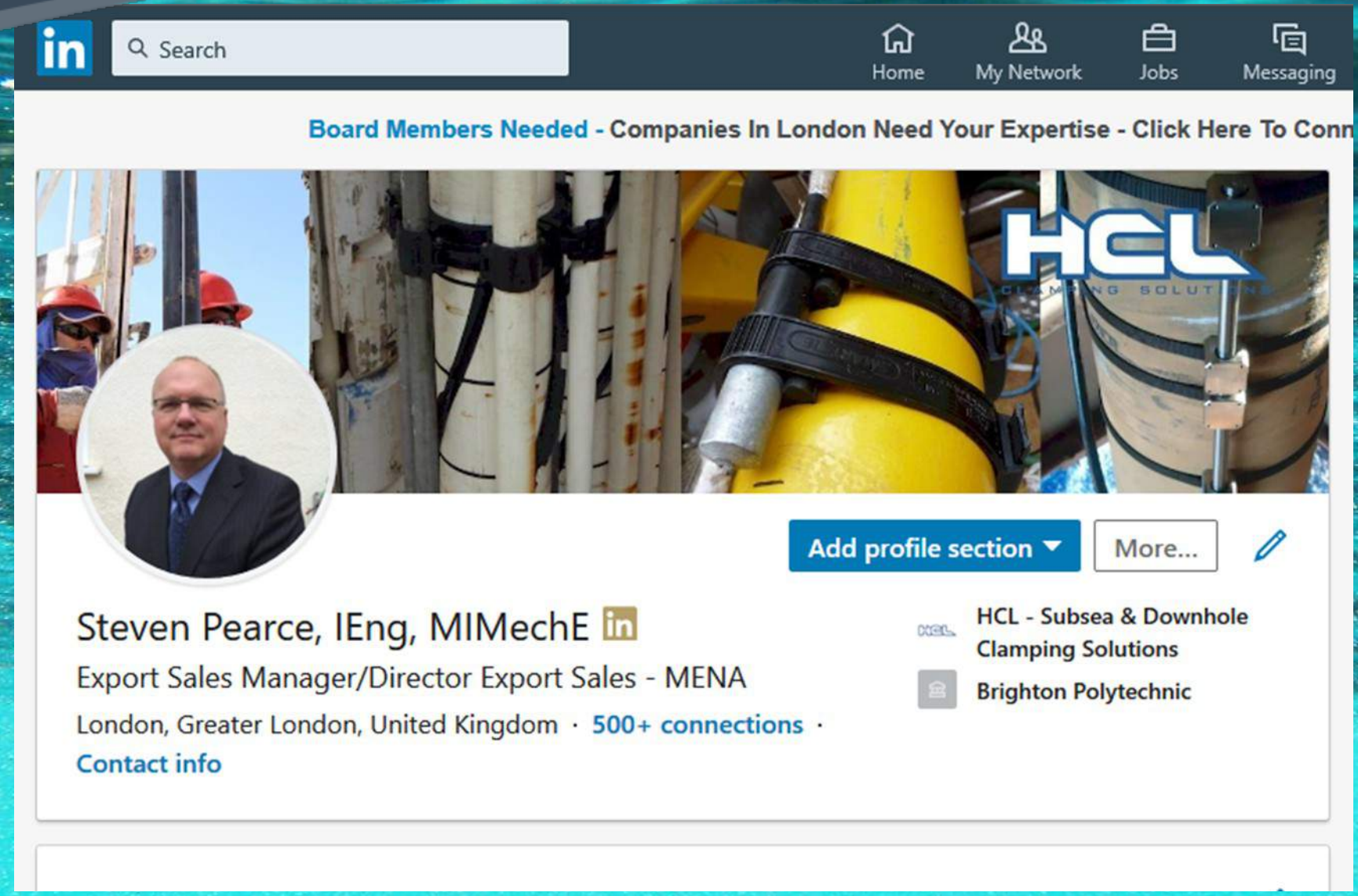
Corrosion

Non-metallic, Corrosion Free, Marine Structure Protection Systems.

Steve Pearce, *IEng, MIMechE* .

HCL Fasteners Ltd.

Connect with me on LinkedIn

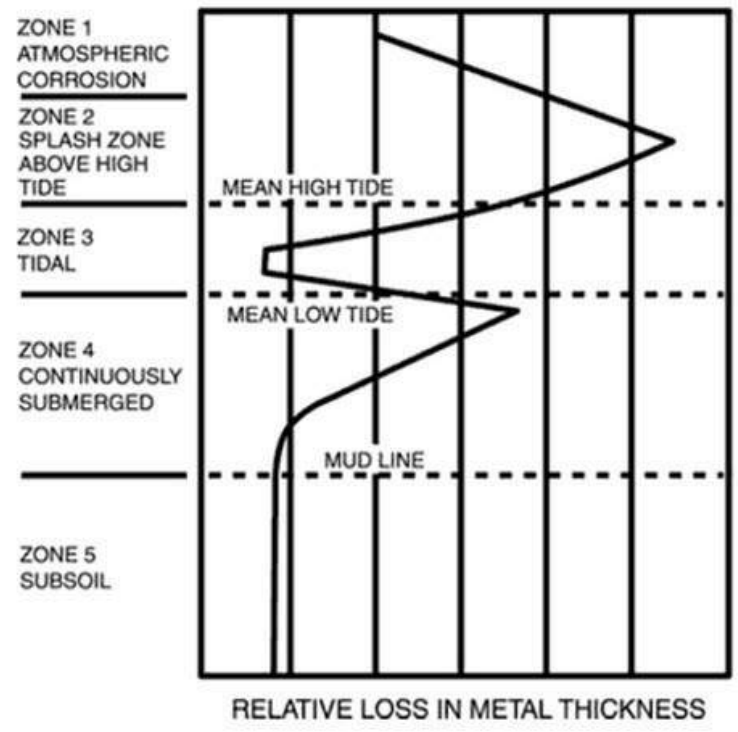


Worldwide Clients

Worldwide Clients

Splash Zone Corrosion Rates

Let’s start with the Splash Zone!



Source: Copper Development Association Inc.

- Corrosion rate can be 5x higher.
- Oxygen concentration usually highest.
- Temperature usually warmest.
- High Chloride levels from wet/dry cycles

Why Site Applied?

- To extend the life of an existing asset due to:-
  - Premature coating failure.
  - High corrosion rates being experienced.
  - Longer than expected service life.
- To rectify damage caused to coating during construction.
- To avoid transport to site damage.
- Failure to include protection in initial design
- Usually just for high value or critical assets.
- To combat Accelerated Low Water Corrosion (ALWC)

Types of Corrosion experienced in the Splash Zone.

ALWC & MIC

Corrosion due to Coating Failure

Poor Initial Application

Wrong Thickness in the Splash Zone area

Poor Initial Protection

Corrosion from Impact

End-of-life Coating Failure

....and what needs more than just protection!

SNOC LPG Jetty Structural Repair Works

Repair Specifications – SNOC LPG Jetty

Scope of Work and Repair Technical Specifications

Client: Sharjah National Oil Company

Reference: DU1445-RHD-02-JS-RP-CM-0102-S1

Revision: P03/Final

Date: 06 May 2019

TITLE

SNOC LPG JETTY
LOCATION

Office 205, Al Zarouni Bldg
P.O.Box : 191463
Al Barsha 1, Dubai, U.A.E.
+971 (0) 4 341 9495 Telephone
+971 (0) 4 341 9010 Fax
admin@haskoning.ae E-mail
www.royalhaskoningdhv.com Internet

Royal HaskoningDHV
Enhancing Society Together

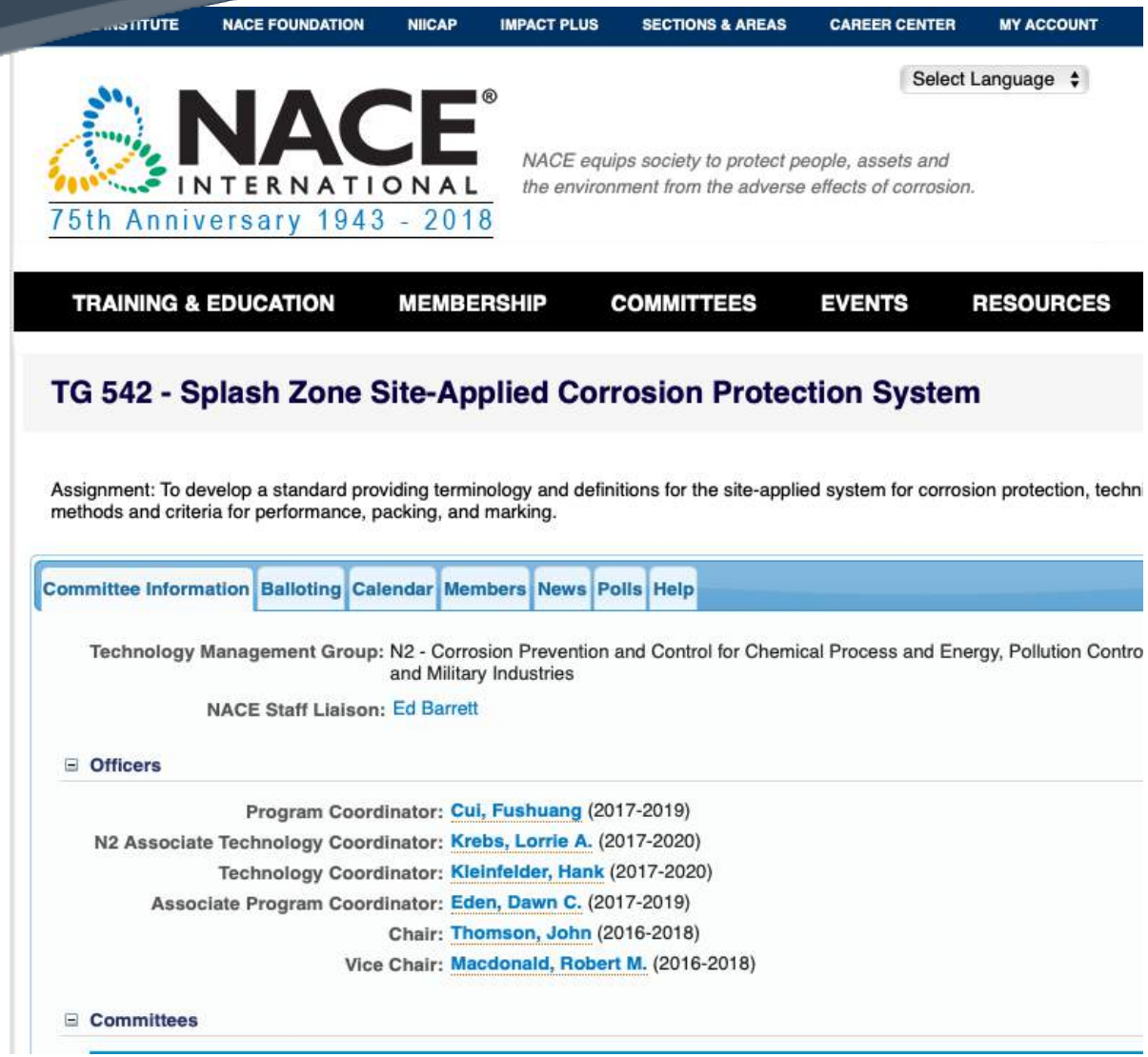
Where are we with existing Splash Zone Standards?

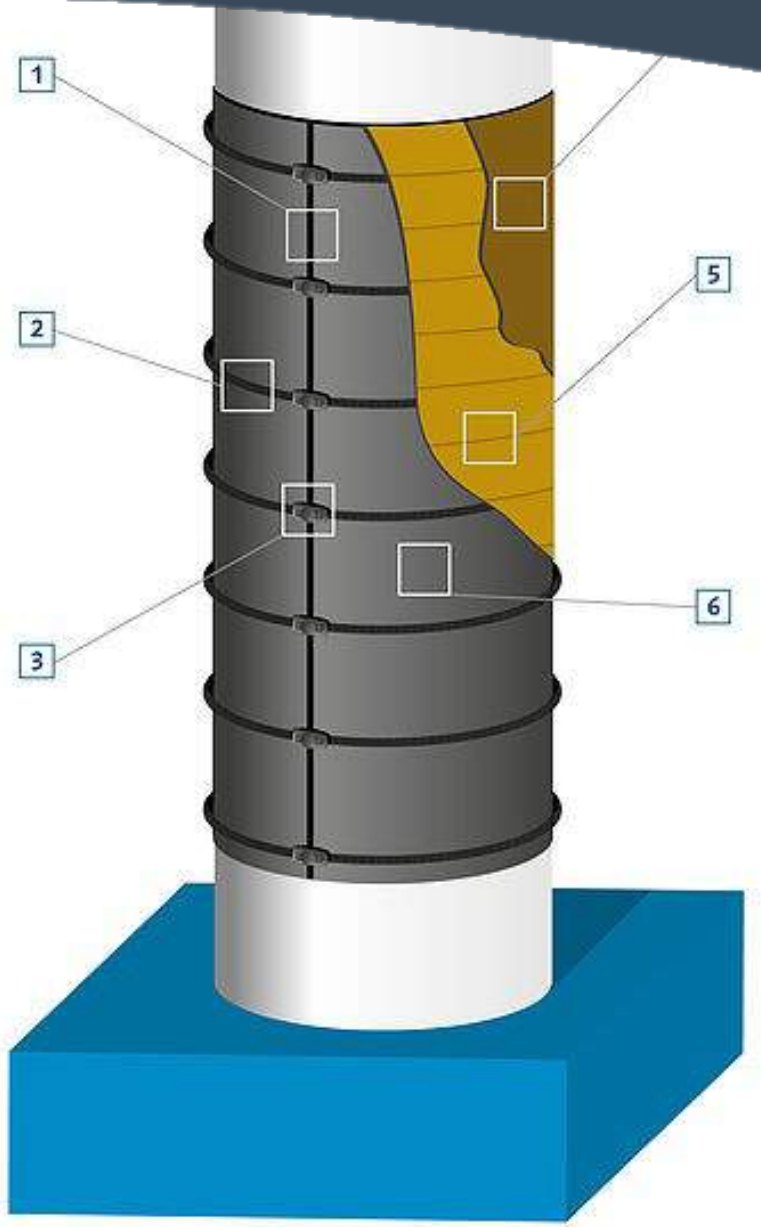
Coating Standards

Currently…….

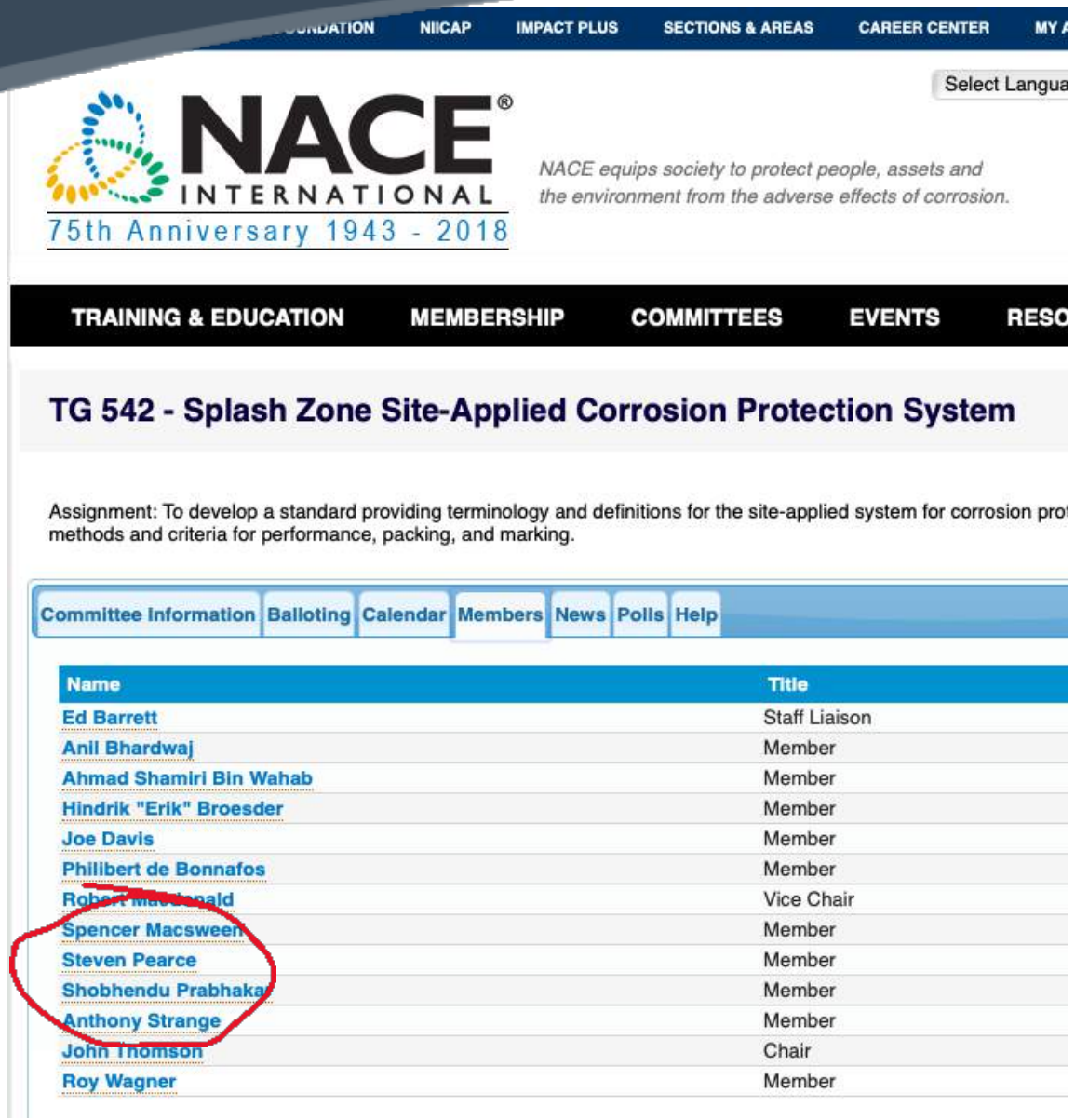
- Liquid Coatings – EN ISO 12944 etc.
- Cathodic Protection for Submerged Steel - SP0169-2013-SG etc.
- Site Applied Splash Zone Systems for Marine Pile Protection – none!

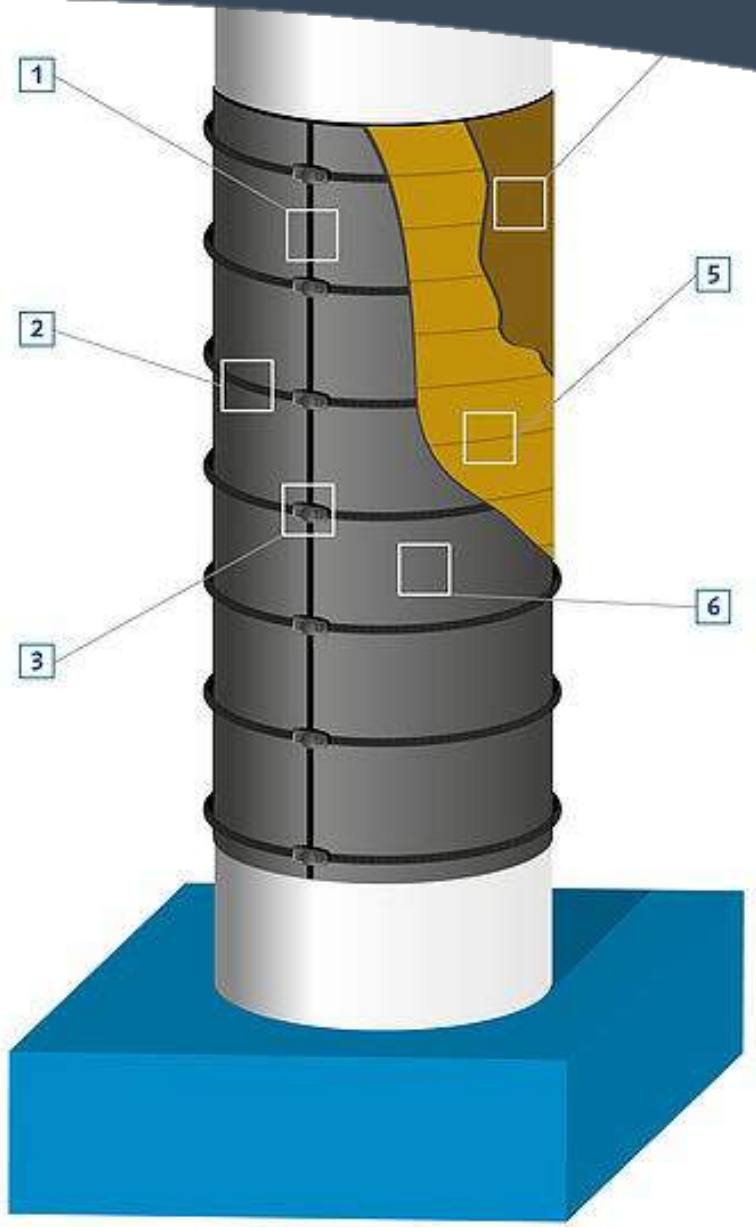
New NACE Standards





NACE Committee





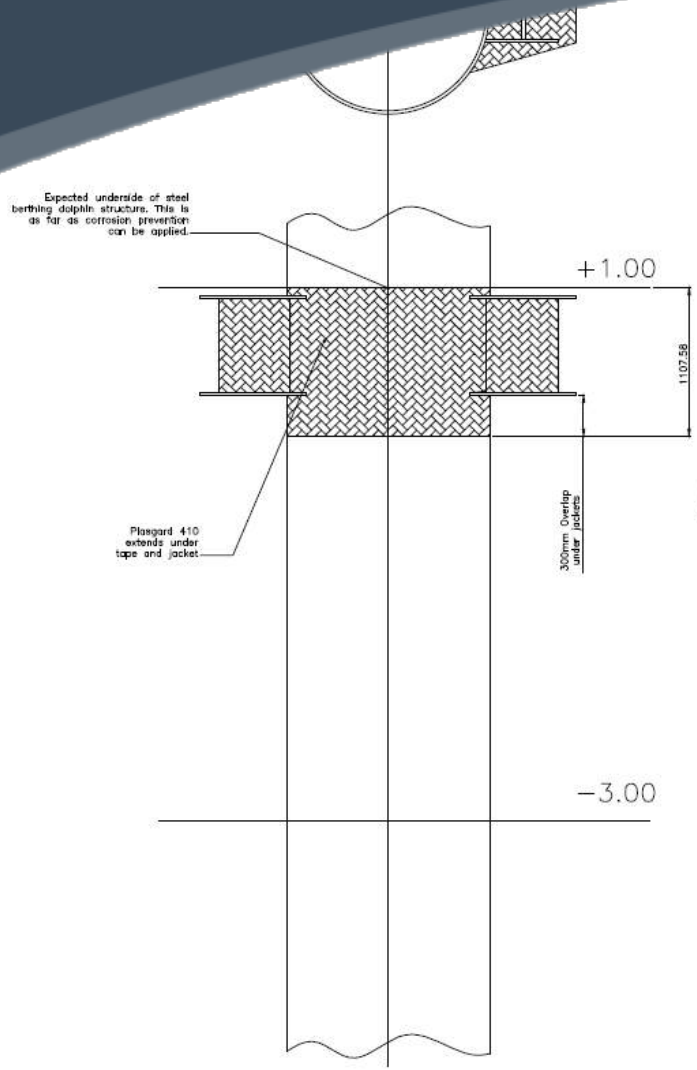
Structural Considerations & Challenges.

Jetty Configuration

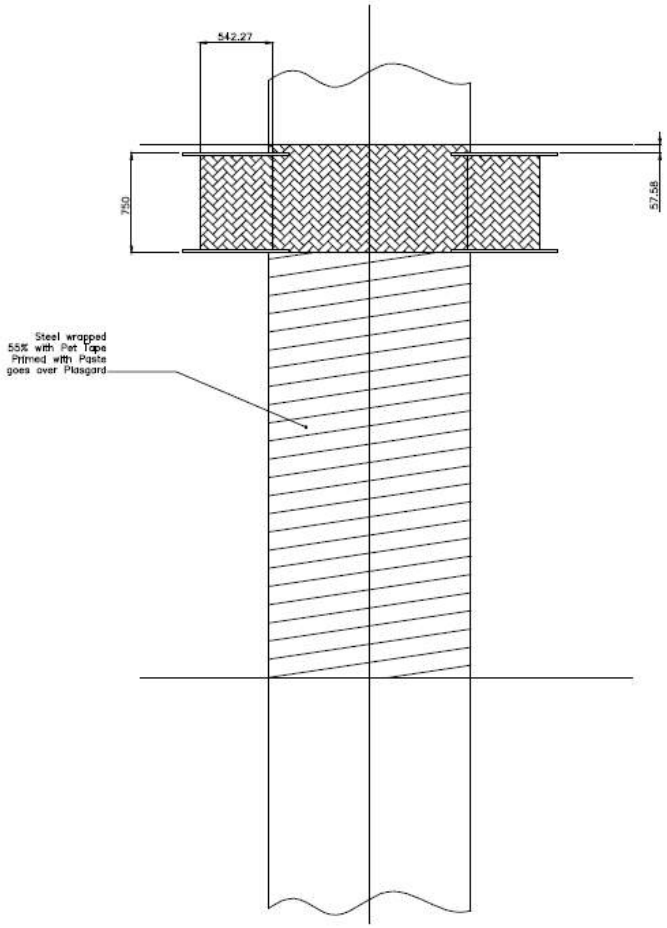
Jetty Configuration

Jetty Configuration

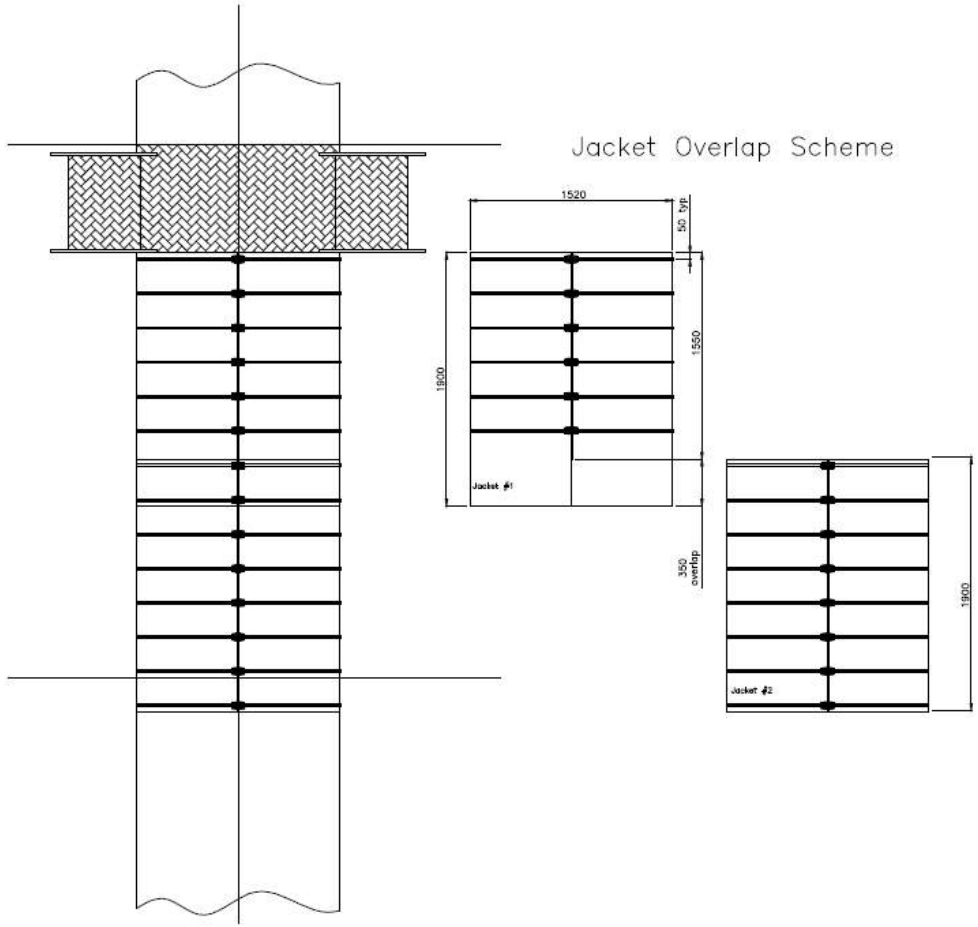
Technical Drawing Support



Stage 1 – Apply Plasgard to Area shown.



Stage 2 – Pet tape wrap overlap Plasgard.



Stage 3 – Apply outer Armour and Banding.

Cross-bracing!

H Beams

Sea-water Intakes

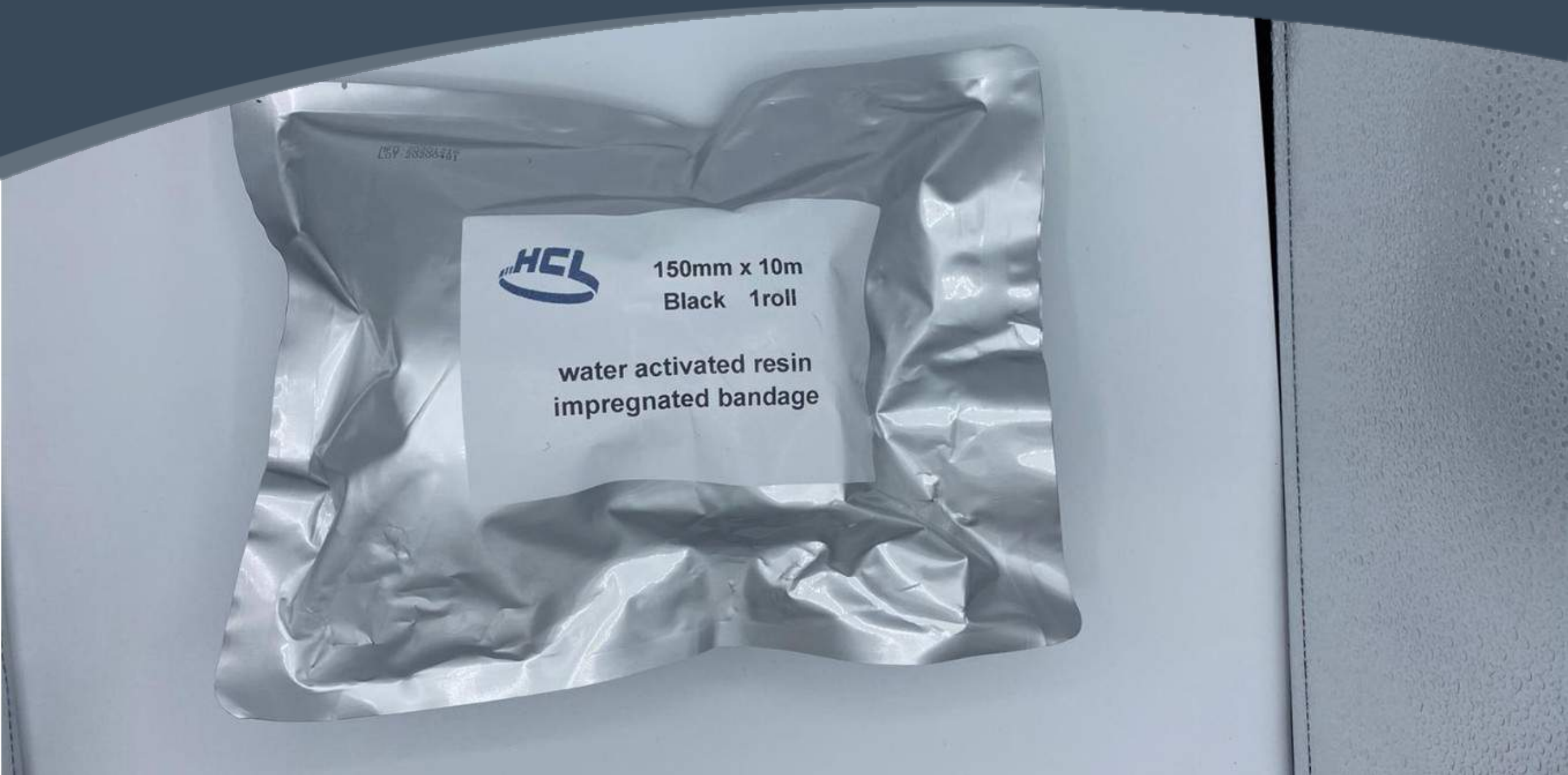
Project Information required

Information usually required to quote:-

- Location?
- Exposure?
- Pile material (steel, concrete, wood etc.)?
- Pile shape (round, square, hex, ‘H’ column etc.)?
- Pile diameter (or major dimensions)?
- Vertical protection required or,
- LWL, HWL, Soffit position?
- Obstructions?
- Bracing?
- Access?

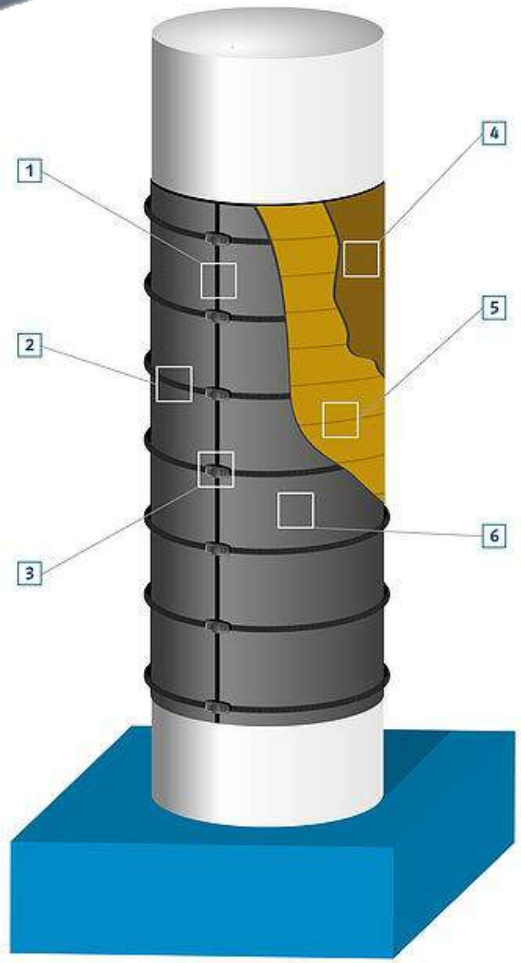
Node & Bracing

Resin Impregnated, water curing GRP Bandage



HCL Pile Wrap System (PWS)

HCL Pile Wrap System (PWS) Benefits



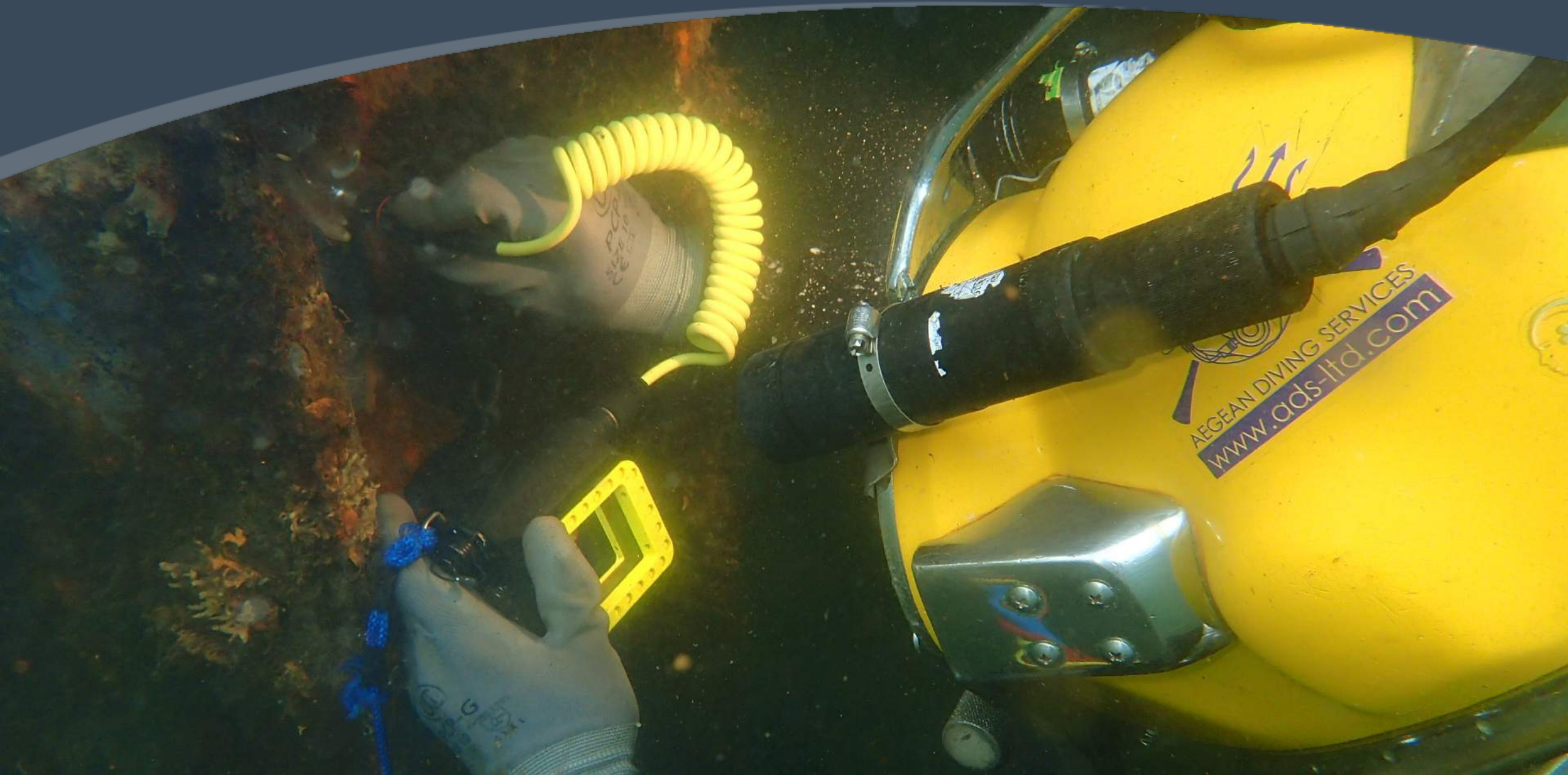
Benefits:-

- Diameter tolerant – no pre-survey required.
- Surface tolerant – st2 or less!
- Cost effective to transport to site.
- Low mobilisation costs.
- Cost effective and intuitive fitting tools.
- Minimal skill level required to install.
- Fast installation times.
- UV resistant and long service life.
- Full tech support and backup from experienced HCL Professionals.

.....not just from HCL!

Installed

It all starts with survey/inspection

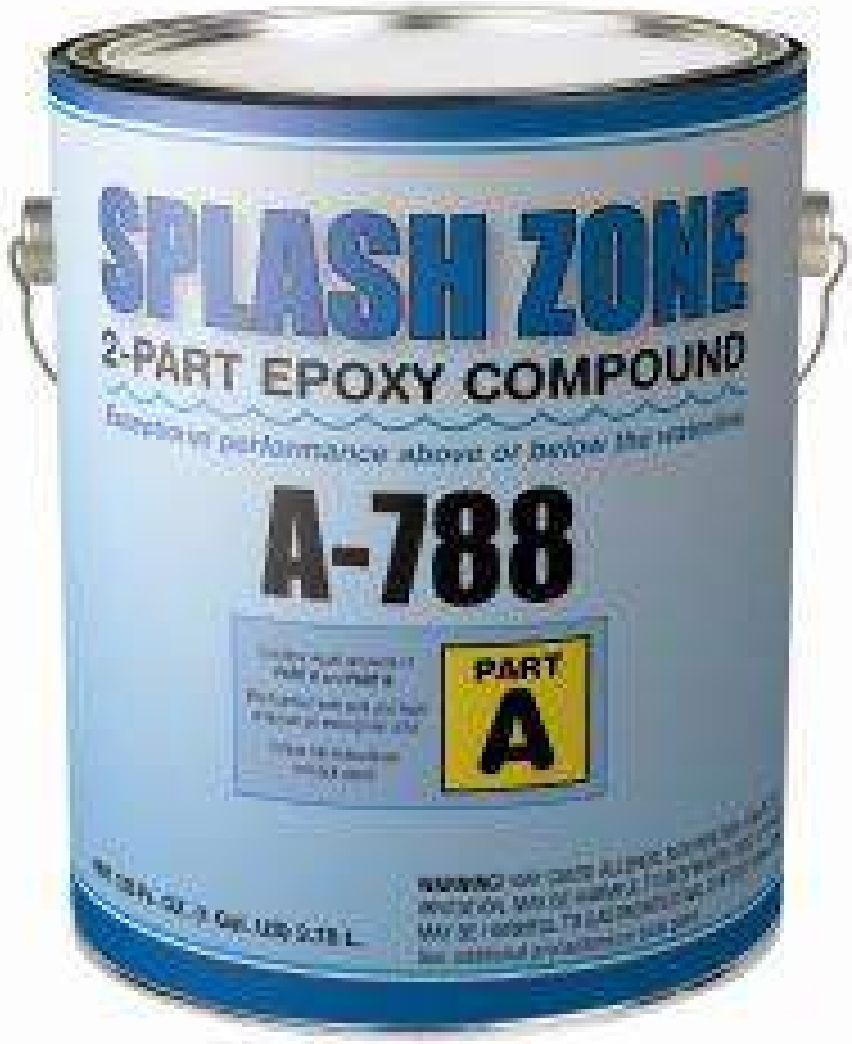


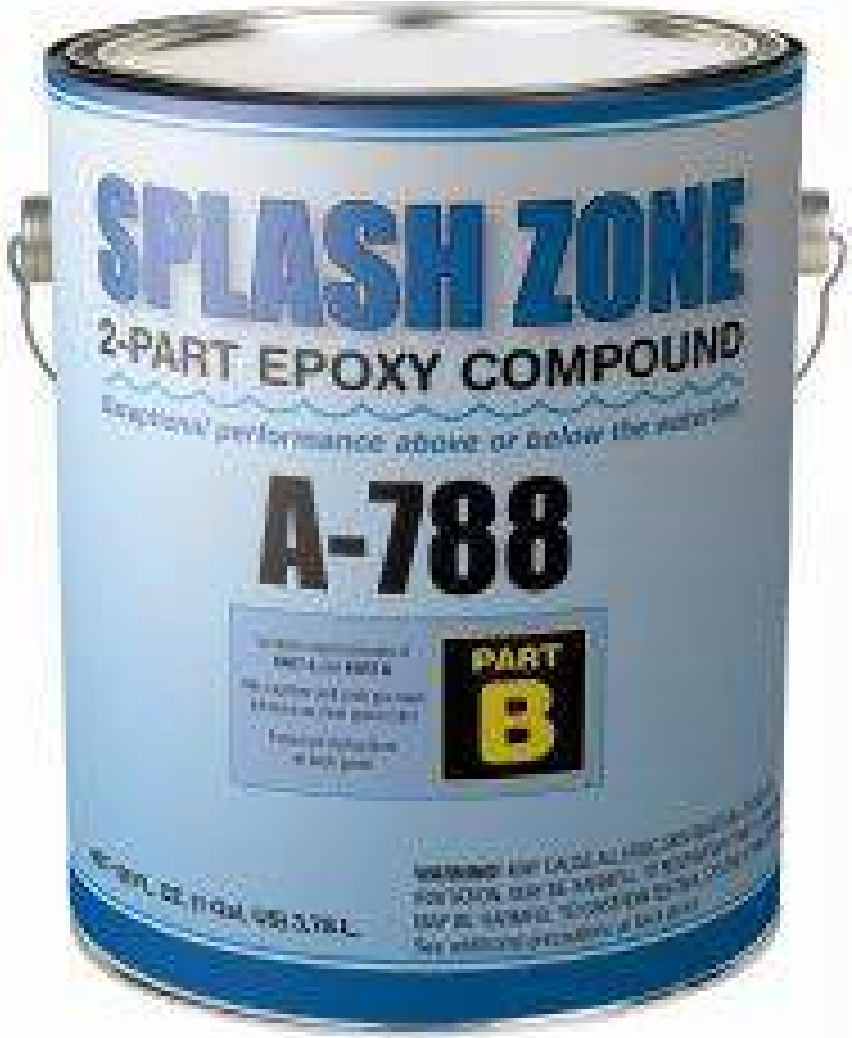
Preparation

Prepare the substrate. Remove marine growth, loose coating and loose

Damaged, holed or concave surfaces

Make good any large voids with Carboline Splash Zone A-788 or





Prime for pits >2mm

Apply the primer to the Prepared Steel. Gloved hand, rag or roller.

...underwater too

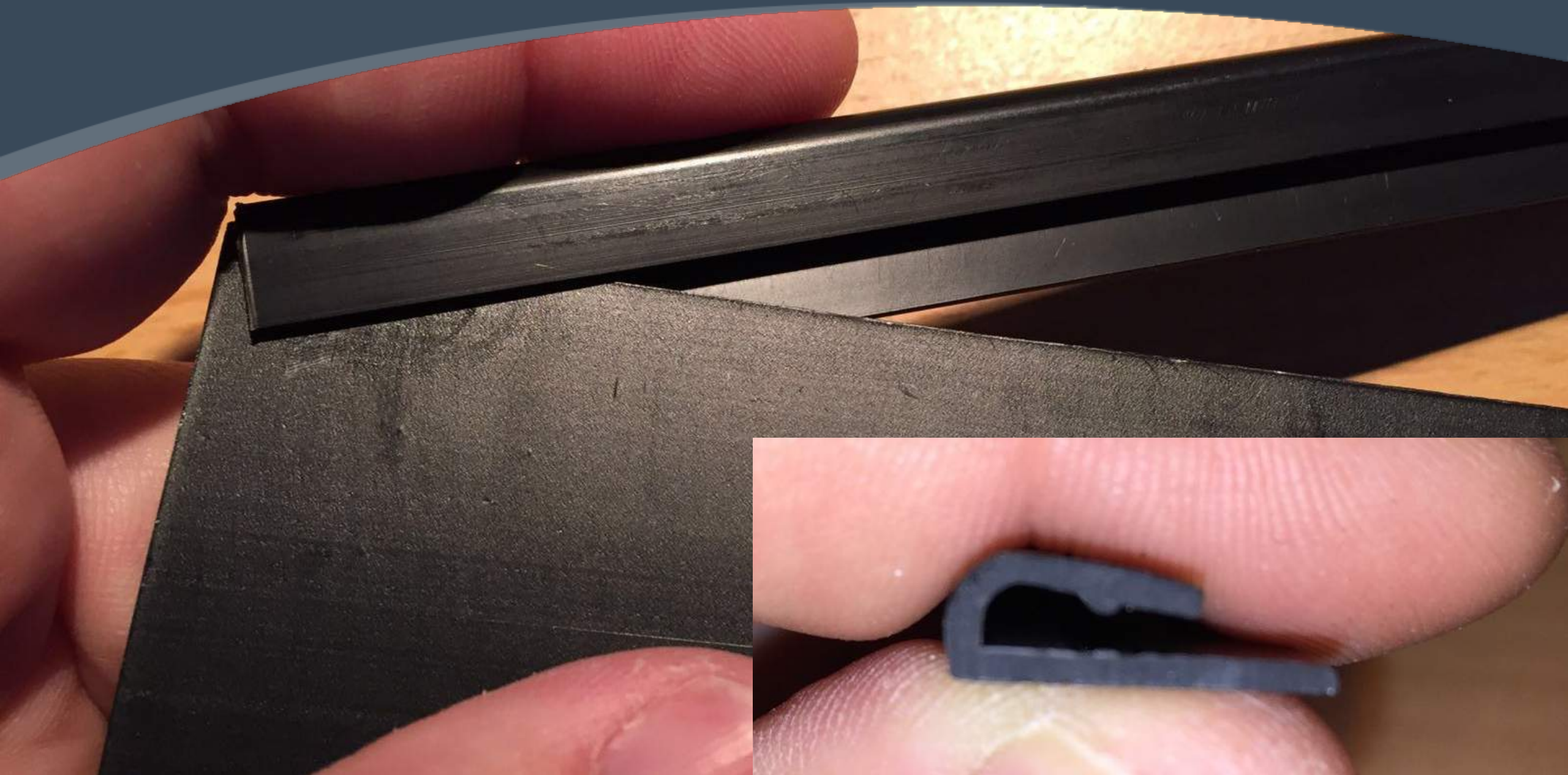
Heading Here

Underwater wrapping

No Holidays

55% Overlap with roll end overlap equal to tape width.

Edging Strip seals Jacket

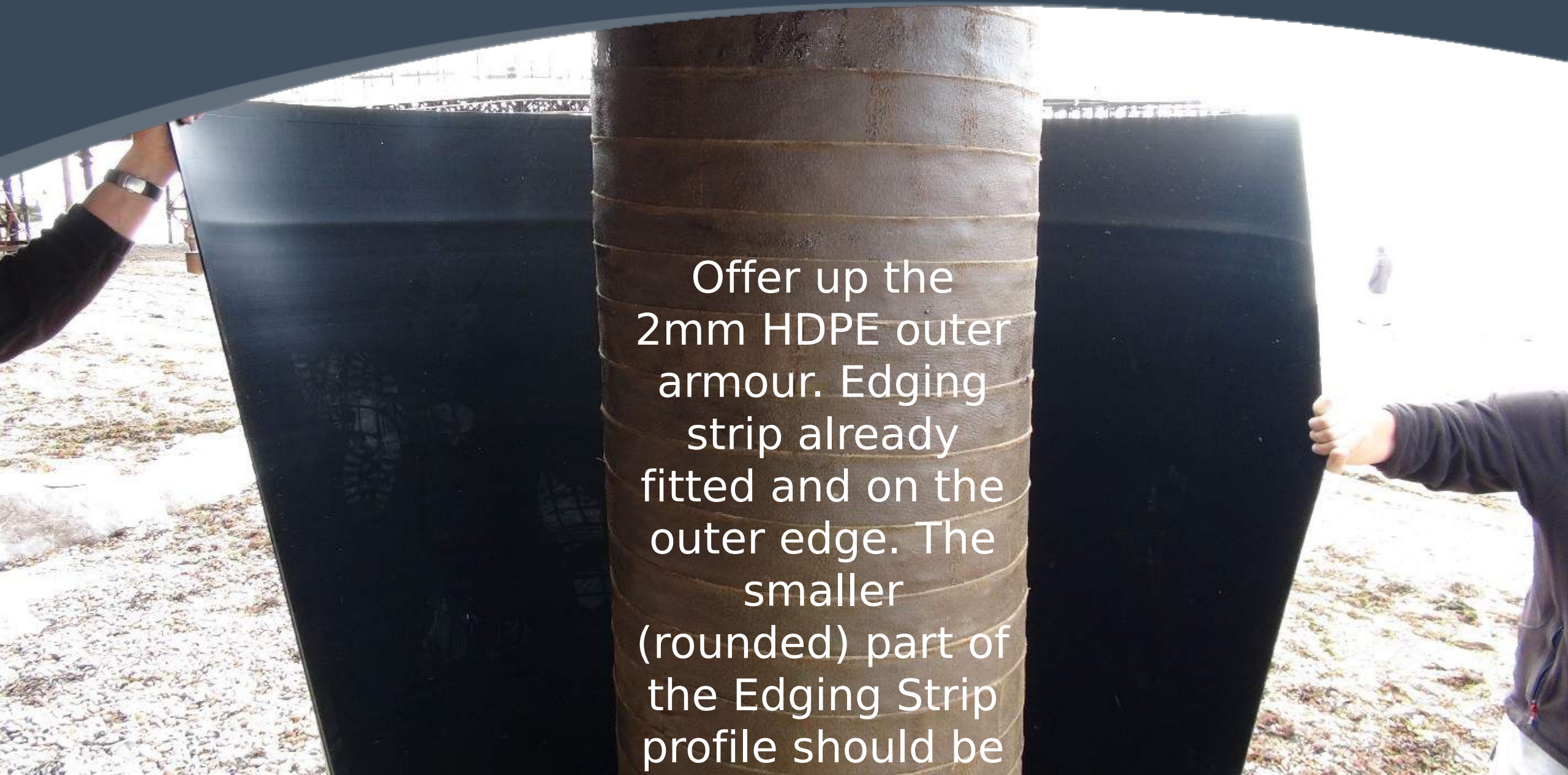


Band position marking

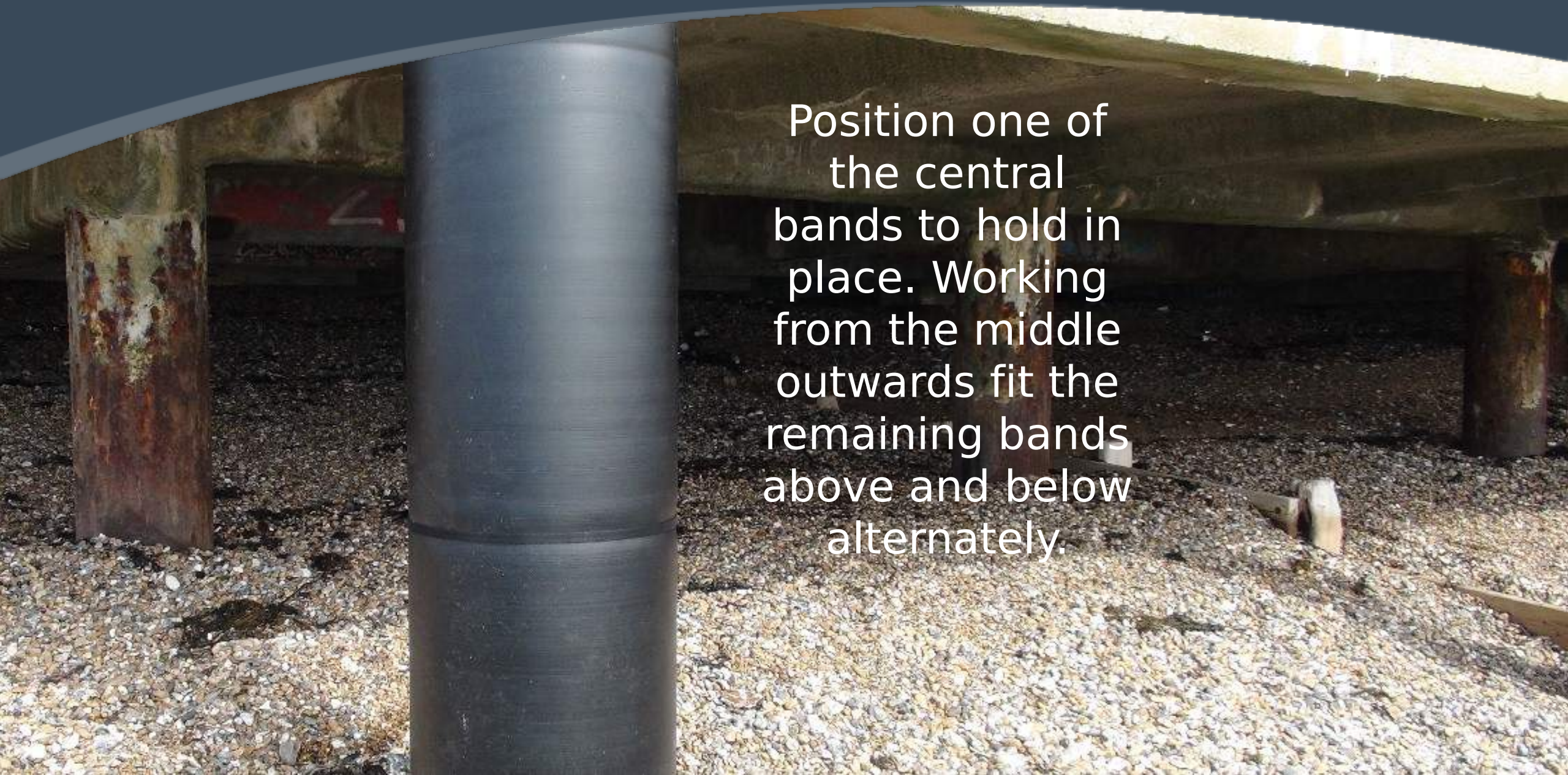
Mark the jacket at the positions that the bands are to be fitted prior to application. White Paint marker is best.

Magnetic gauge also available for ze

Fit HDPE Jacket



First Band



Position one of the central bands to hold in place. Working from the middle outwards fit the remaining bands above and below alternately.

Band Tensioning – hand tool

Correct Band Placement

Fit the remainder of the bands. The last being the end bands which are 50mm in from edge of

Finished Installation

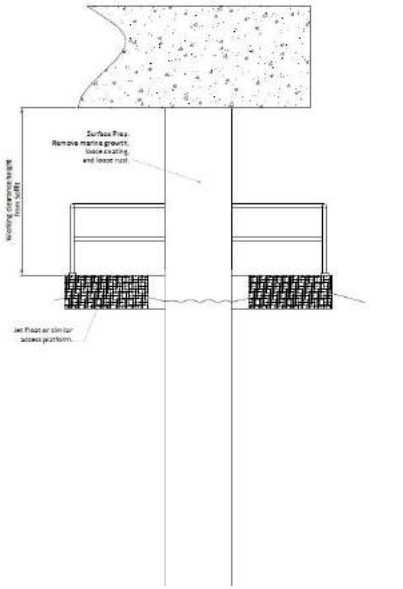
Installed Series 100 System on Ø600mm Pile.

Easy Jet Float Installation

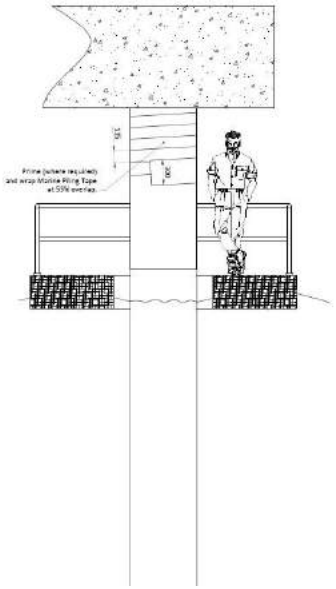
Method for Wrapping Piles using Tide levels and Jet Floats for cheapest access fitting solution (potentially no diving required).

Stage 1 - Assemble the Jet Float platform around the pile/s and proceed to clean the pile to water level.

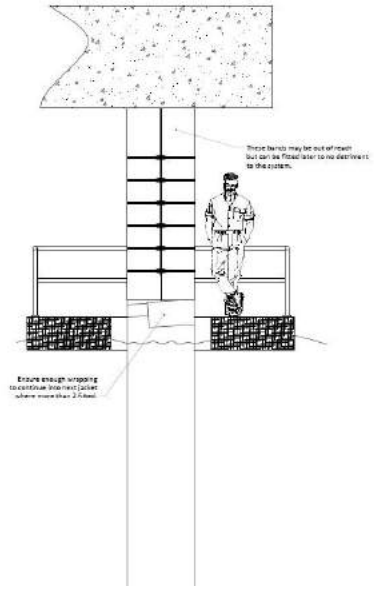
Falling Tide



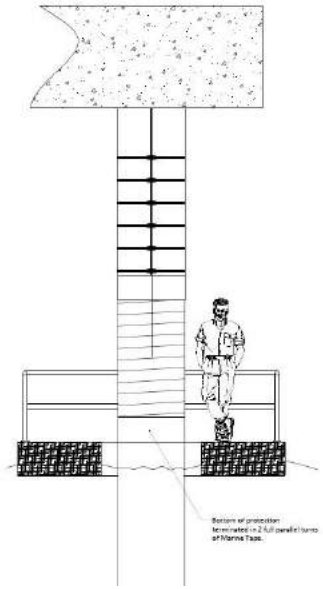
Stage 2 - Apply primer (where required) and start wrapping tape foillowing the cleaned pile surface down. Always ensure the Jet Float platform is below the level or work to ensure no damage to the freshly applied system.



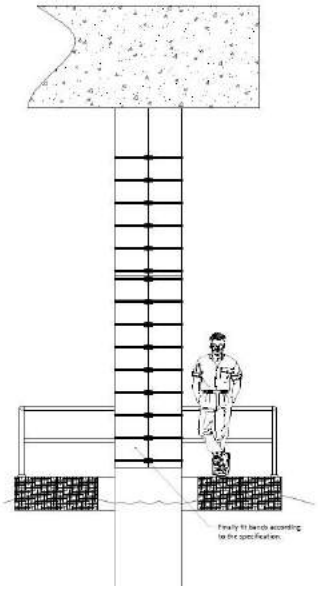
Stage 3 - If a single jacket project then finish tape at the correct level with a double parallel wrap. If overlapping jackets then ensure more that one full width of wrapped tape extends past the bottom of the first jacket. Fit as many bands as working height allows. Out of reach bands can be fitted later.



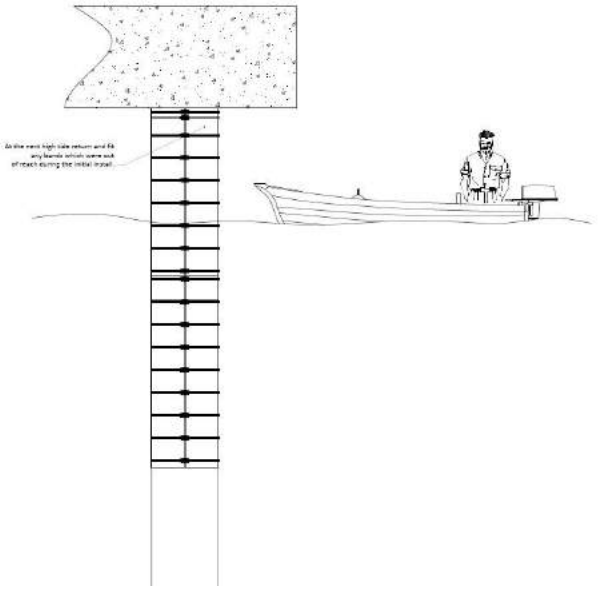
Stage 4 - Continue following the tide down with cleaning priming and wrapping operations working from the Jet Floats. If this is the last jacket to fit then end the 55% overlap wrapping with 2 full turns at the lower level.



Stage 5 - Fit the final jacket and tension the bands. Remove the Jet Float platform before the tide turns to prevent the platform form damaging the newly fitted system.



Stage 6 - Return at high tide to fit any bands which were out of reach during initial fit due to tall jackets, fast tide drop or delays in the working schedule.



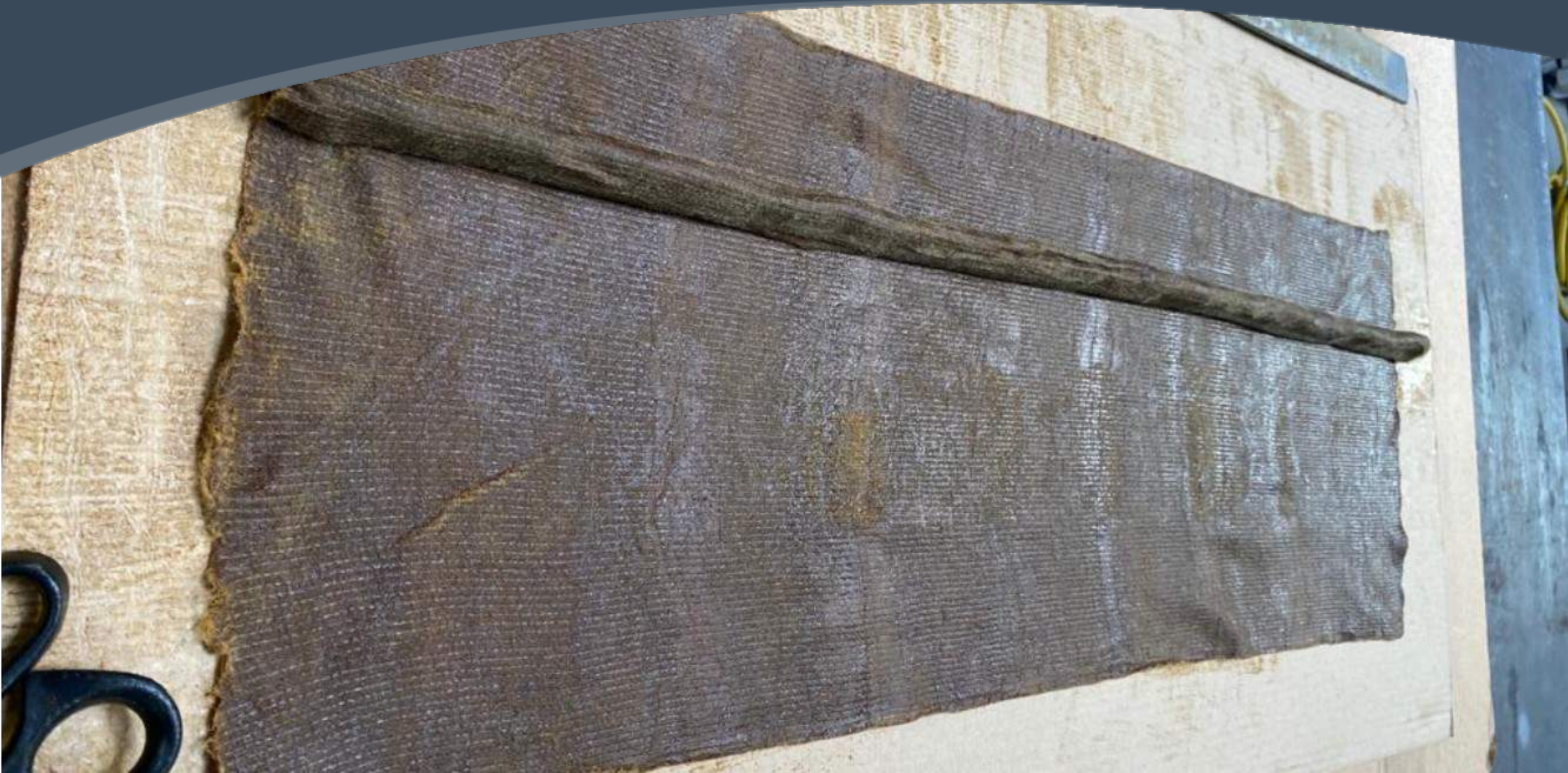
Jet Float Installation

HCL Pile Wrap System on Ø711mm Pile.


How to deal with the Soffit.

Roll a bead of tape into a sausage

Place ‘sausage’ into tape



Form ¼ of tape width over ‘sausage’

Seal in ‘sausage’ by pushing and amalgamating tab

Fit tape arrangement to soffit

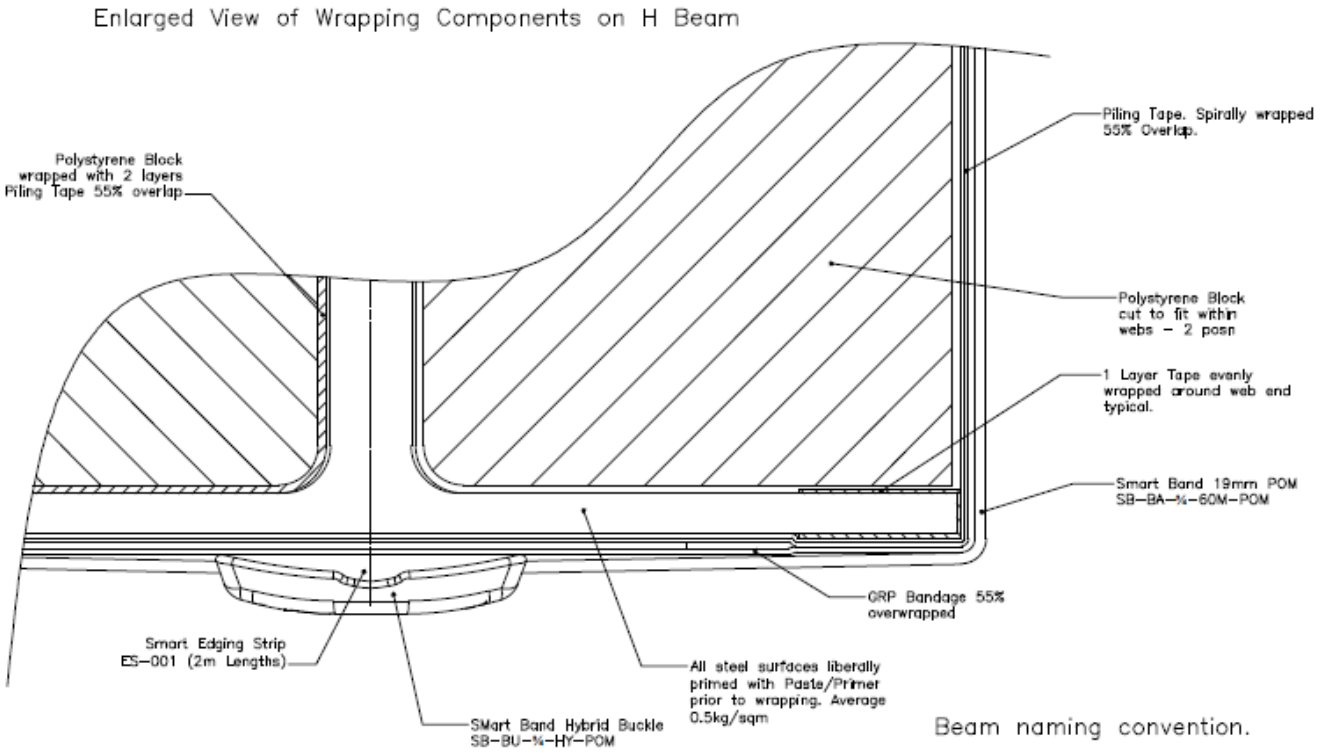
And if necessary seal with GRP Resin bandage

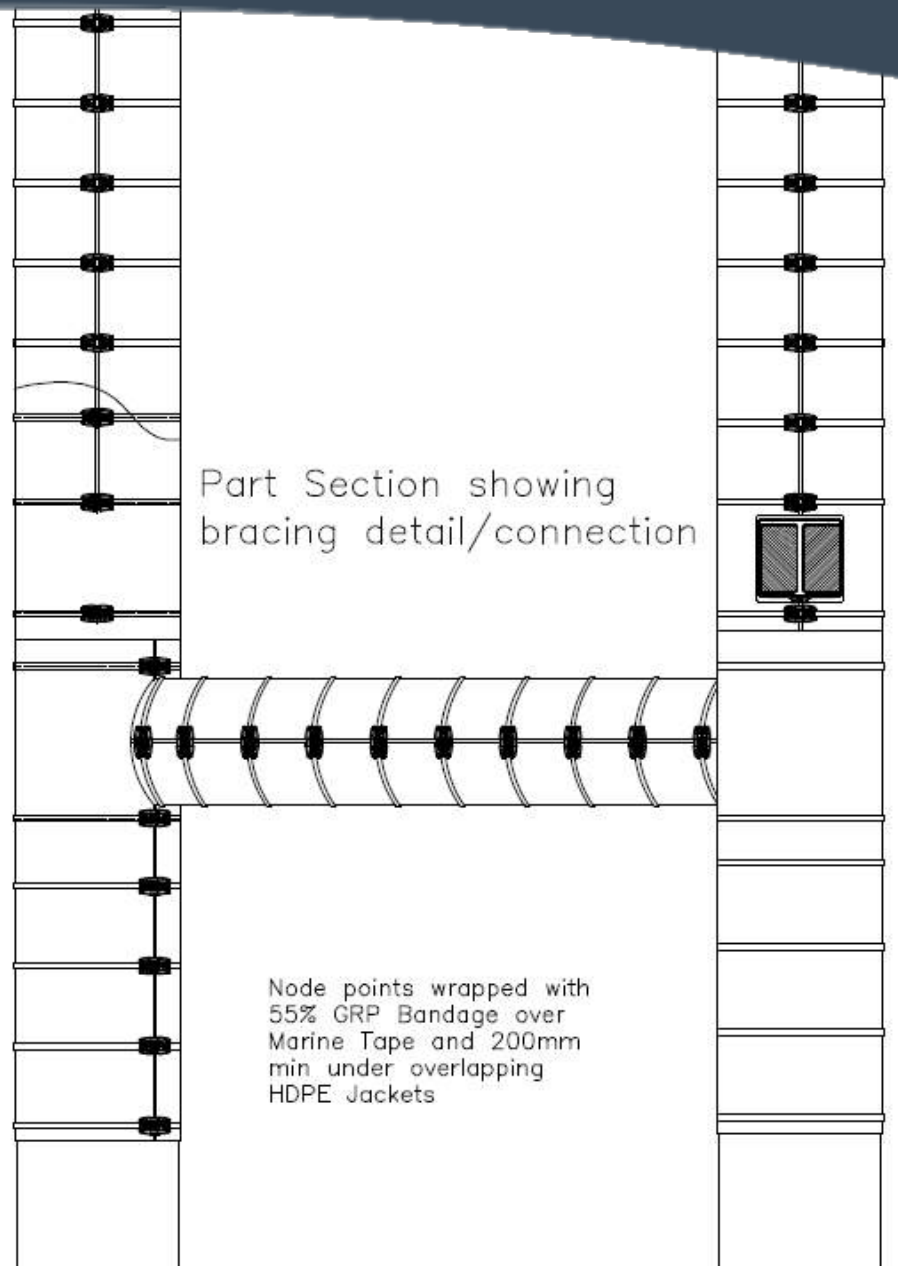
Soffit Solution

Bitumen Soffit Seal

Flexibility for Earthing Connections

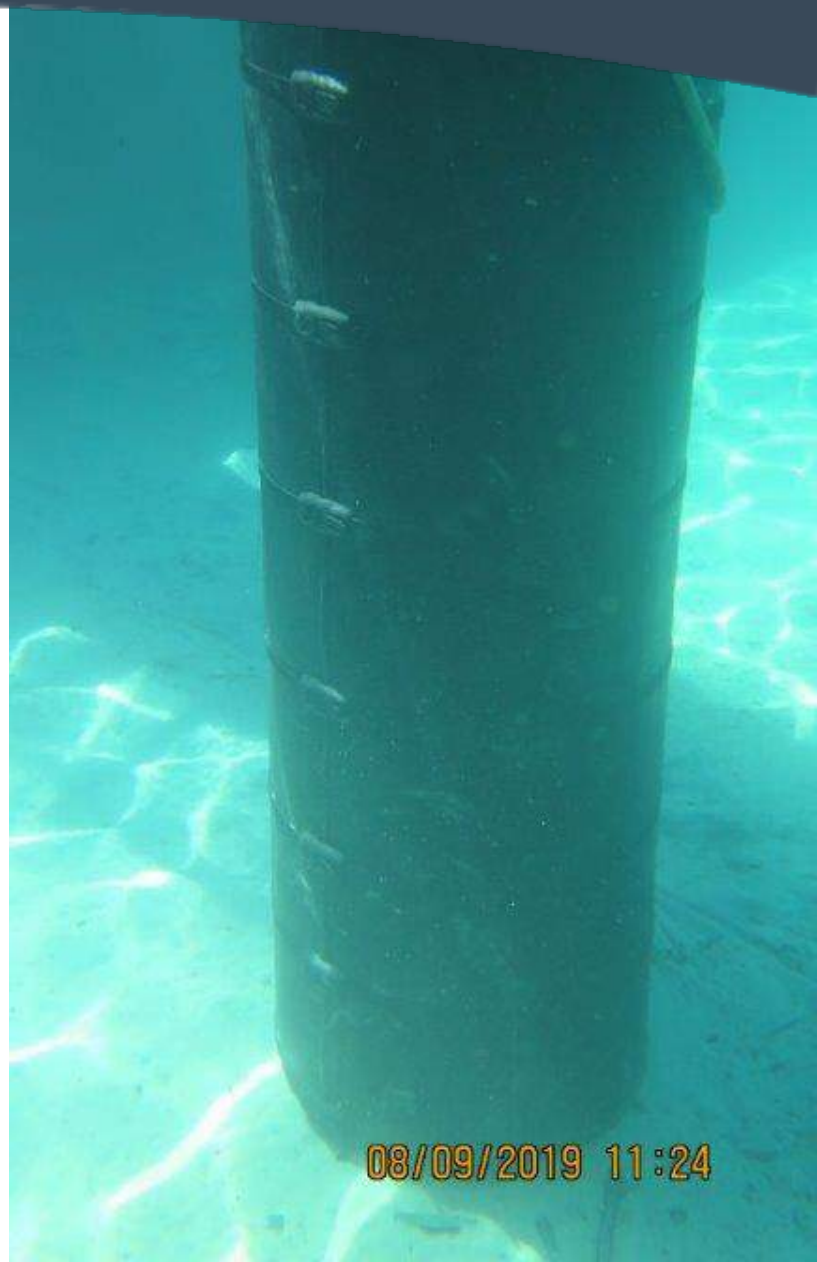
H Beam Solution



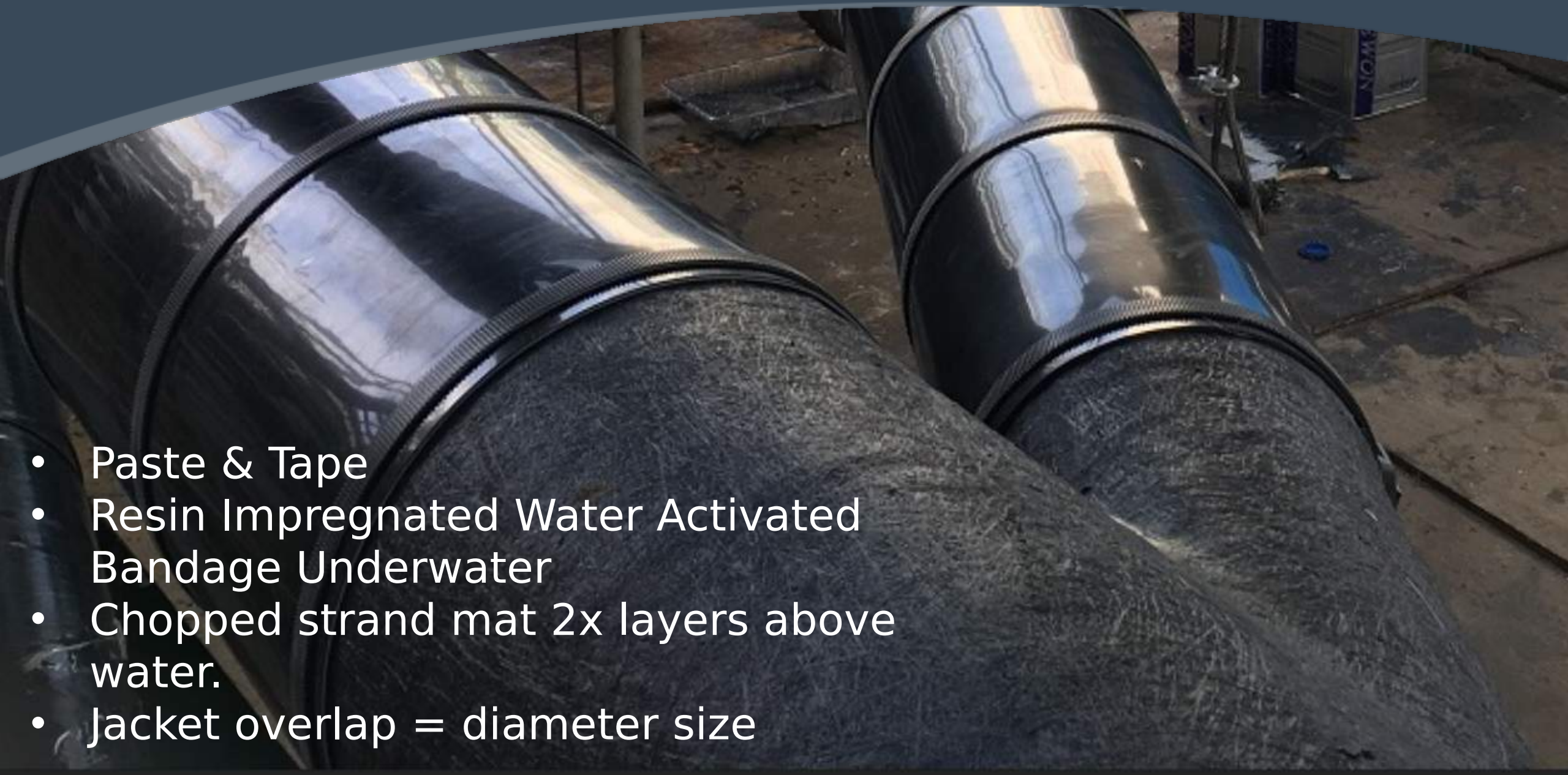


Finished Installation

Installed Series 100 System on Ø600mm Pile



Node Point Treatment



- Paste & Tape
- Resin Impregnated Water Activated Bandage Underwater
- Chopped strand mat 2x layers above water.
- Jacket overlap = diameter size

Waterproof Tooling

...and completed using these basic hand tools and Band only. Above or below water!

ITP & ITR

ITP and ITR to ensure a quality installation.

Combined ITP/ITR for HCL Pile Protection System.

Client Logo Here	Project Name Here	HCL

Inspection and Test Plan

Rev	Date	Comments	Prepared by	Reviewed by	Approved by

Legend:- I-Inspection, T-Test, W-Witness, H-Mandatory Hold Point for Inspection, R-Document Review, S-Surveillance, E-Execution, RE-Records.


HCL
CLAMPING SOLUTIONS

Inspections

So how to monitor future corrosion levels?

360° Inspection System - 10% coverage.

PWS – 360° Inspection

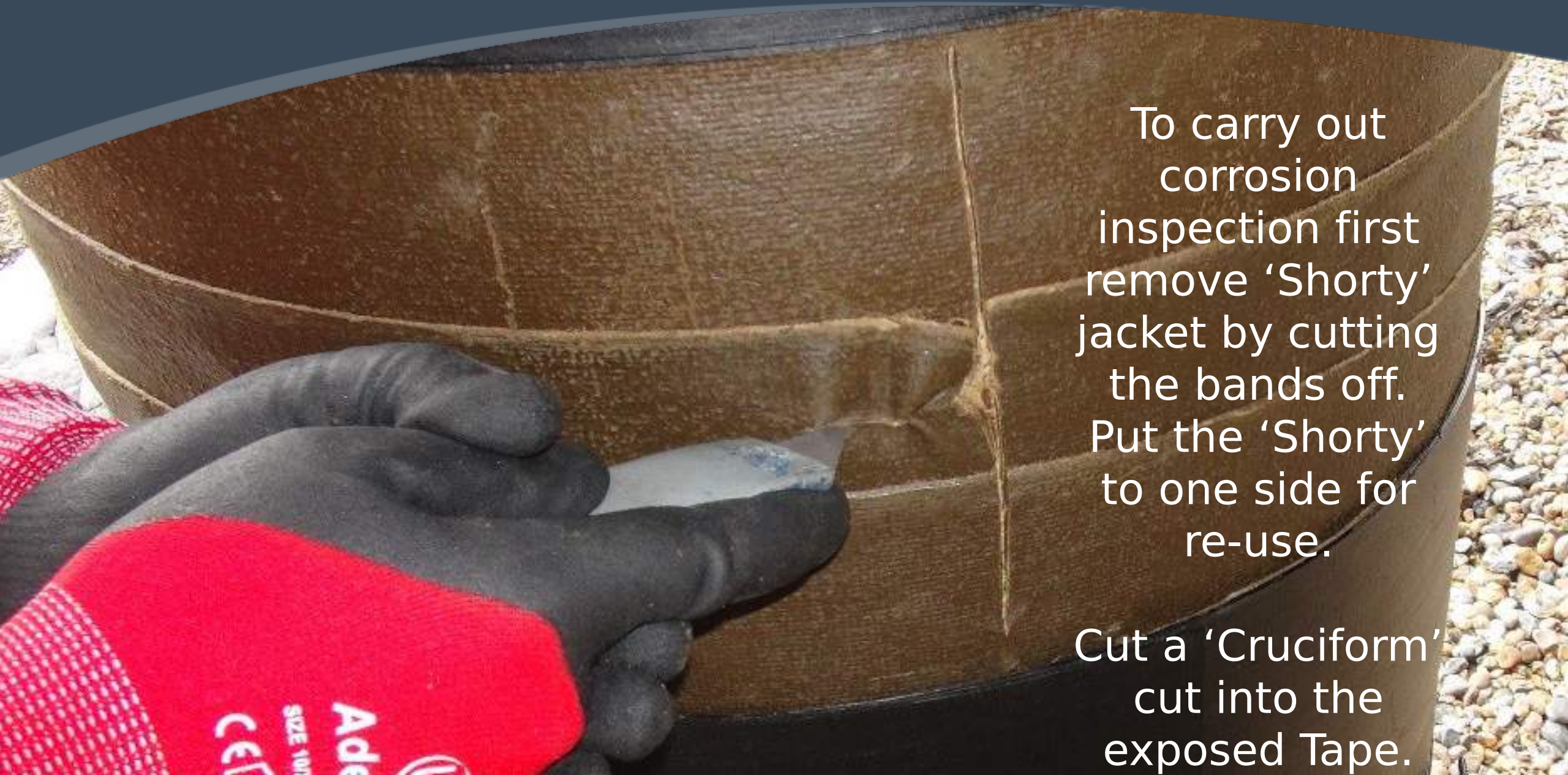
Fit regular Series 100 jackets but leave a 200mm wide band with the tape exposed. Across this a 0.6m (or ‘Shorty’) jacket applied with 5 bands.

PWS – 360° Inspection

Installed ‘Shorty’ Jacket.

The Edging strip should be rotated so as to be at about 30° to regular jacket strips as

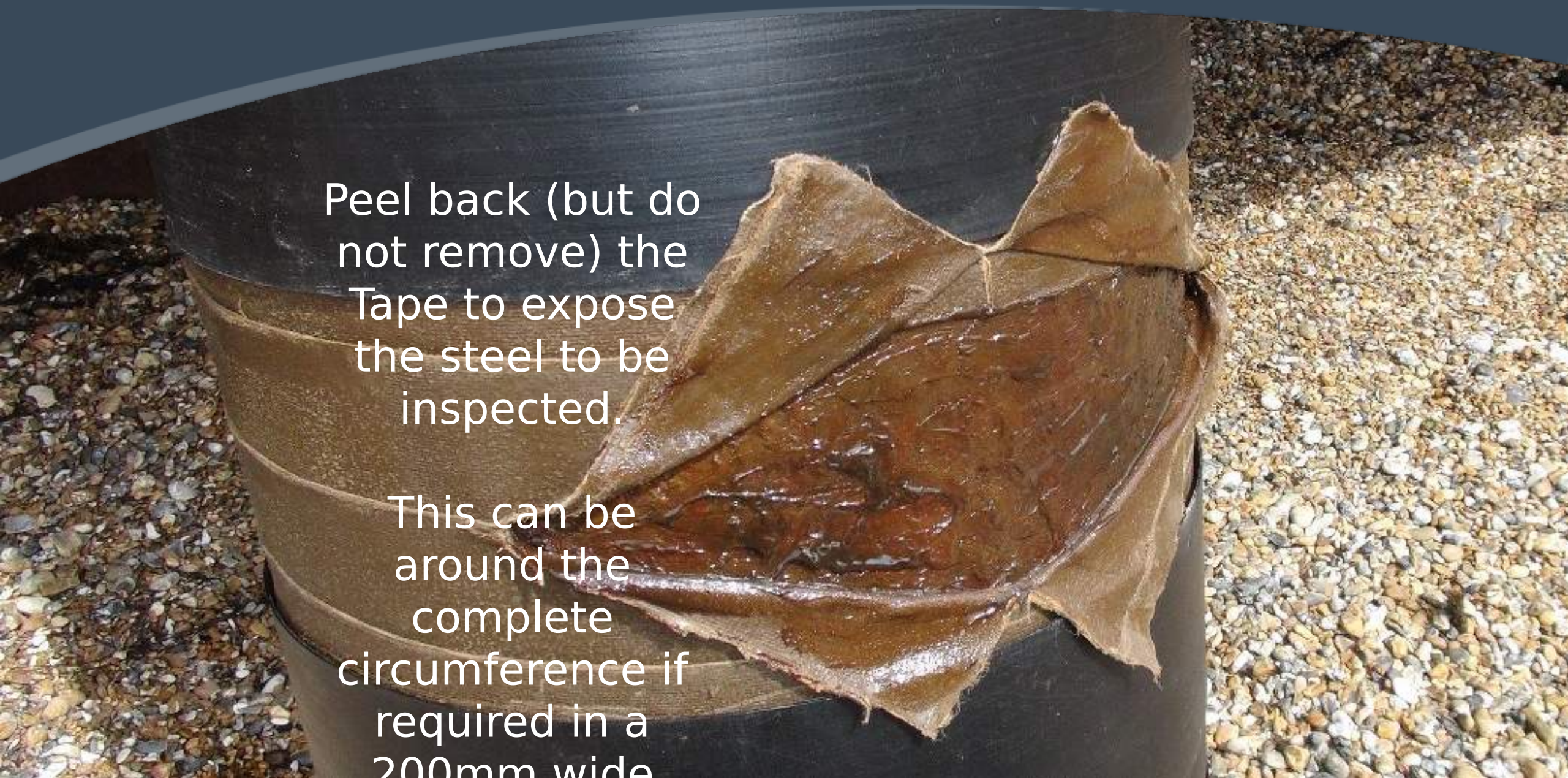
PWS – 360° Inspection



To carry out corrosion inspection first remove ‘Shorty’ jacket by cutting the bands off. Put the ‘Shorty’ to one side for re-use.

Cut a ‘Cruciform’ cut into the exposed Tape.

PWS – 360° Inspection



Peel back (but do not remove) the Tape to expose the steel to be inspected.

This can be around the complete circumference if required in a 200mm wide

PWS – 360° Inspection

Once complete smooth the Tape back into position

PWS – 360° Inspection

Repair cuts first with Paste/Primer and then with a vertical patch and a complete circumferential wrap over cuts made in existing tape

PWS – 360° Inspection

Repaired Inspection.

Ensure tape edges are smoothed down prior to re-fitting the ‘Shorty’ Jacket.

PWS – 360° Inspection

PWS – 360° Inspection

Installed ‘Shorty’ jacket.

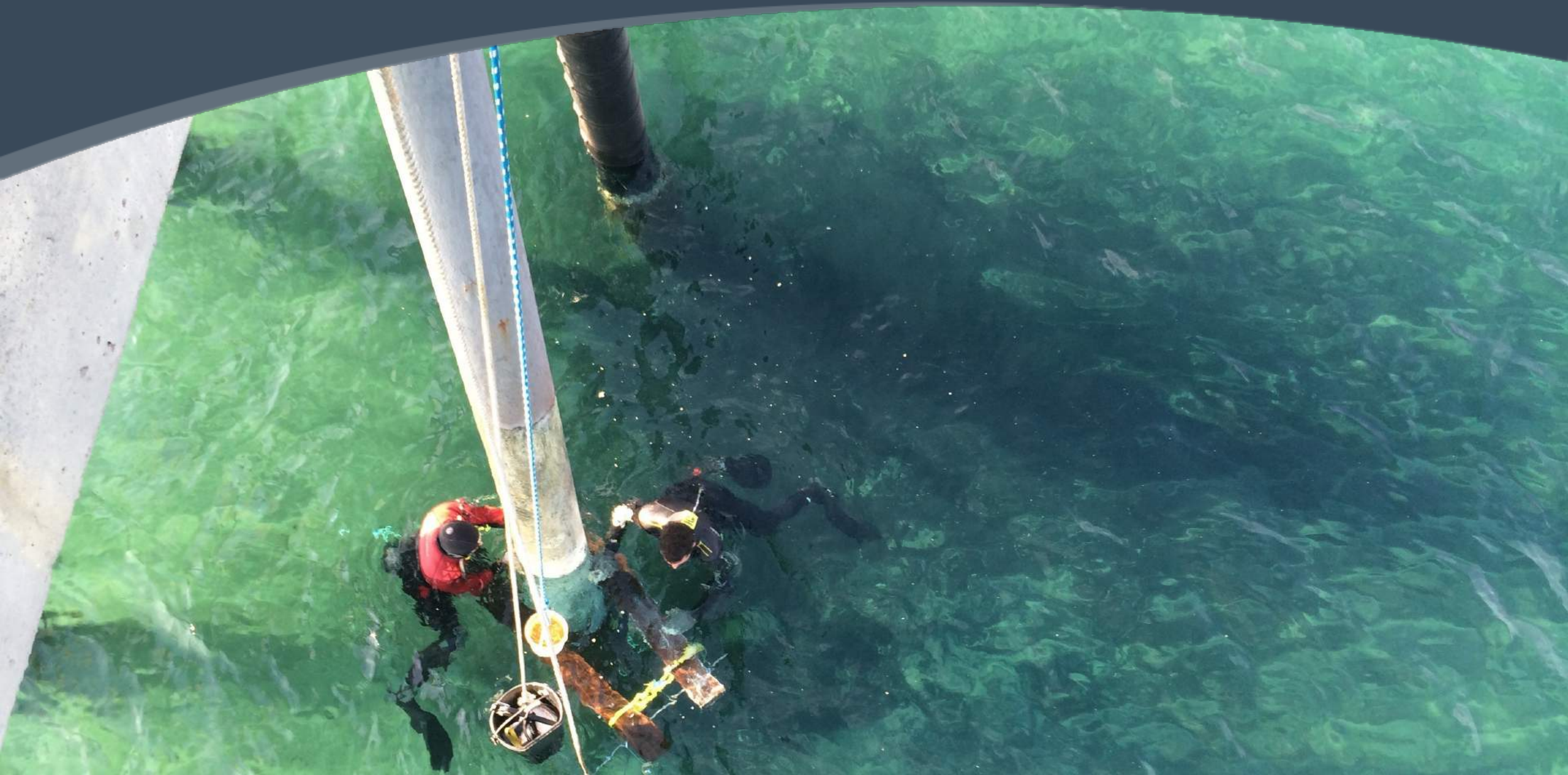
As well as in-between jackets these can also be at the top or bottom of

….but not here!

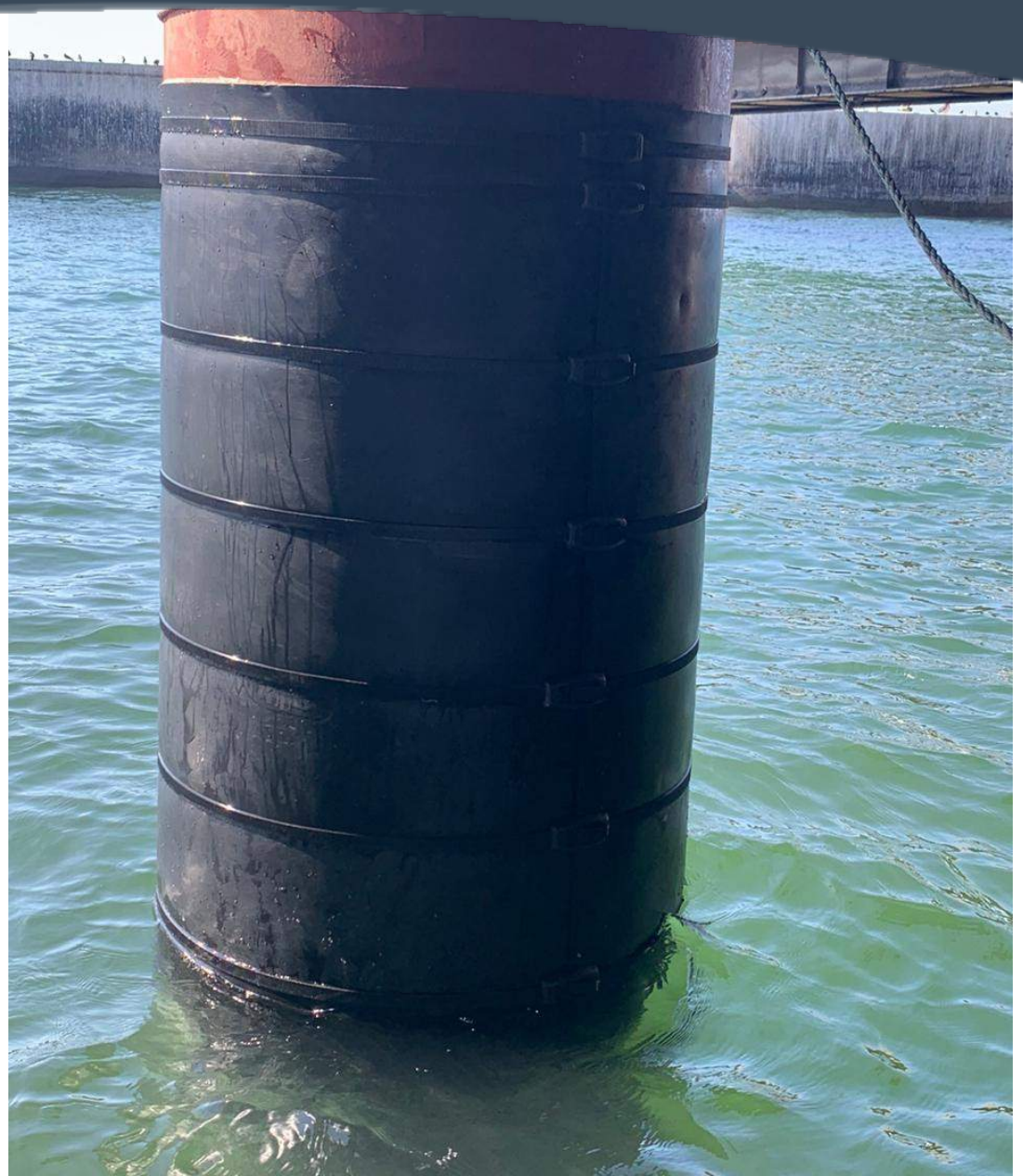
Pile Wrap System Projects

Shell Jetty #4 – Rotterdam

South America



South America – St.Angamos

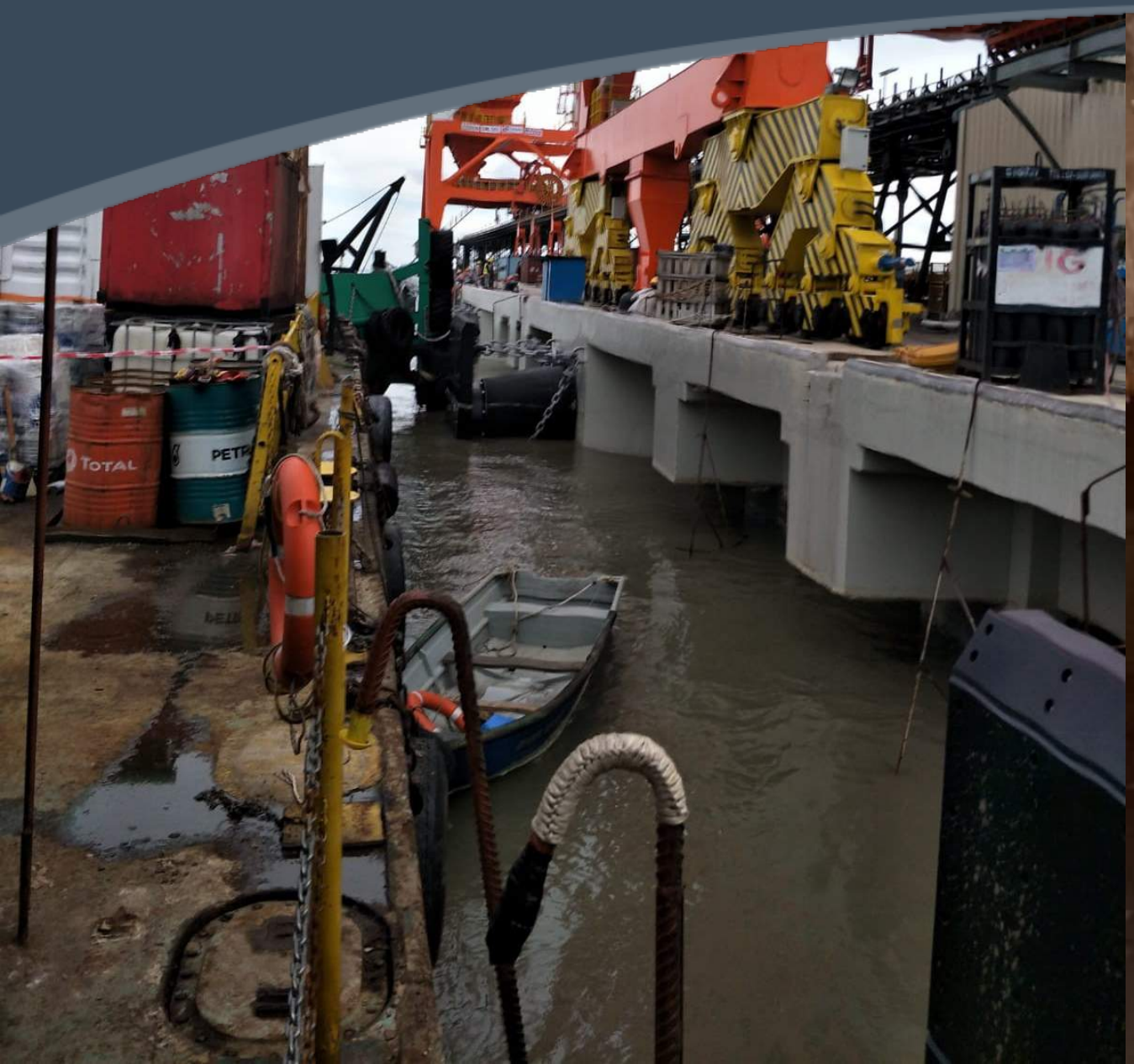


South America

China

Malaysia

Malaysia



Singapore

Thailand

South Korea

Seoul

UK South Coast.

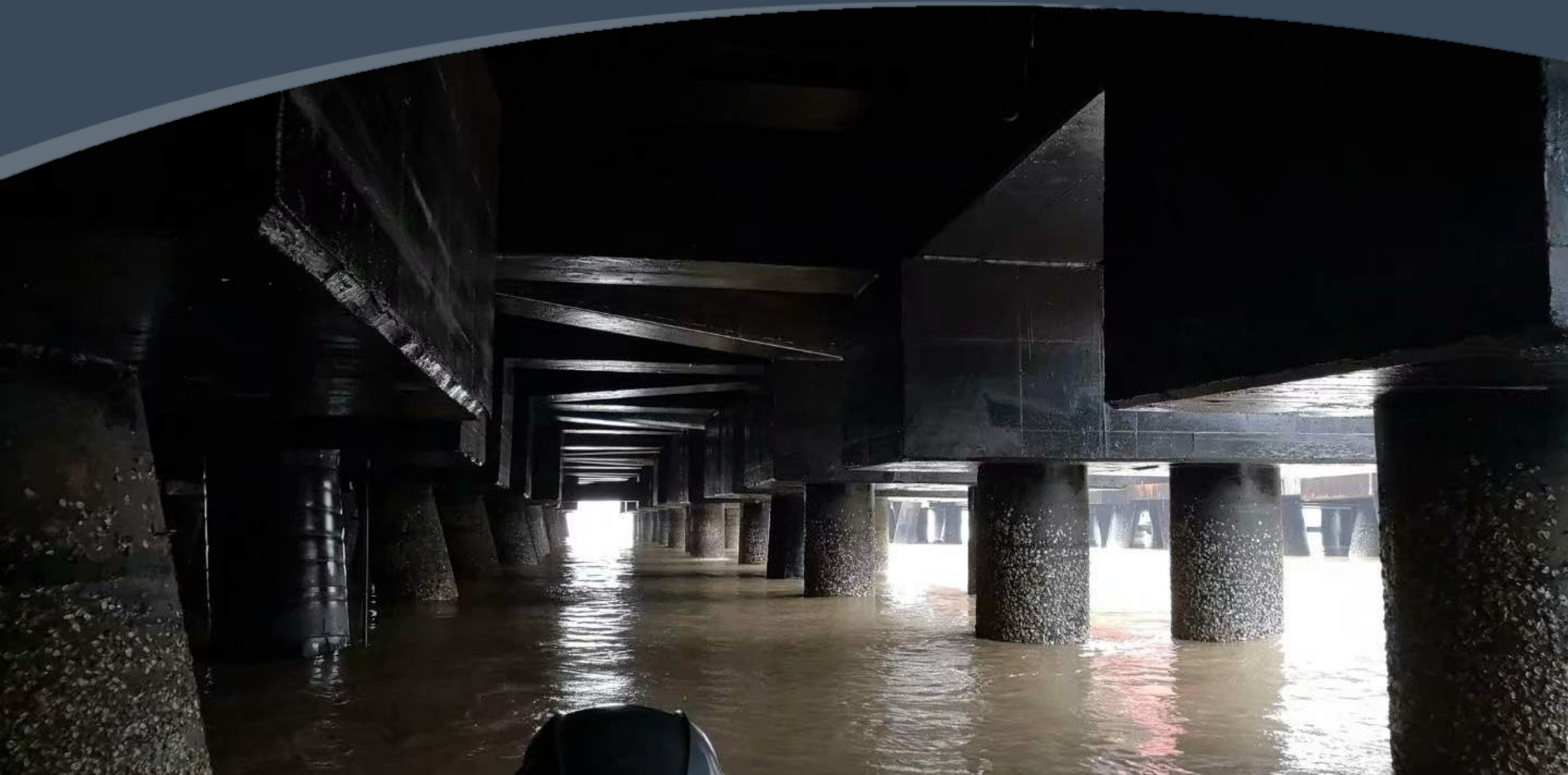
Cornwall, UK

Cornwall, UK.

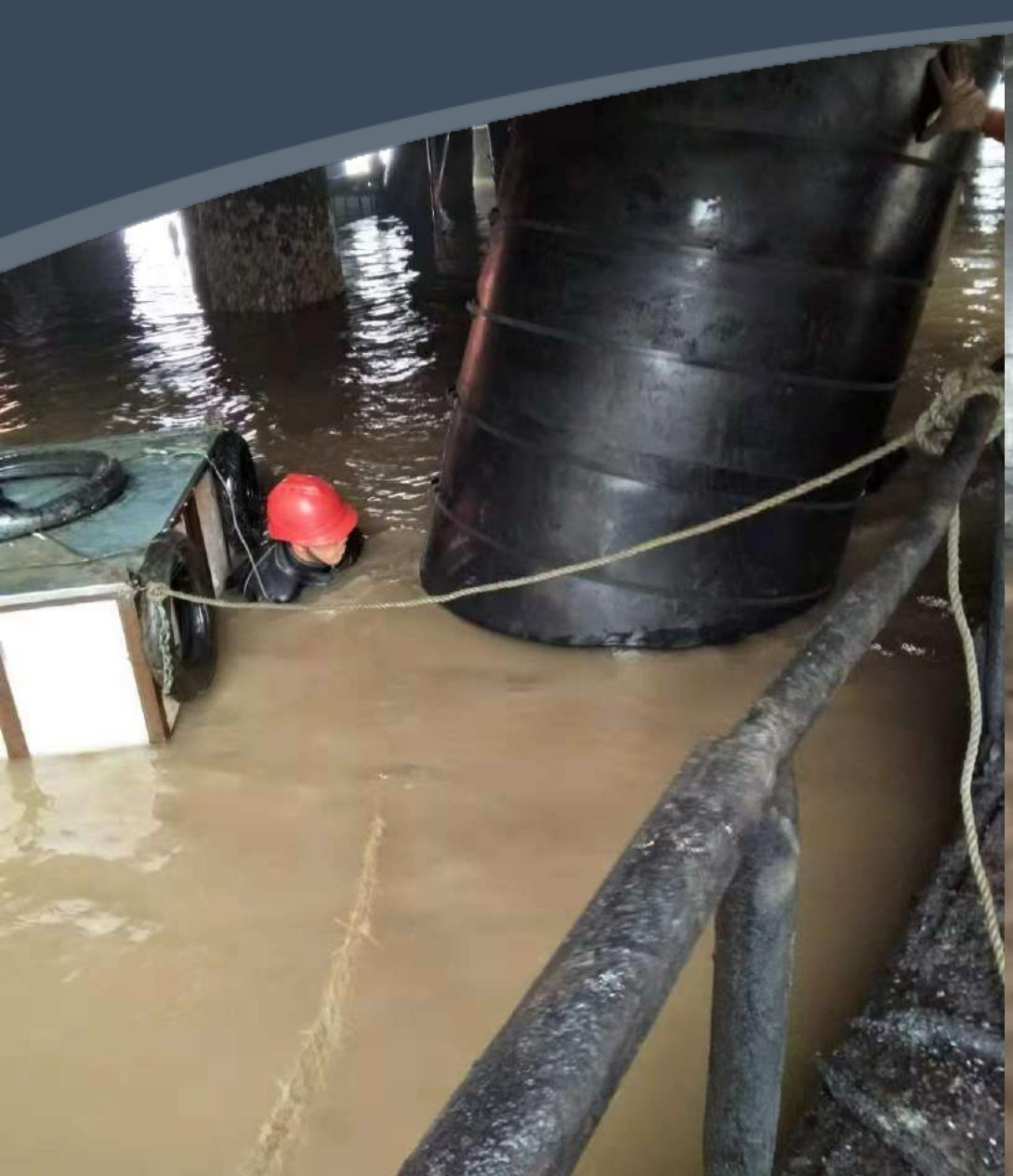
Cornwall, UK.

China – Ningbo.

China

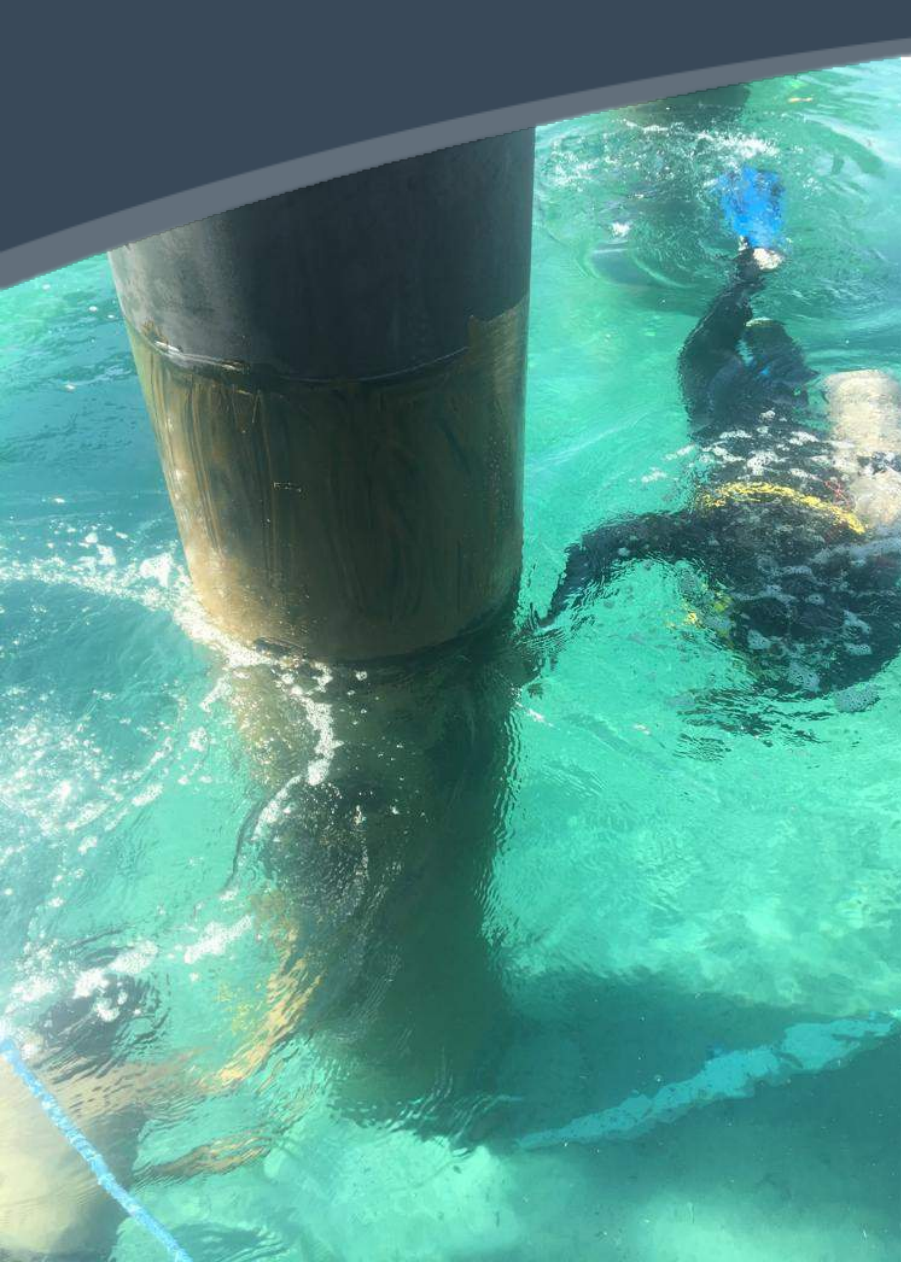


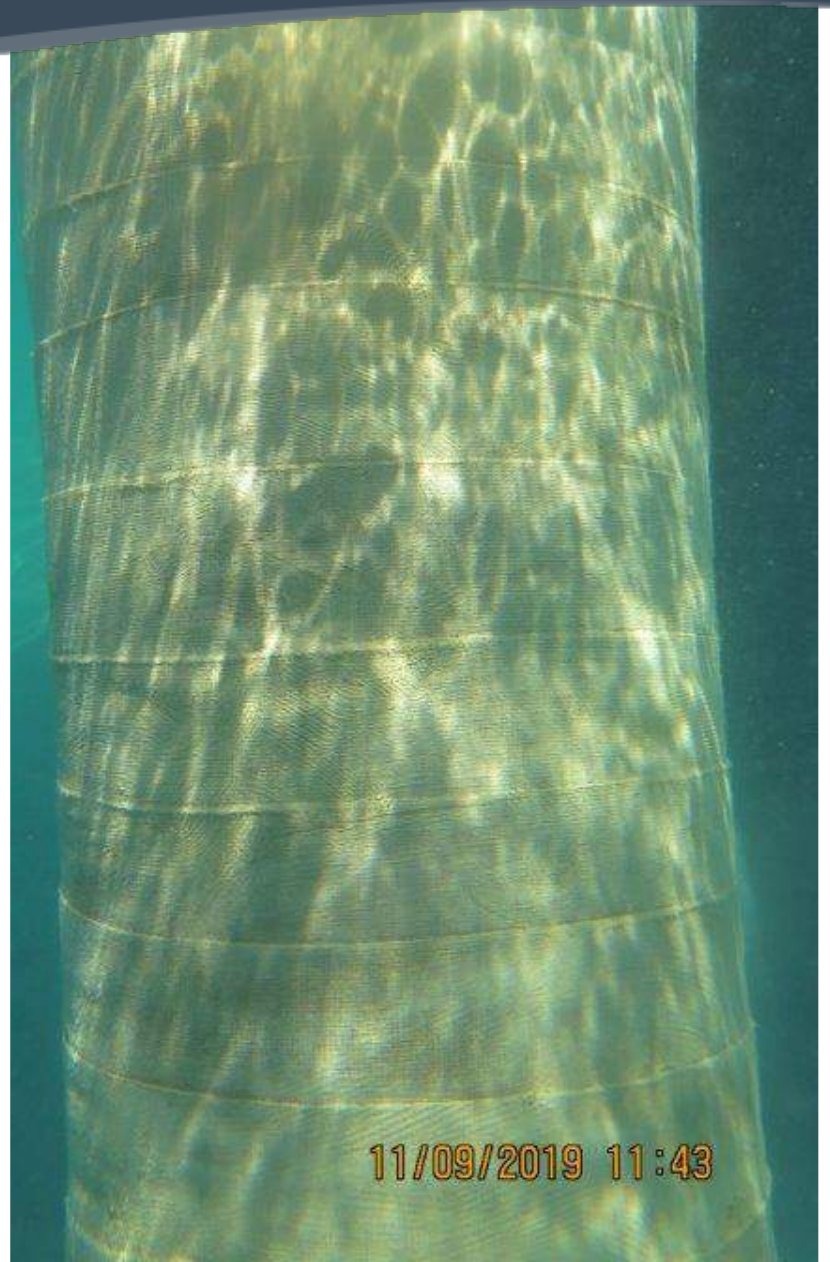
China



Thailand

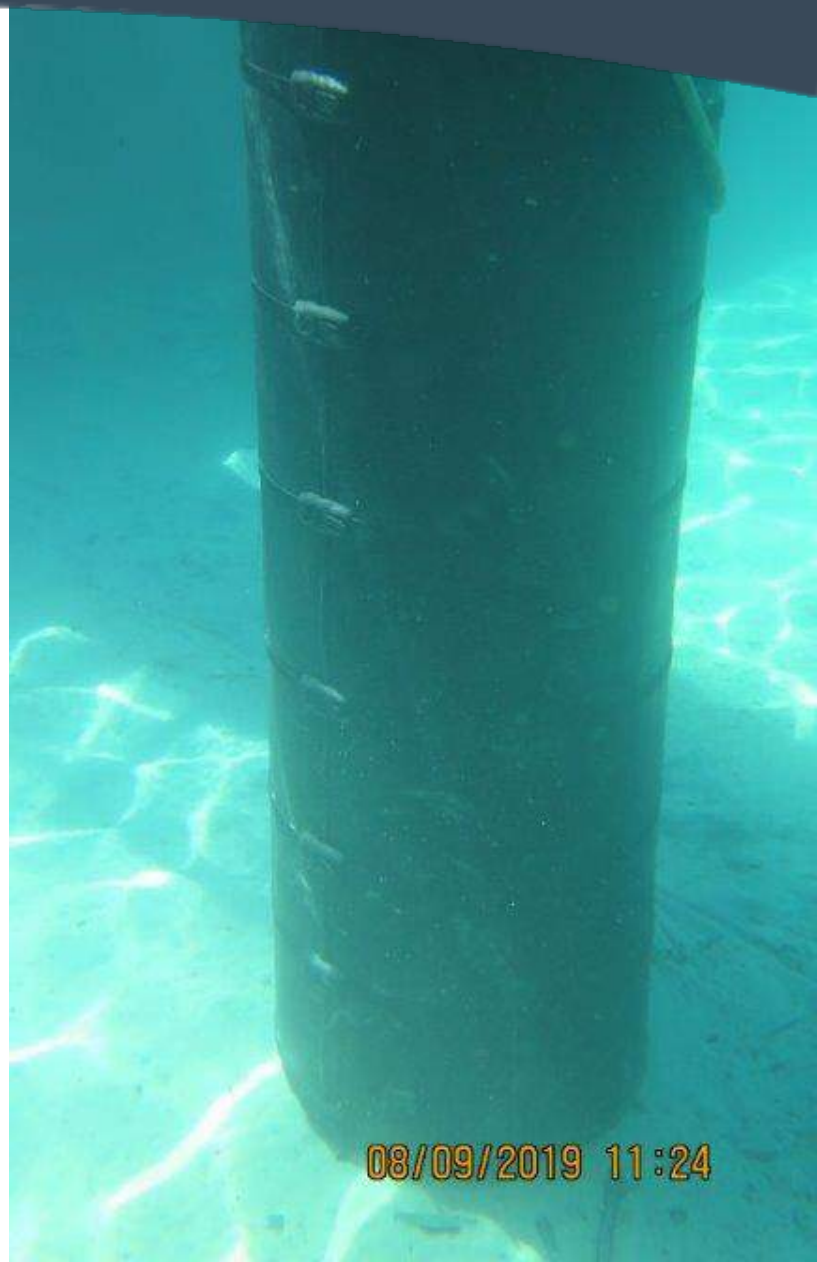
Jordan - Aqaba





Thailand

Jordan



Unaffected by Marine Growth

ICCP Clamping

MMO’s, Ref Elec. & Cable Clamping from HCL.

ICCP Brackets in Yard!

Steel ICCP Supports

Turkey – where it started.

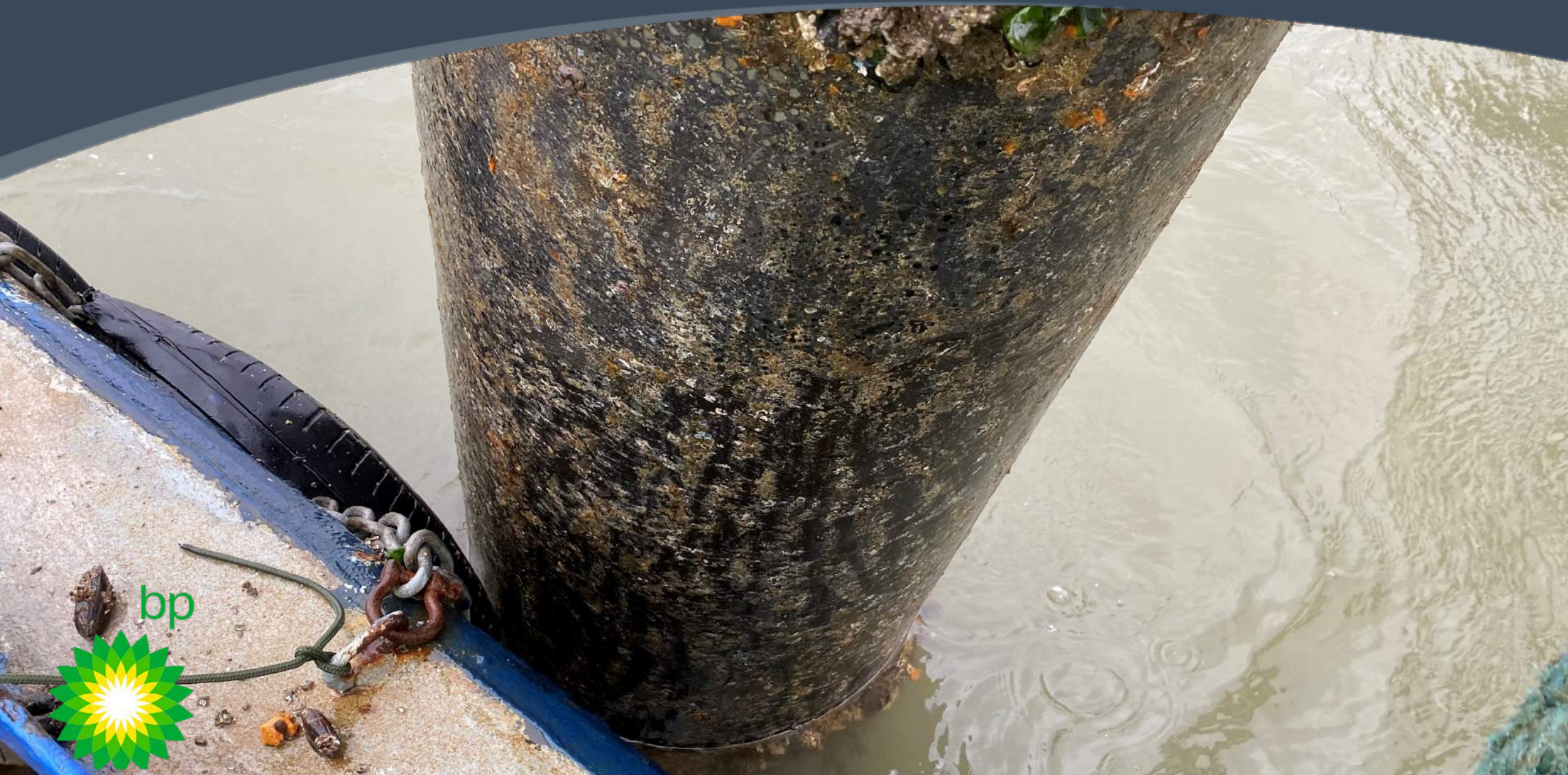
Turkey

Turkey

BP Hamble – UK. ICCP Anodes

CTS Install of HCL ICCP Clamps

First clean the Pile



Saddles are clamped into place

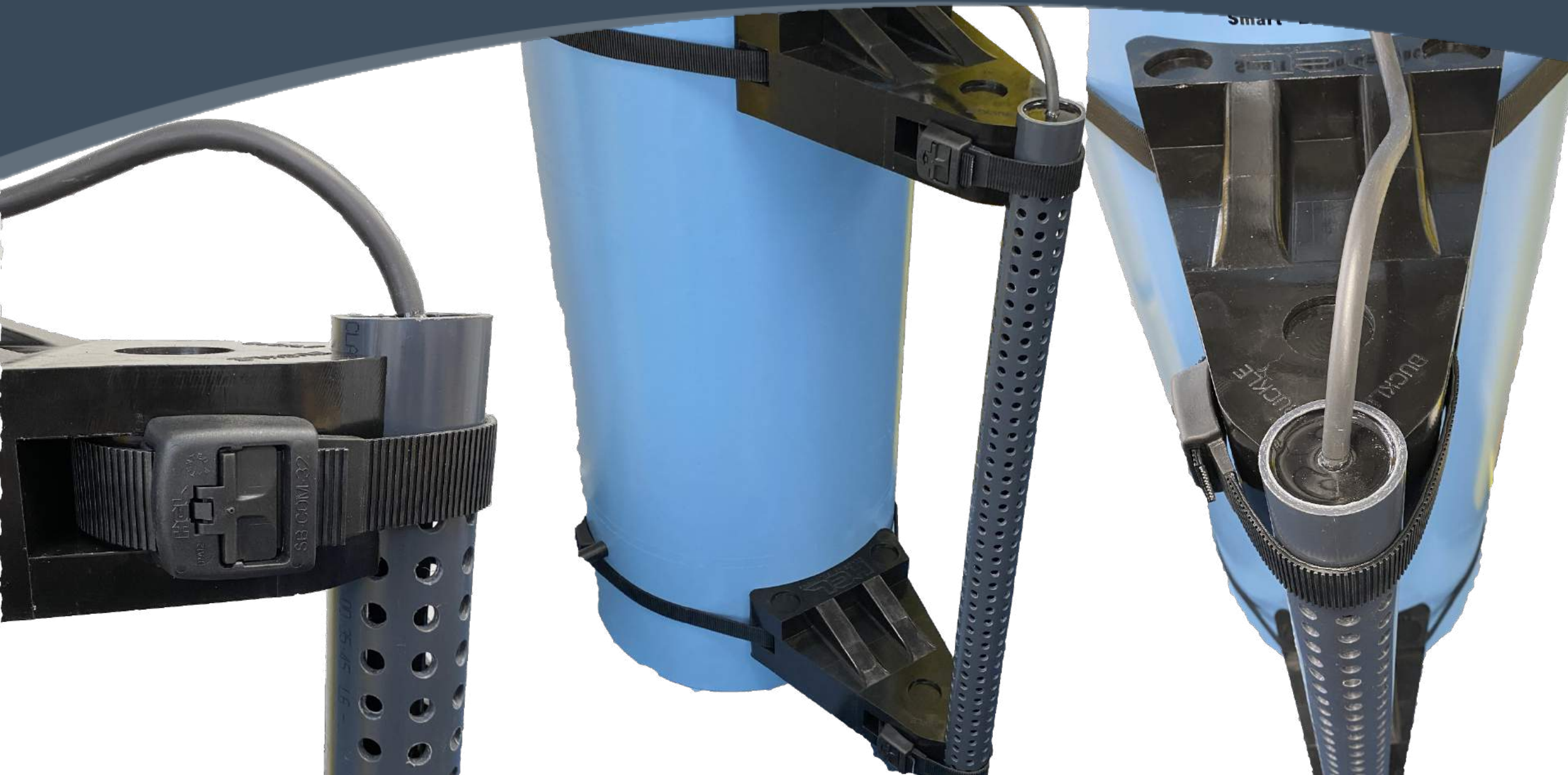
Routing and clamping of cables

Indonesia Coal Jetty – ICCP Clamps

Totally non-metallic clamping!

3 standoff heights & multiple MMO Ø’s

Secure, without shielding!



System Integration

How the HCL Part Codes Work

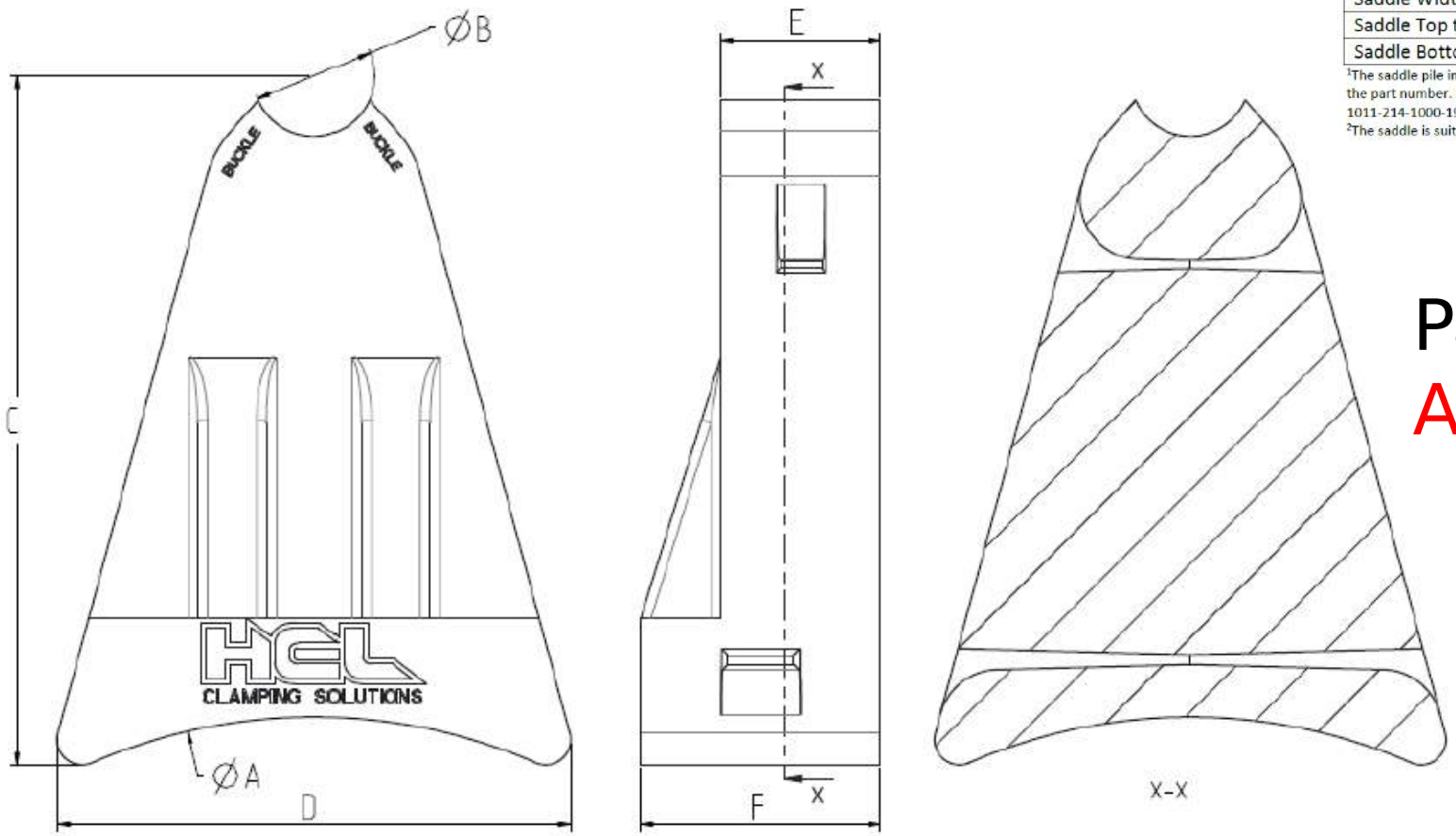
SADDLE: SDL-1011-214-A-B, Material Polyurethane
Part No. SDL-1011-214-A-B

SADDLE: SDL-1011-274-A-B, Material Polyurethane
Part No. SDL-1011-274-A-B

SADDLE: SDL-1011-344-A-B, Material Polyurethane
Part No. SDL-1011-344-A-B

Part Code Convention

Outline Dimensions (General Tolerance ± 2%)



General Properties		
Property	Value	Unit
Weight	5.6 (12.3) */- 5%	Kg (Lbs)
Saddle Pile interface Diameter[1,2] (A)	TBC – See final part No.	mm
Anode Recess Diameter[1] (B)	TBC – See final part No.	mm
Offset Saddle base to Anode Centre Length (C)	344 (13.5)	mm (inch)
Saddle Width (D)	256 (10.1)	mm (inch)
Saddle Top thickness (E)	80 (3.15)	mm (inch)
Saddle Bottom thickness (F)	120 (4.72)	mm (inch)

[1]The saddle pile interface diameter and the anode recess diameter is determined in mm and replaces the letters A and B respectively in the part number. For example if the pile interface diameter is 1000mm and anode is 19mm in diameter, the part number would be SDL-1011-214-1000-19

[2]The saddle is suitable for pile diameters at the stated interface diameter and above

Part # SDL-1011-344-A-B

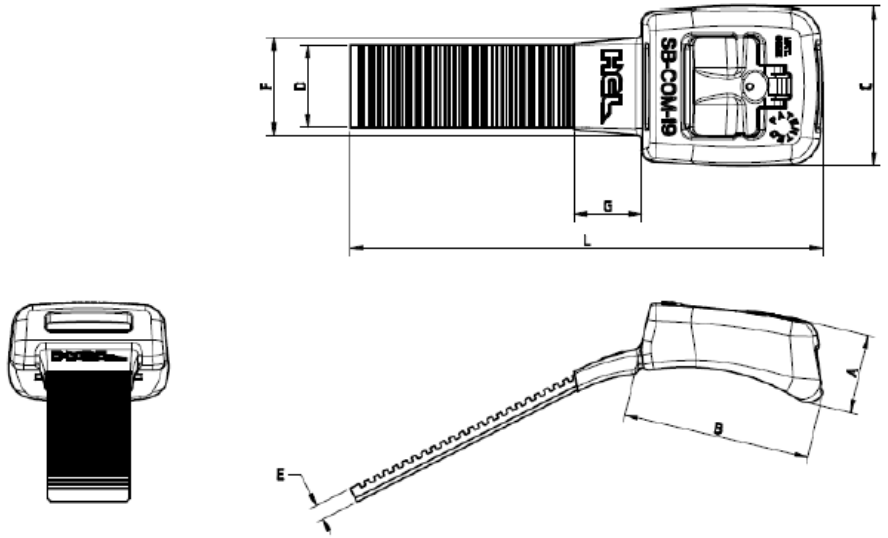
Compact banding strength

Smart® Band Compact 19mm, Material PA12GF

Part No. SB-COM-19-PA12GF

Banding part codes

Outline Dimensions (General Tolerance ± 1%)



"SB-COM-19-PA12GF-XXXXMM"

Where 'xxxx' is the length 'L' starting at 600mm

(HCL will advise length required inclusive of tensioning tail).

General Properties PA12GF[1]		
Property	Value	Unit
Weight – Buckle[2]	23.7 (0.84) +/- 2%	g (oz)
Weight – Band[2]	72.0 (0.77) +/- 2%	g/m (oz/ft)
Buckle Height (A)	18.7 (0.74)	mm (inch)
Buckle Length (B)	44.2 (1.74)	mm (inch)
Buckle Width (C)	37.4 (1.47)	mm (inch)
Band Width (D)	19.2 (0.76)	mm (inch)
Band Height (E)	3.5 (0.14)	mm (inch)
Band Support Width (F)	22.9 (0.90)	mm (inch)
Band Support Length (G)	15.9 (0.63)	mm (inch)
Band Length (L)	User Defined	

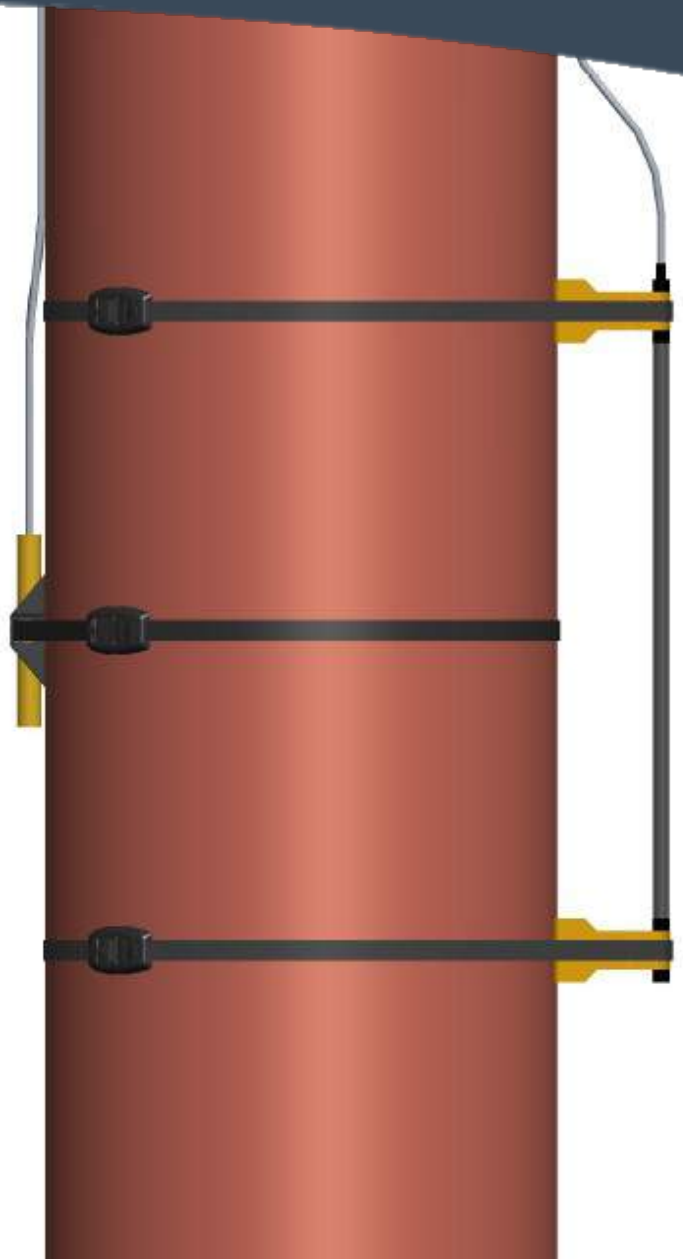
[1]PA12GF is the material code for Polyamide 12 glass filled. The generic designation is Nylon 12 glass filled

[2]The weight of the buckle does not include the internally over-moulded band. Therefore the complete weight of the Band assembly can be calculated by adding the weight of the buckle to the weight of the band per length.

Anode splice box mounting too

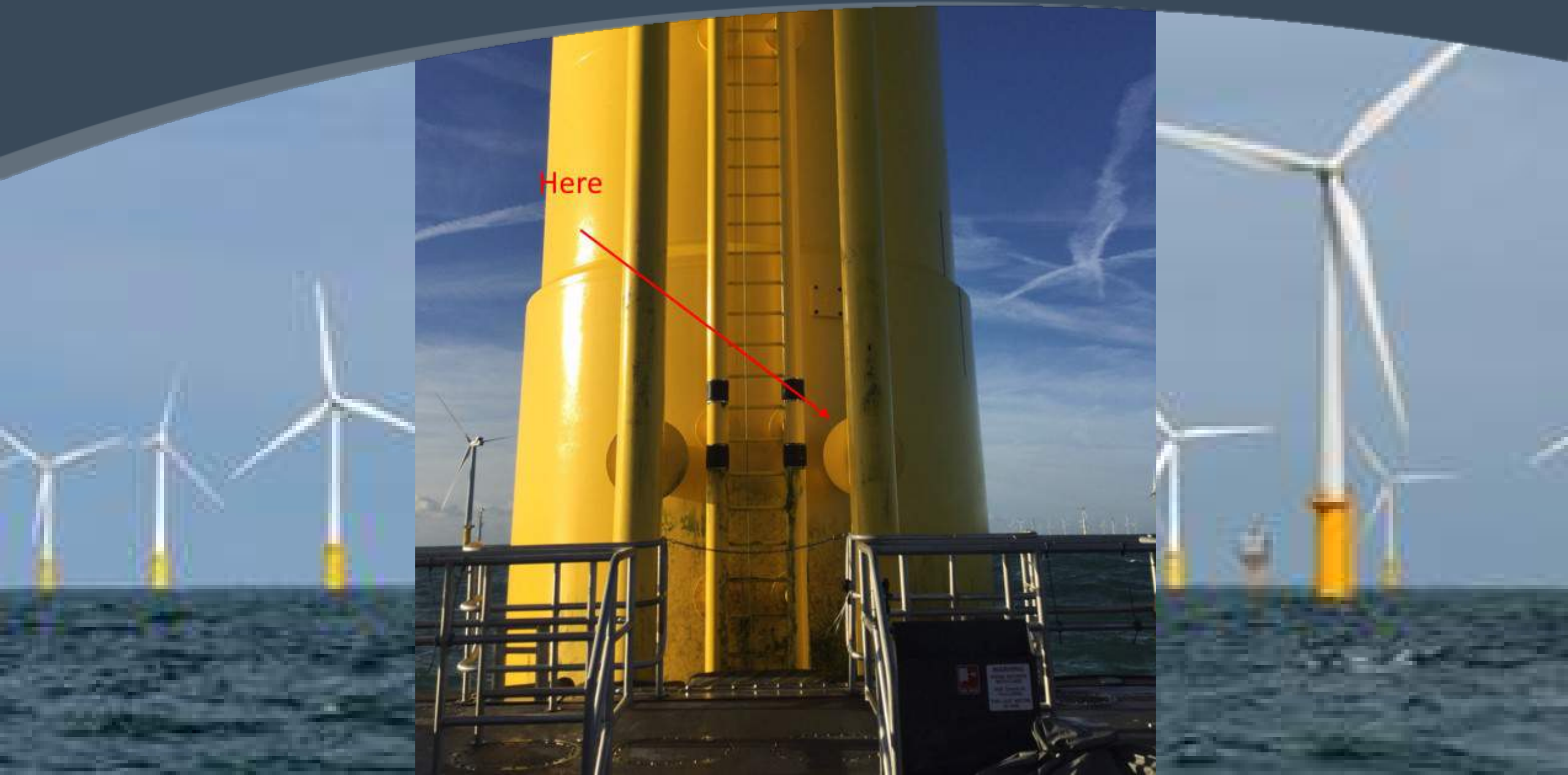
System Benefits

- No penetration of existing coating.
- No requirement for skilled Divers.
- No Power Plant required.
- Will fit any irregular Pile.
- Lightweight & easy to Mobilise.
- No welding required.



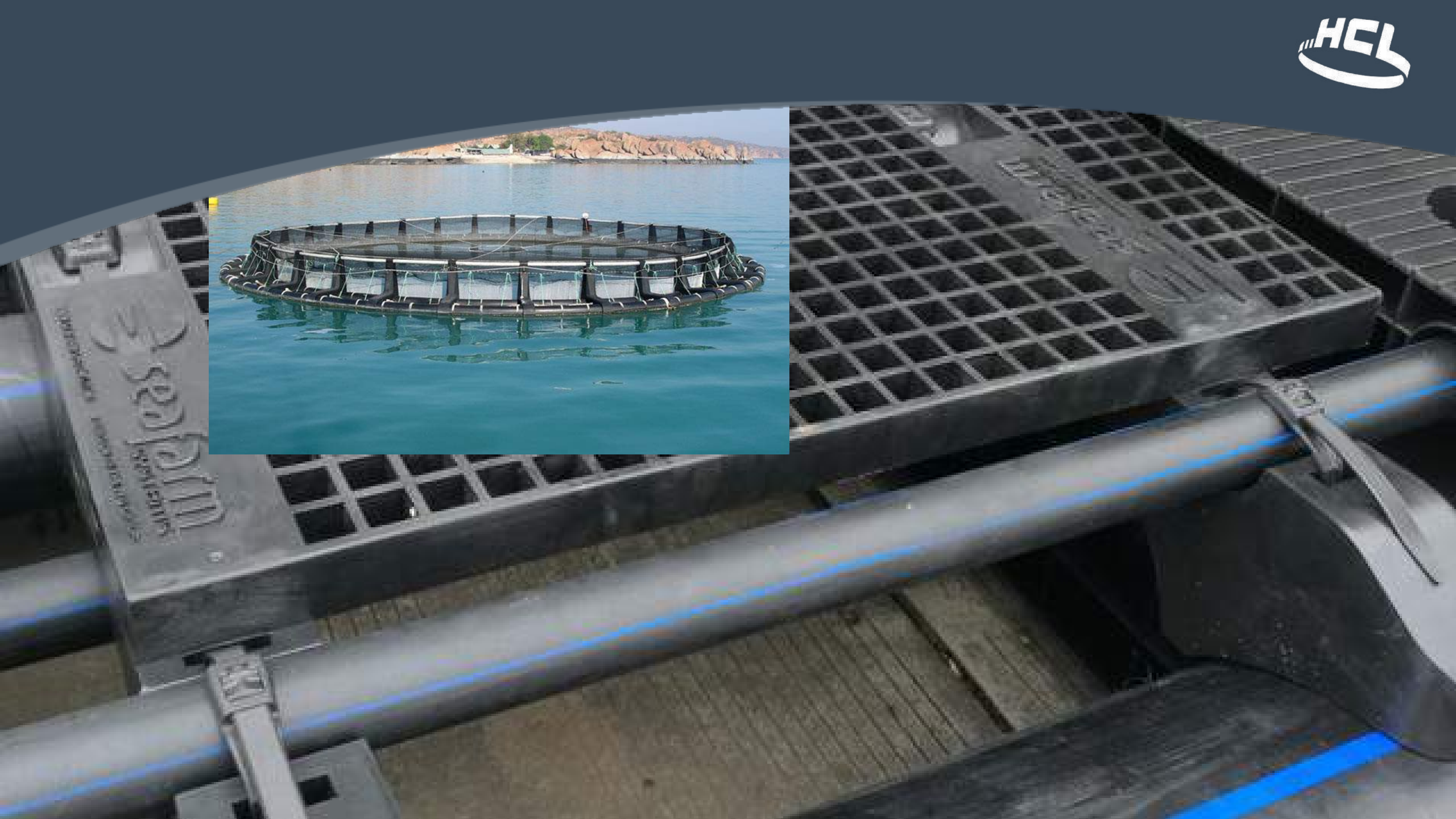
Other Marine Corrosion Related Applications

Headng Here


Here

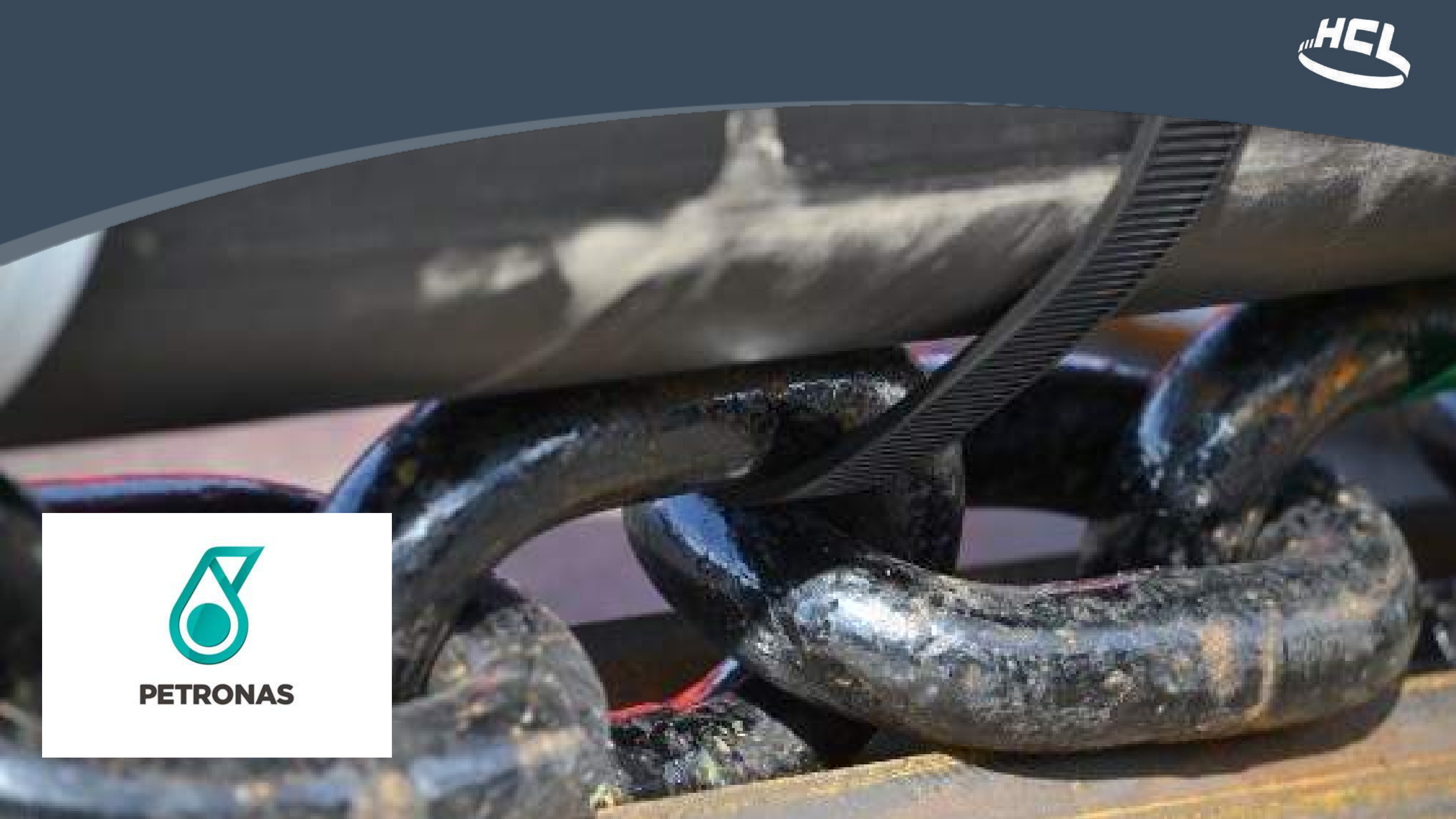

14


x 23
E12

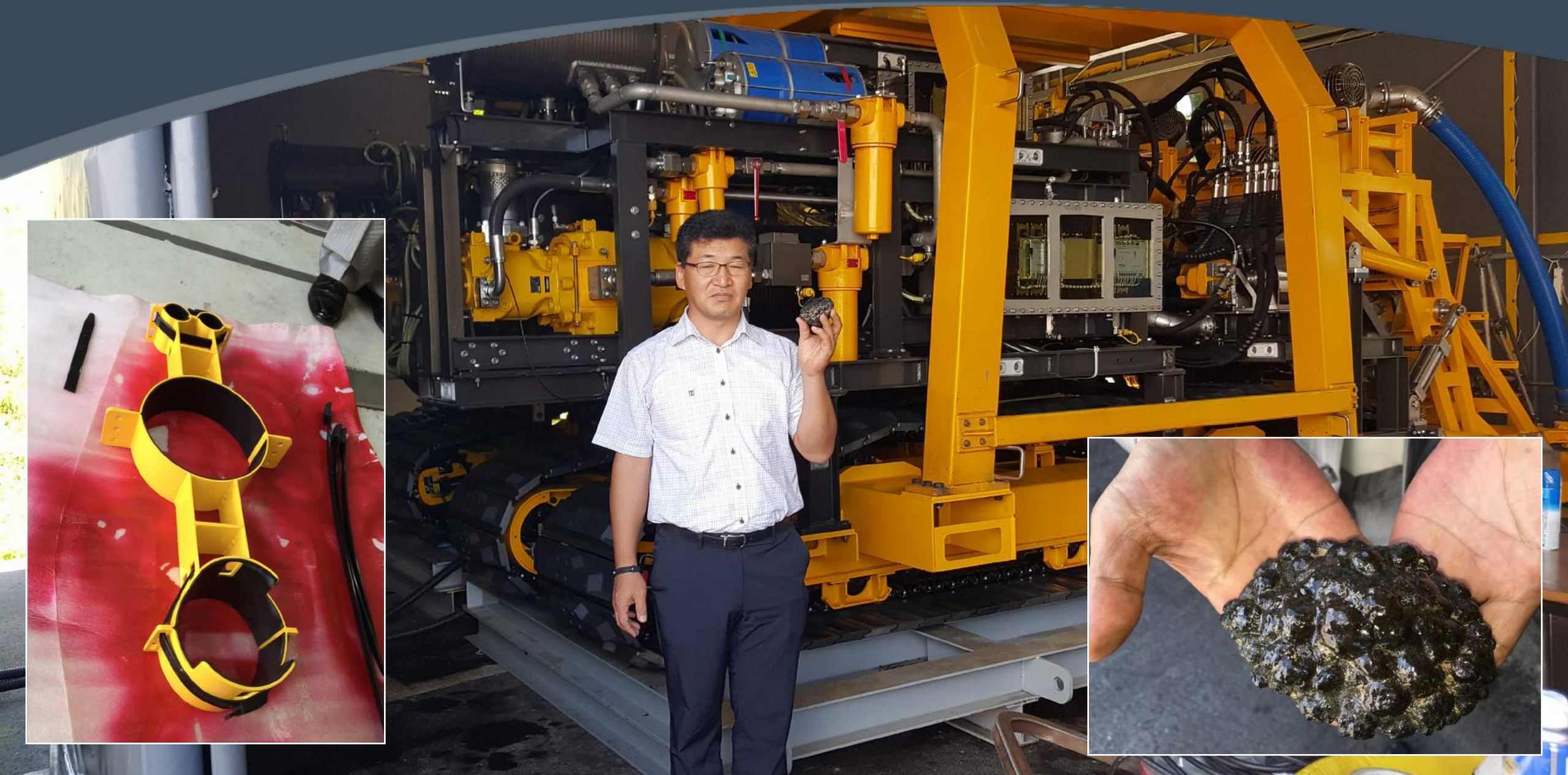


HCL


SAIPEM

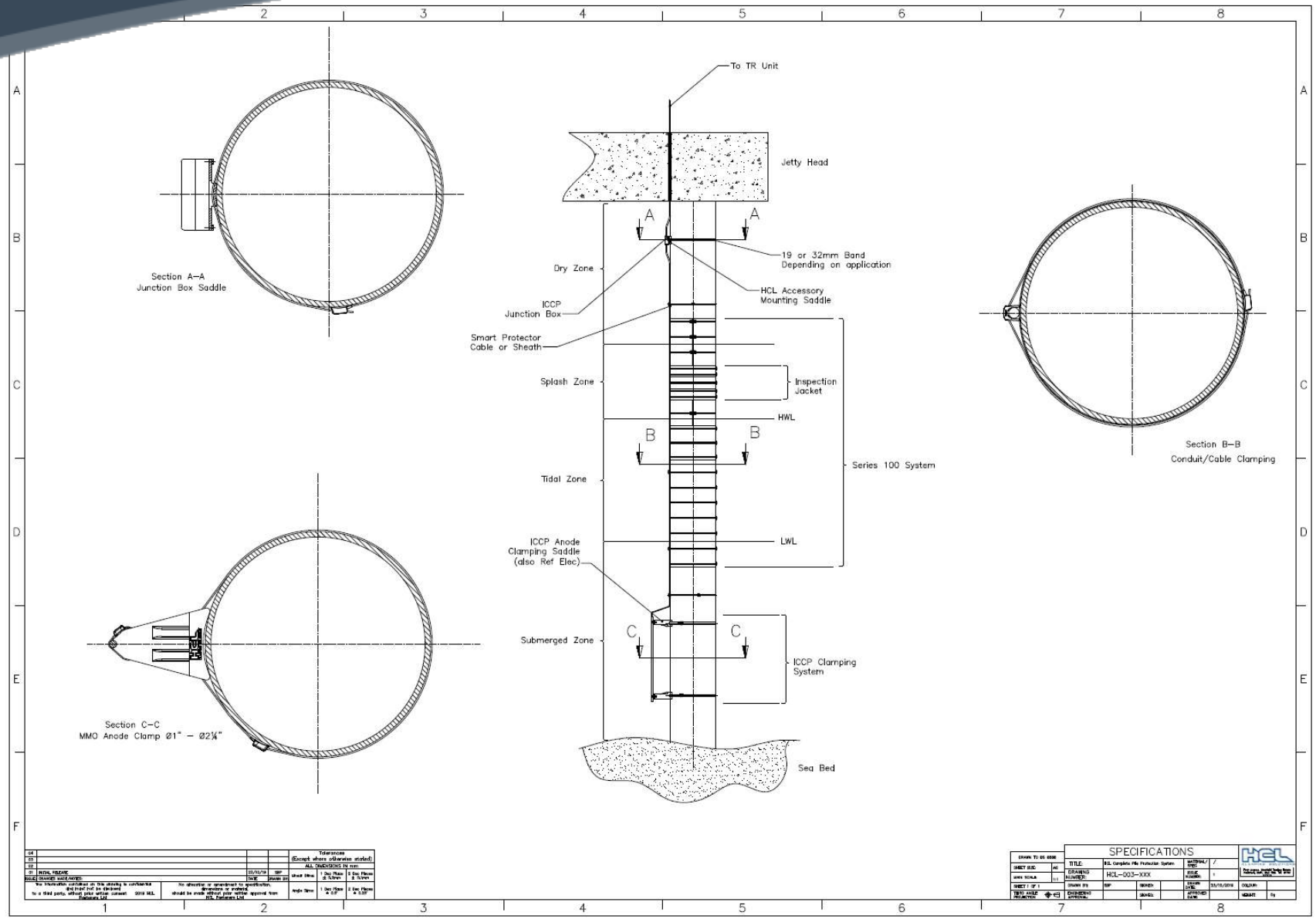

PETRONAS


05.05.2014 08:26

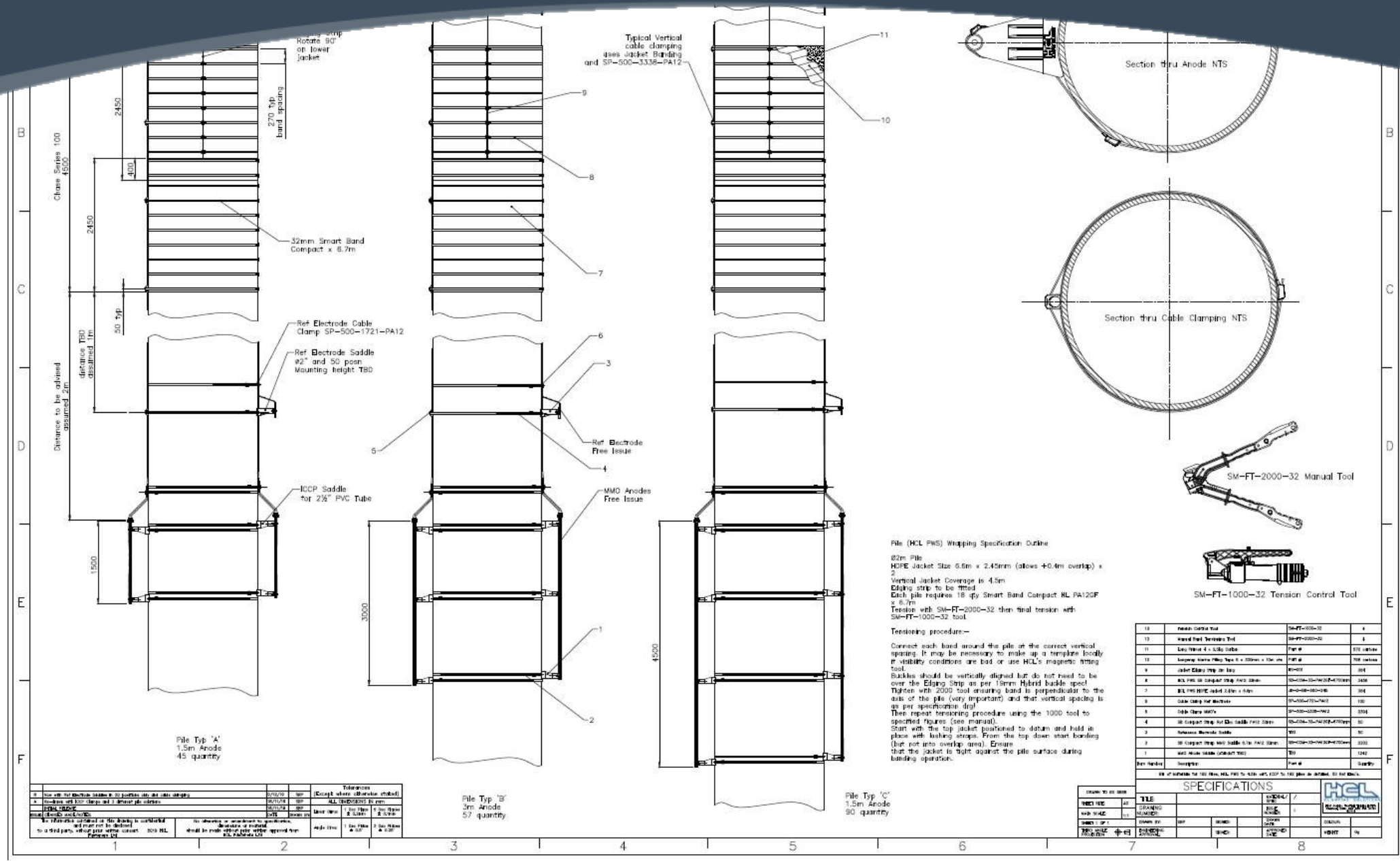


Support!

Specification drawings



System drawings, RAMS

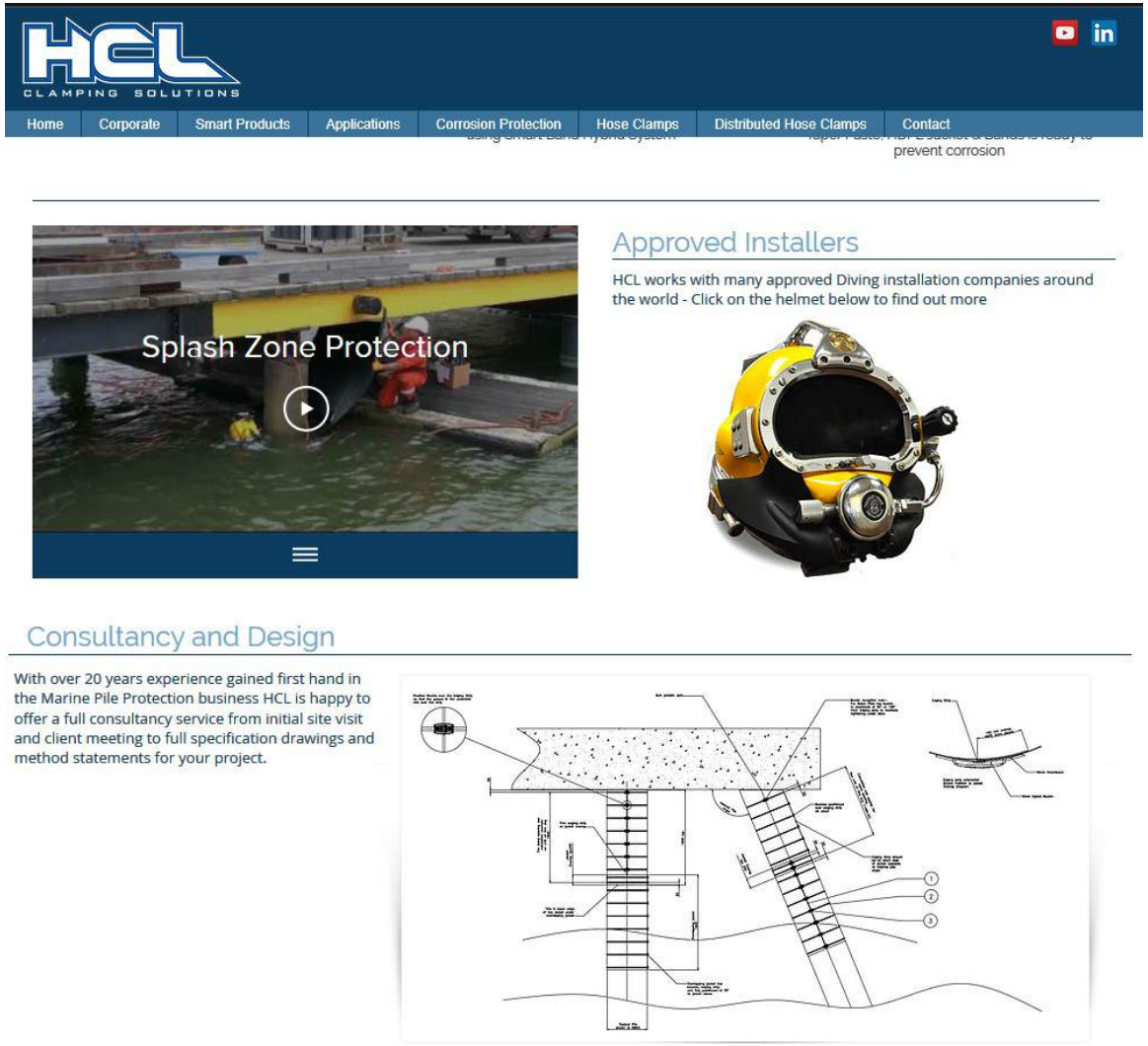


On-site training

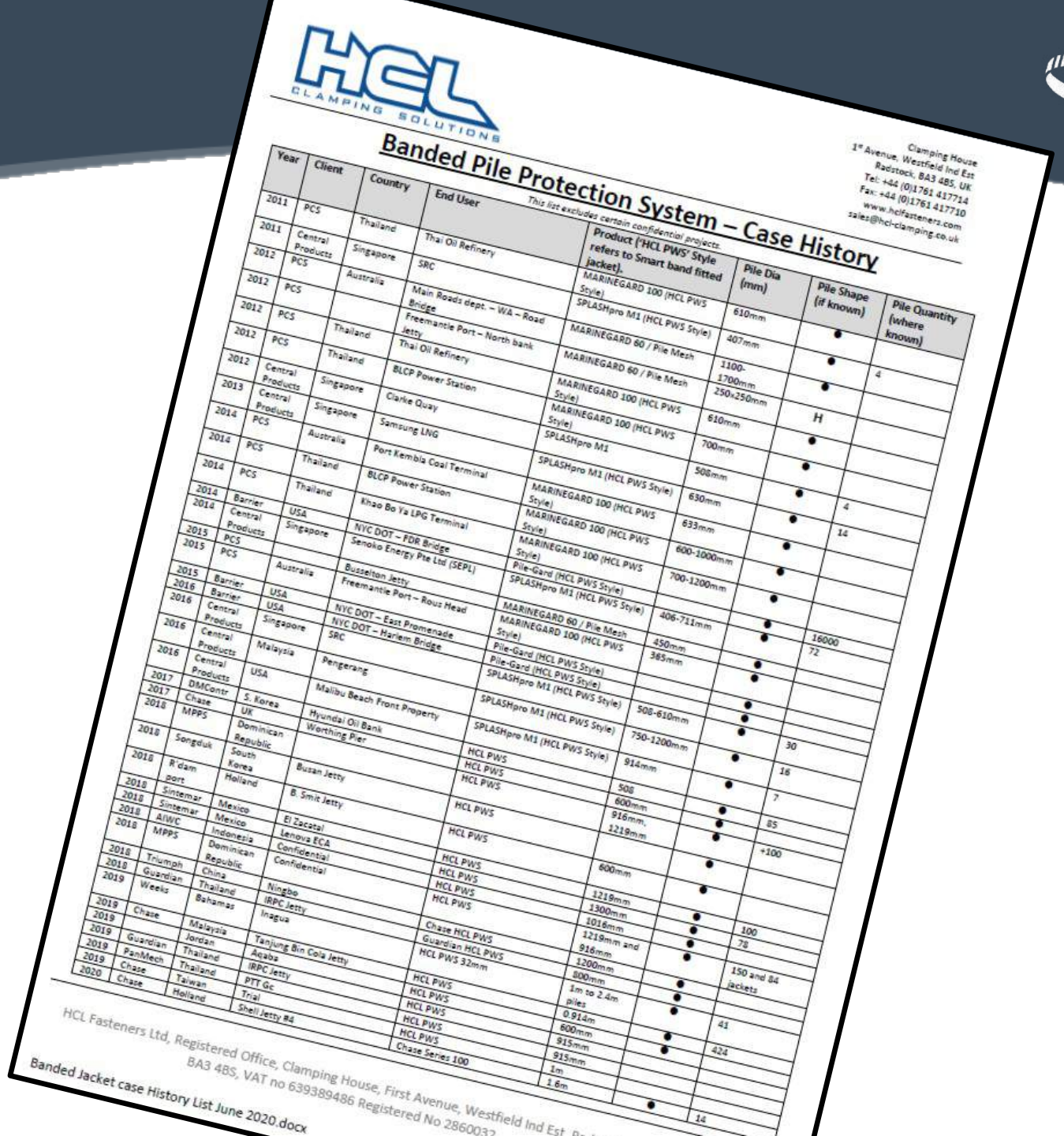
International Support.

Online Resource

- Literature
- Videos
- Approved Installers
- News
- Fully Updated.



PWS Case History List.



HCL CLAMPING SOLUTIONS

Banded Pile Protection System – Case History

This list excludes certain confidential projects.

Clamping House
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Fax: +44 (0)1761 417710
www.hclfasteners.com
sales@hcl-clamping.co.uk

Year	Client	Country	End User	Product ('HCL PWS' Style refers to Smart band fitted jacket).	Pile Dia (mm)	Pile Shape (if known)	Pile Quantity (where known)
2011	PCS	Thailand	Thai Oil Refinery	MARINEGARD 100 (HCL PWS Style)	610mm	●	
2011	Central Products	Singapore	SRC	SPLASHpro M1 (HCL PWS Style)	407mm	●	4
2012	PCS	Australia	Main Roads dept. – WA – Road Bridge	MARINEGARD 60 / Pile Mesh	1100-1700mm	●	
2012	PCS	Thailand	Freemantle Port – North bank jetty	MARINEGARD 60 / Pile Mesh	250x250mm	H	
2012	PCS	Thailand	Thai Oil Refinery	MARINEGARD 100 (HCL PWS Style)	610mm	●	
2012	Central Products	Singapore	BLCP Power Station	MARINEGARD 100 (HCL PWS Style)	700mm	●	
2013	Central Products	Singapore	Clarke Quay	SPLASHpro M1	508mm	●	
2014	PCS	Australia	Samsung LNG	SPLASHpro M1 (HCL PWS Style)	630mm	●	4
2014	PCS	Thailand	Port Kembla Coal Terminal	MARINEGARD 100 (HCL PWS Style)	633mm	●	14
2014	PCS	Thailand	BLCP Power Station	MARINEGARD 100 (HCL PWS Style)	600-1000mm	●	
2014	Barrier	USA	Khao Bo Ya LPG Terminal	Pile-Gard (HCL PWS Style)	700-1200mm	●	
2014	Central Products	Singapore	NYC DOT – FDR Bridge	SPLASHpro M1 (HCL PWS Style)	406-711mm	●	
2015	PCS		Senoko Energy Pte Ltd (SEPL)	MARINEGARD 60 / Pile Mesh	450mm	●	16000
2015	PCS	Australia	Busselton Jetty	MARINEGARD 100 (HCL PWS Style)	385mm	●	72
2015	Barrier	USA	Freemantle Port – Rous Head	Pile-Gard (HCL PWS Style)		●	
2016	Barrier	USA	NYC DOT – East Promenade	Pile-Gard (HCL PWS Style)		●	
2016	Central Products	Singapore	NYC DOT – Harlem Bridge	SPLASHpro M1 (HCL PWS Style)	508-610mm	●	
2016	Central Products	Malaysia	SRC	SPLASHpro M1 (HCL PWS Style)	750-1200mm	●	30
2016	Central Products	USA	Pengerang	HCL PWS	914mm	●	16
2017	DMContr	S. Korea	Malibu Beach Front Property	HCL PWS	508	●	7
2018	Chase	UK	Hyundai Oil Bank	HCL PWS	600mm	●	85
2018	MPPS	Dominican Republic	Worthing Pier	HCL PWS	916mm, 1219mm	●	+100
2018	Songduk	South Korea	Busan Jetty	HCL PWS	600mm	●	
2018	R'dam port	Holland	B. Smit Jetty	HCL PWS	1219mm	●	
2018	Sintemar	Mexico	El Zacatal	HCL PWS	1300mm	●	100
2018	Sintemar	Mexico	Lenova ECA	HCL PWS	1016mm	●	78
2018	AIWC	Indonesia	Confidential	Chase HCL PWS	1219mm and 916mm	●	
2018	MPPS	Dominican Republic	Confidential	Guardian HCL PWS	1200mm	●	150 and 84 jackets
2018	Triumph	China	Ningbo	HCL PWS 32mm	800mm	●	
2018	Guardian	Thailand	IRPC Jetty	HCL PWS	1m to 2.4m piles	●	
2019	Weeks	Bahamas	Inagua	HCL PWS	0.914m	●	41
2019	Chase	Malaysia	Tanjung Bin Cola Jetty	HCL PWS	600mm	●	424
2019	Guardian	Jordan	Aqaba	HCL PWS	915mm	●	
2019	PanMech	Thailand	IRPC Jetty	HCL PWS	915mm	●	
2019	Chase	Thailand	PTT Gc	HCL PWS	1m	●	
2020	Chase	Taiwan	Trial	HCL PWS	1.6m	●	14
		Holland	Shell Jetty B4	Chase Series 100		●	

Questions?

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HCL Fasteners Ltd.

Thank You.

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