



HCL Smart Products Presentation

Corrosion

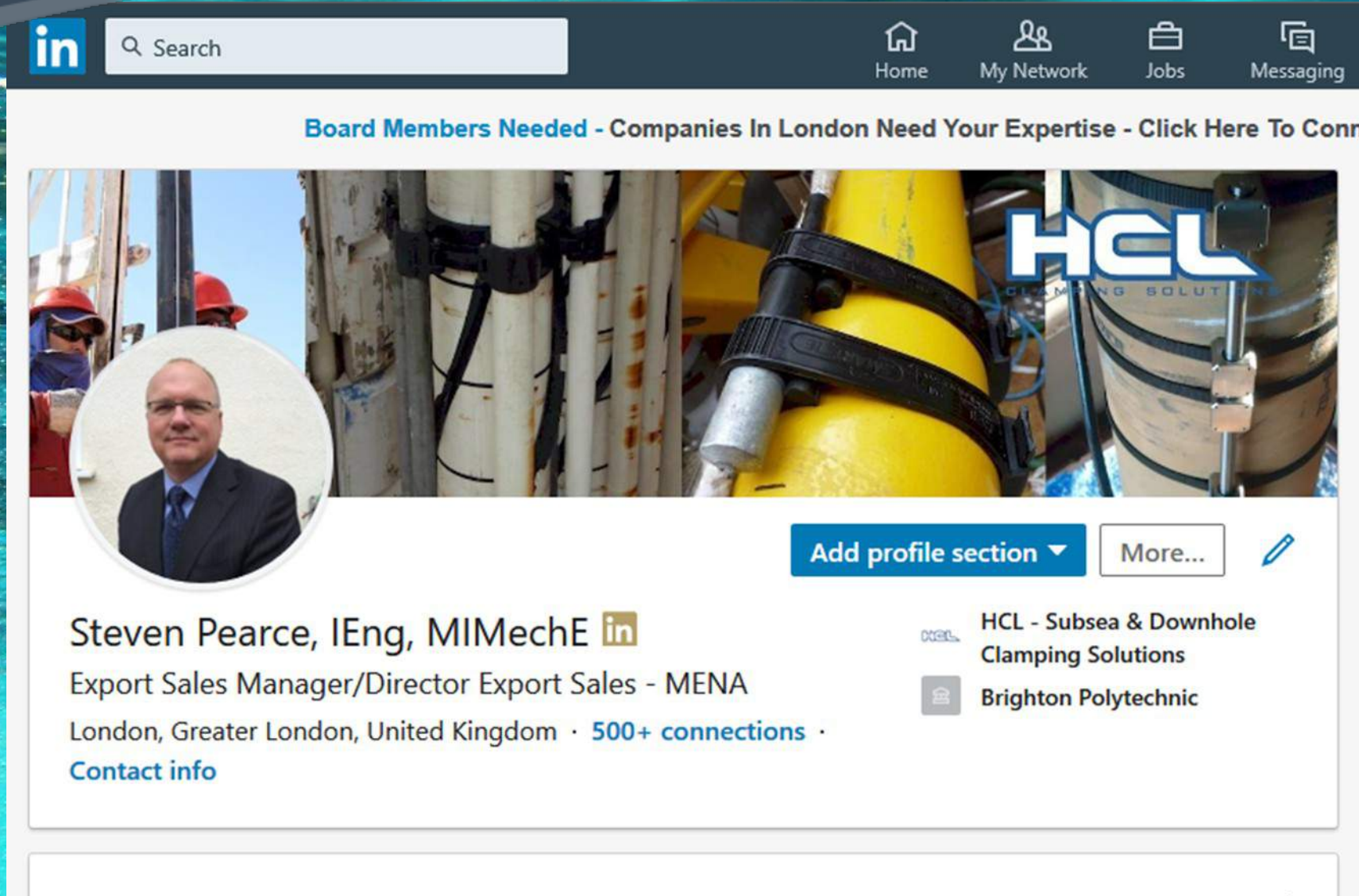


Non-metallic, Corrosion Free, Marine Structure Protection Systems.

Steve Pearce, *IEng, MIMechE* .

HCL Fasteners Ltd, *September 2020 ©*

Connect with me on LinkedIn

A screenshot of a LinkedIn profile for Steven Pearce. The background of the profile banner is a collage of images: on the left, two workers in red hard hats and safety gear; in the center, a yellow industrial component with black straps; on the right, a close-up of a metal clamping mechanism with the HCL logo overlaid. The LinkedIn interface includes a search bar at the top, navigation icons for Home, My Network, Jobs, and Messaging, and a banner with the text 'Board Members Needed - Companies In London Need Your Expertise - Click Here To Conn'. The profile name is 'Steven Pearce, IEng, MIMechE' with a LinkedIn icon. His title is 'Export Sales Manager/Director Export Sales - MENA' and his location is 'London, Greater London, United Kingdom'. He has '500+ connections'. To the right of the name are buttons for 'Add profile section', 'More...', and an edit icon. Below the name are two company logos: 'HCL - Subsea & Downhole Clamping Solutions' and 'Brighton Polytechnic'. A 'Contact info' link is visible at the bottom left of the profile section.

Worldwide Clients



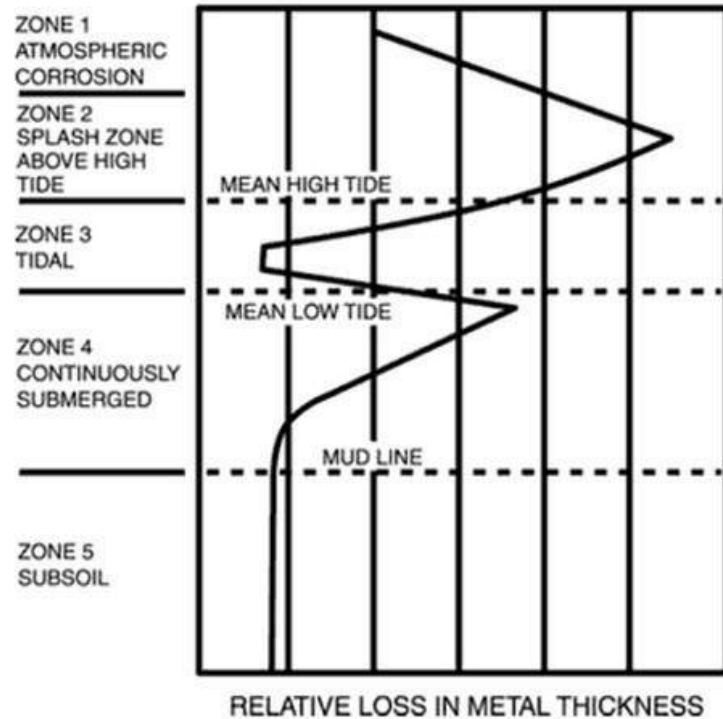
Worldwide Clients



Let's start with the Splash

Zone!

- 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



Strange Corrosion, LLC

....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	
	<small>Office: 205, Al Zorani Bldg P.O. Box: 191465 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</small>
Royal HaskoningDHV <i>Enhancing Society Together</i>	



Where are we with existing Splash
Zone 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



INSTITUTE NACE FOUNDATION NIICAP IMPACT PLUS SECTIONS & AREAS CAREER CENTER MY ACCOUNT

Select Language ▾



NACE
INTERNATIONAL

NACE equips society to protect people, assets and the environment from the adverse effects of corrosion.

75th Anniversary 1943 - 2018

TRAINING & EDUCATION MEMBERSHIP COMMITTEES EVENTS RESOURCES

TG 542 - Splash Zone Site-Applied Corrosion Protection System

Assignment: To develop a standard providing terminology and definitions for the site-applied system for corrosion protection, technical methods and criteria for performance, packing, and marking.

Committee Information Balloting Calendar Members News Polls Help

Technology Management Group: N2 - Corrosion Prevention and Control for Chemical Process and Energy, Pollution Control and Military Industries

NACE Staff Liaison: [Ed Barrett](#)

▢ **Officers**

Program Coordinator: [Cui, Fushuang](#) (2017-2019)

N2 Associate Technology Coordinator: [Krebs, Lorrie A.](#) (2017-2020)

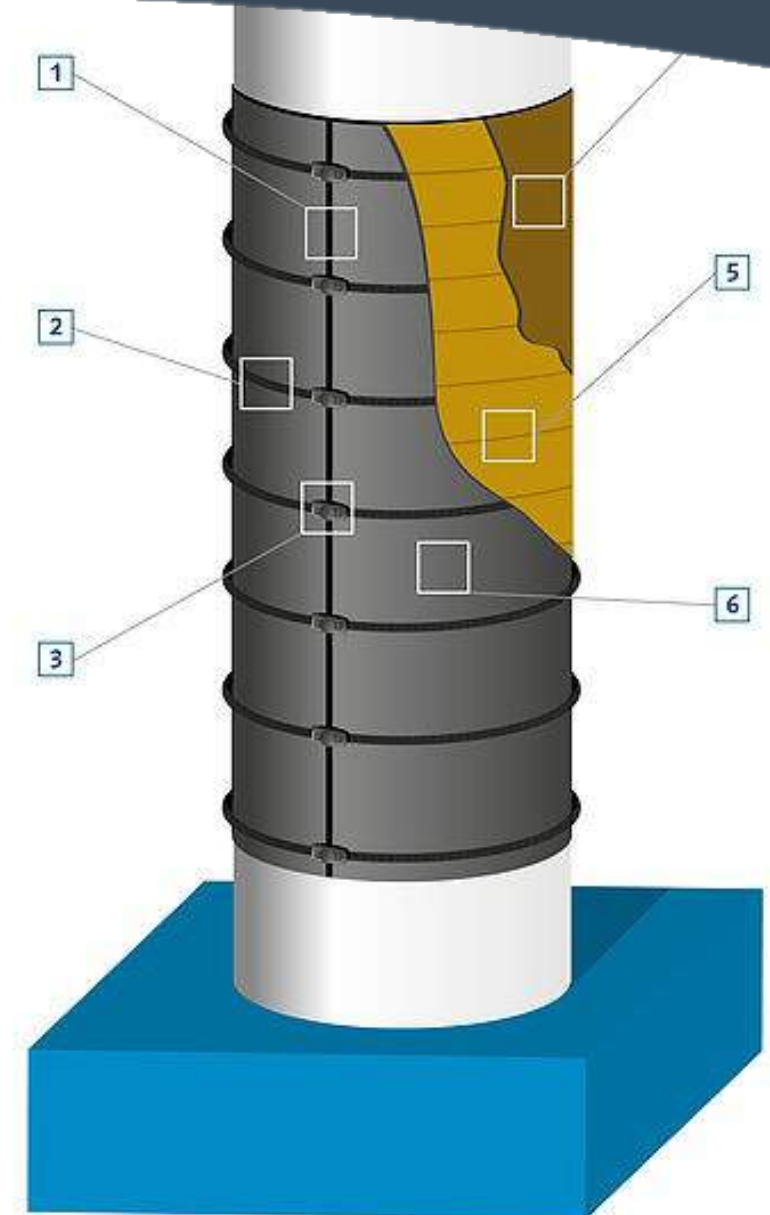
Technology Coordinator: [Kleinfelder, Hank](#) (2017-2020)

Associate Program Coordinator: [Eden, Dawn C.](#) (2017-2019)

Chair: [Thomson, John](#) (2016-2018)

Vice Chair: [Macdonald, Robert M.](#) (2016-2018)

▢ **Committees**




NACE Committee



FOUNDATION NIICAP IMPACT PLUS SECTIONS & AREAS CAREER CENTER MY A

Select Language



NACE[®]
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NACE equips society to protect people, assets and the environment from the adverse effects of corrosion.

75th Anniversary 1943 - 2018

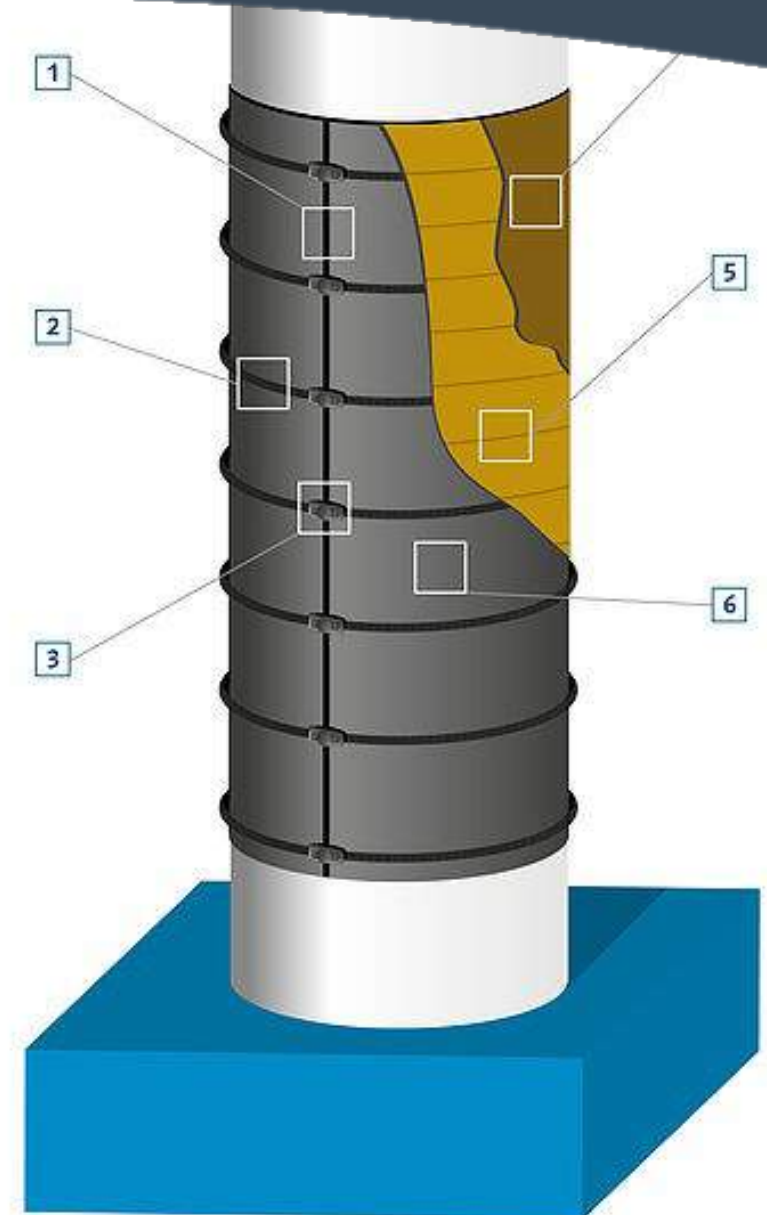
TRAINING & EDUCATION MEMBERSHIP COMMITTEES EVENTS RESO

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Name	Title
Ed Barrett	Staff Liaison
Anil Bhardwaj	Member
Ahmad Shamiri Bin Wahab	Member
Hindrik "Erik" Broesder	Member
Joe Davis	Member
Phillibert de Bonnafos	Member
Robert MacDonald	Vice Chair
Spencer Macsween	Member
Steven Pearce	Member
Shobhendu Prabhakar	Member
Anthony Strange	Member
John Thomson	Chair
Roy Wagner	Member



Heading Here



Structural Considerations & Challenges.

Jetty Configuration



Not all jetty's look like this!

Jetty Configuration

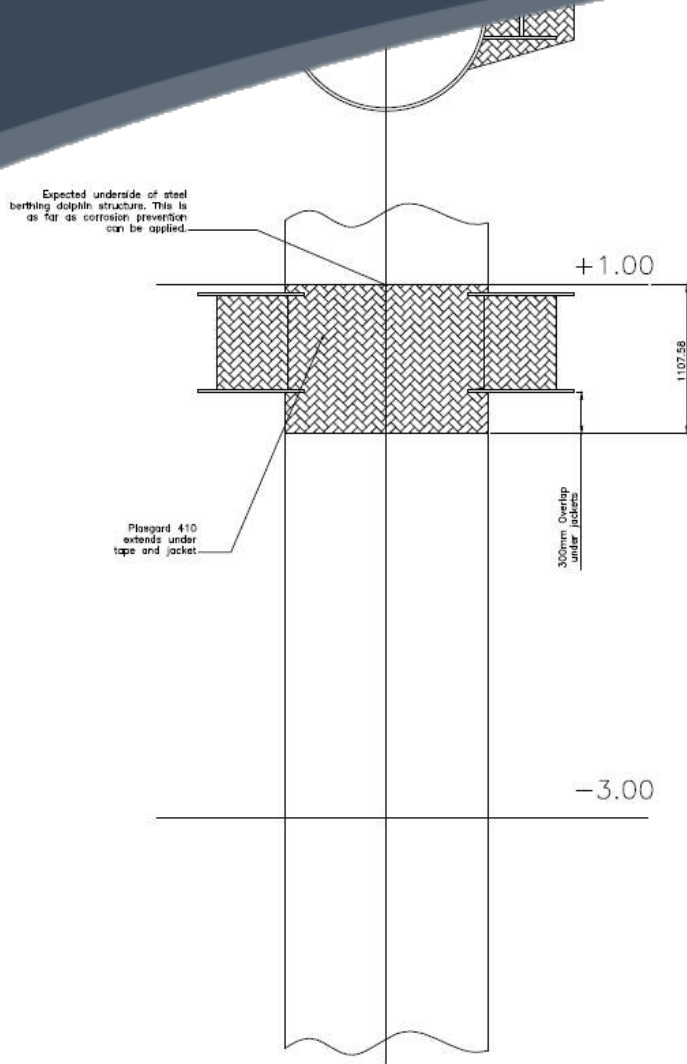


Or this!

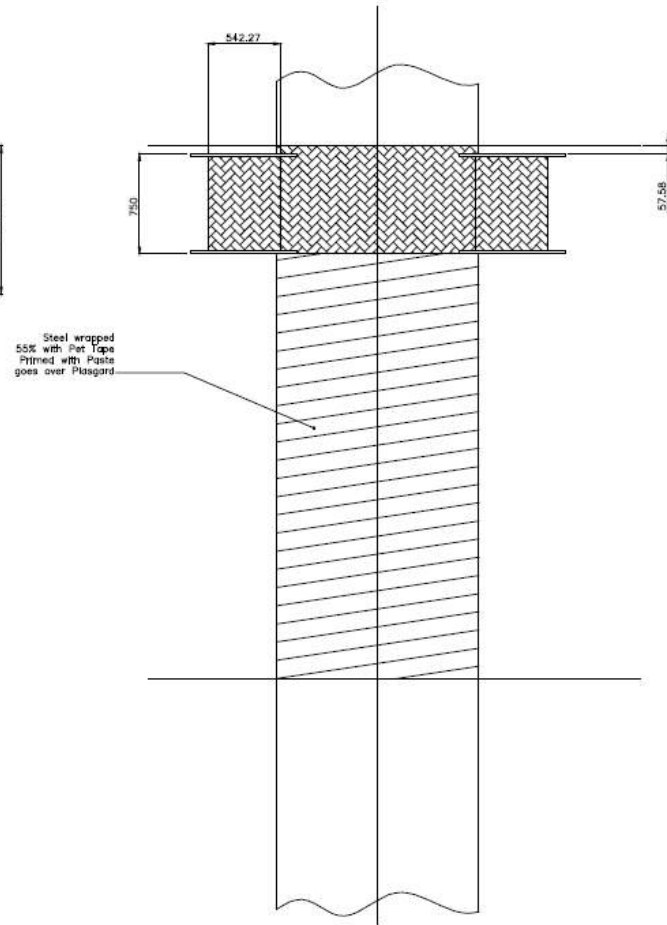
Jetty Configuration



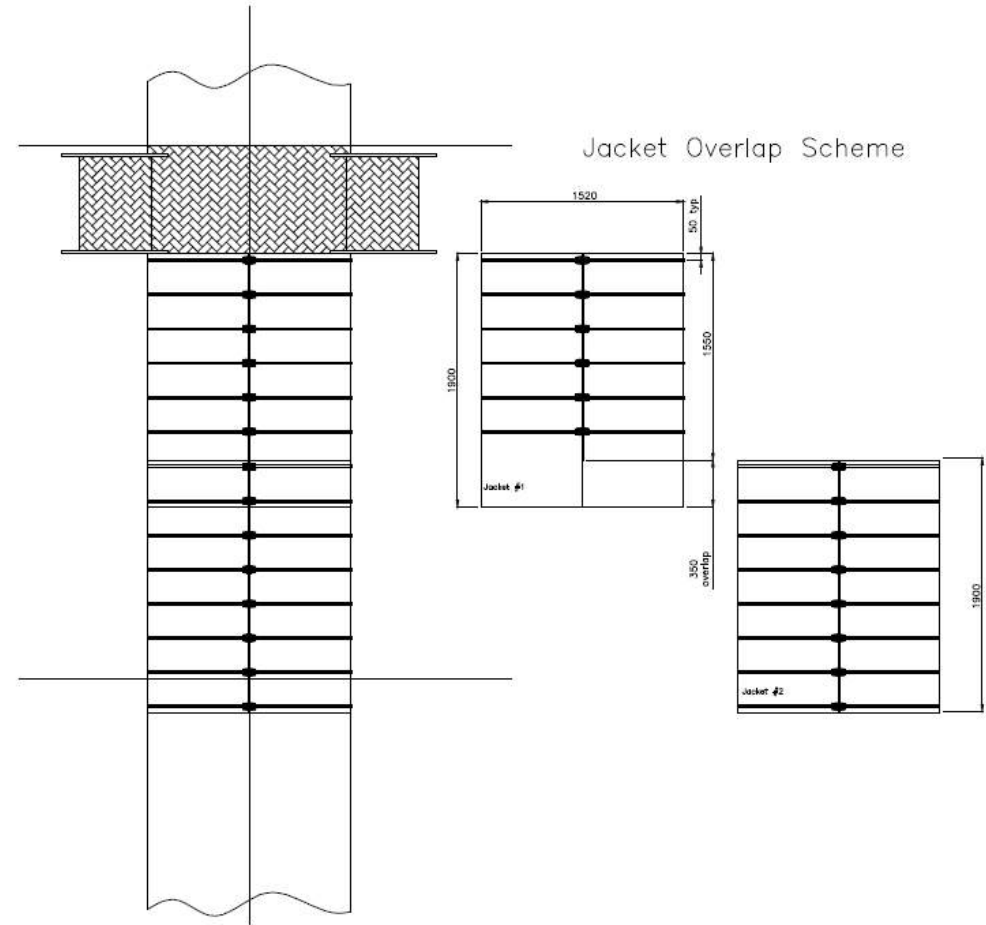
Technical Drawing Support



Stage 1 – Apply Plagard to Area shown.



Stage 2 – Pet tape wrap overlap Plagard.



Stage 3 – Apply outer Armour and Banding.

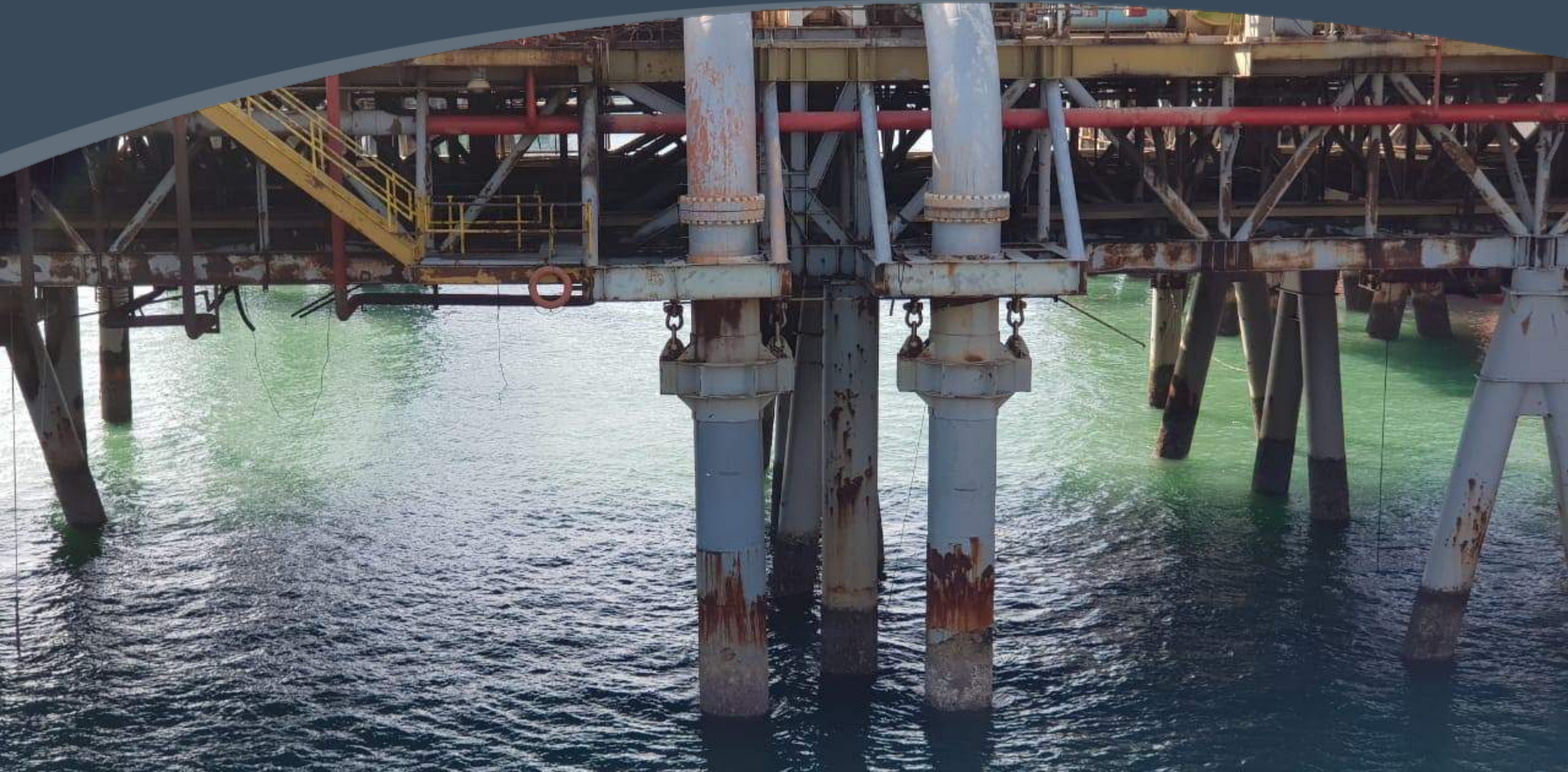
Cross-bracing!



H Beams



Sea-water Intakes



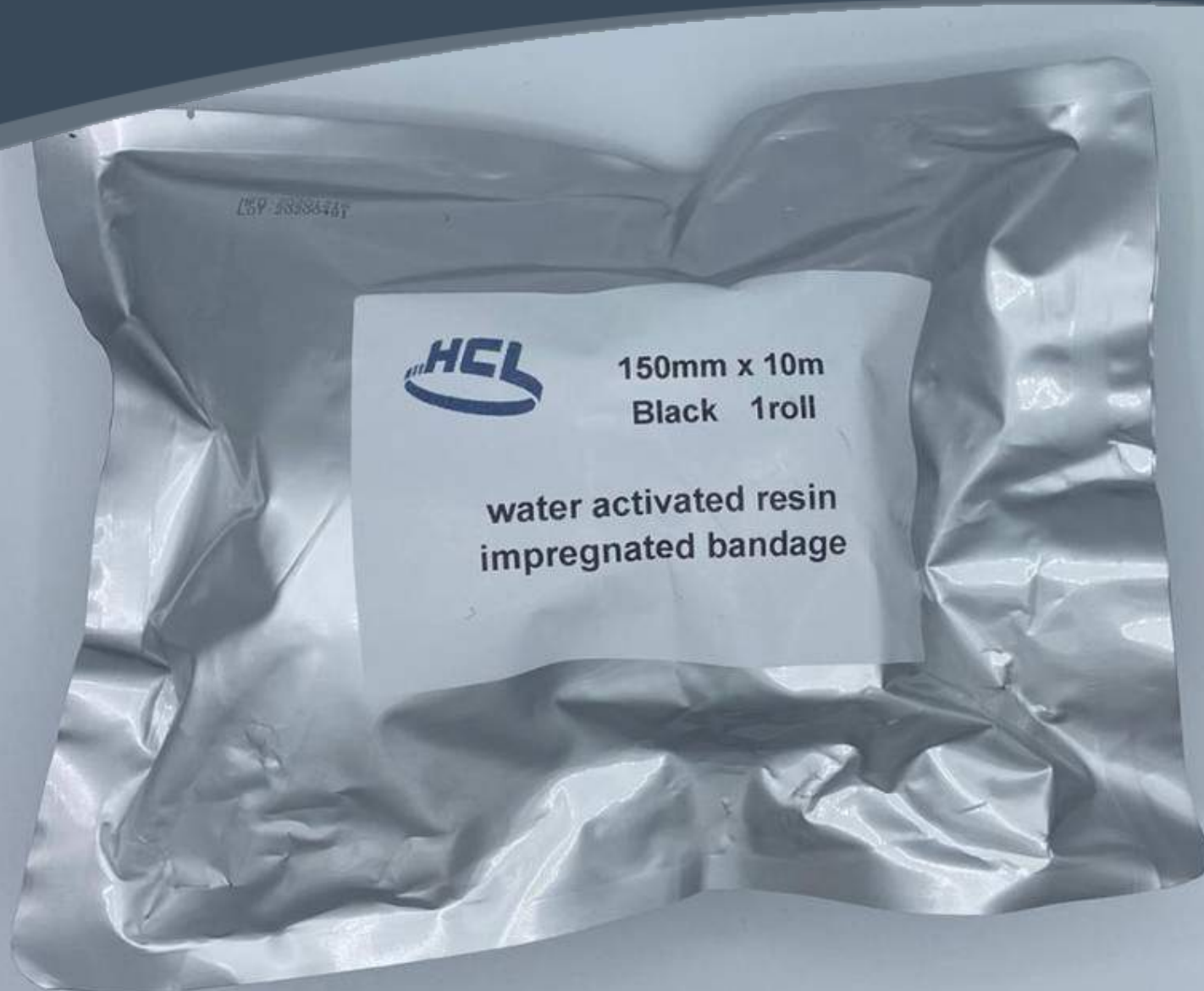
Information usually required to quote:-

- 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



150mm x 10m
Black 1roll

water activated resin
impregnated bandage

159-2838444



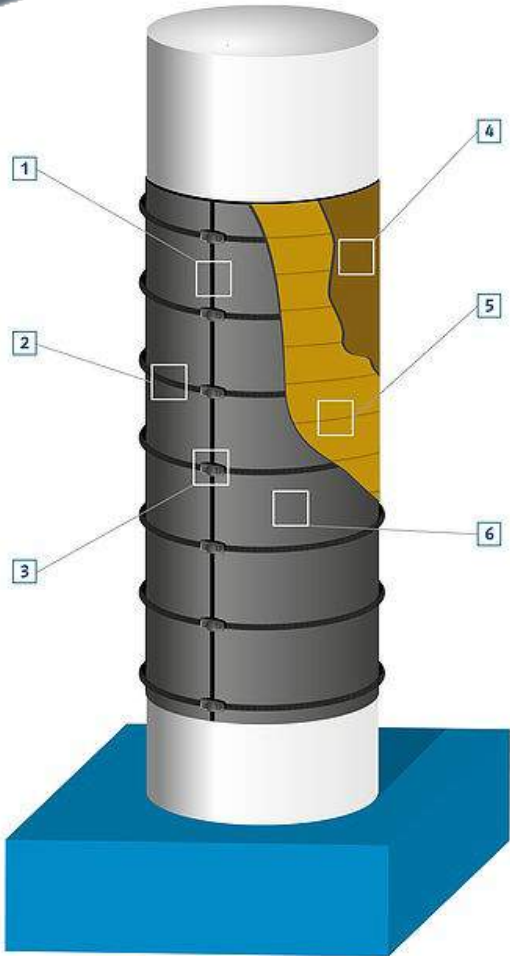
HCL Pile Wrap System (PWS)

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.



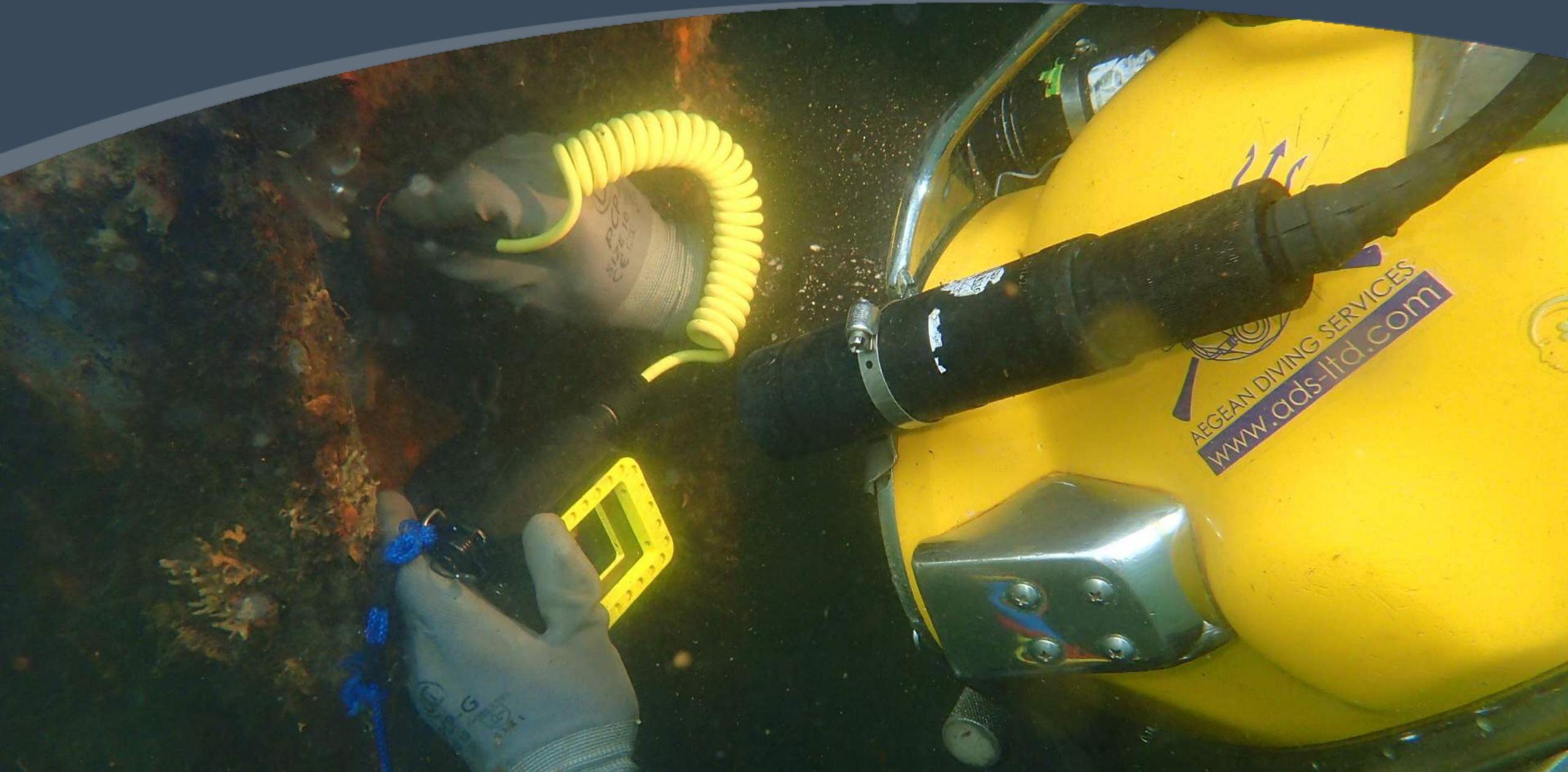
.....not just from HCL!



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



08/09/2019 11:21

Heading Here



Wrap with
Marine
Grade
Petrolatum
Tape.
Smooth
over the
tape edges
when
fitting.



Underwater wrapping



08/09/2019 12:14

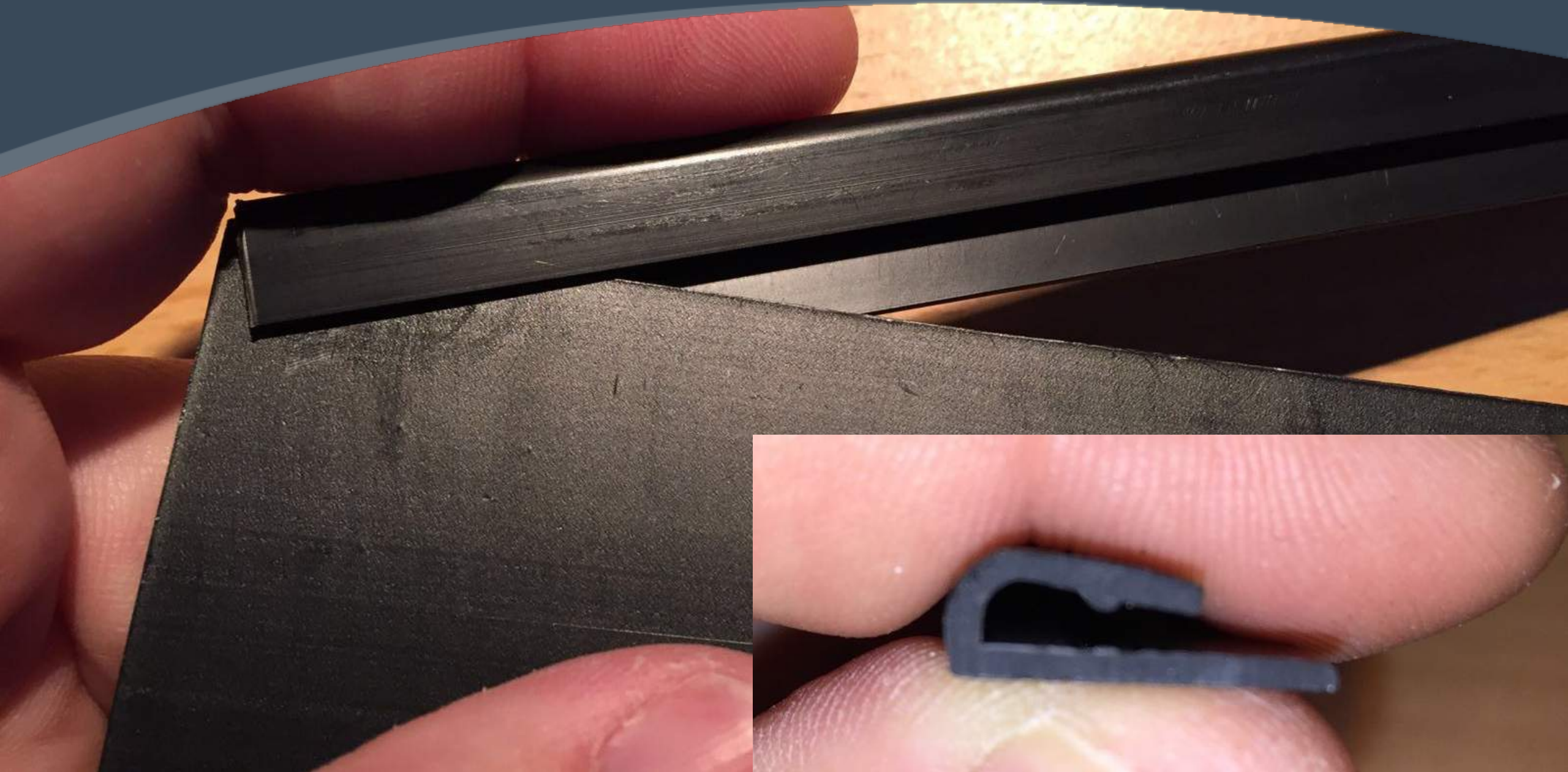
No Holidays



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 zero



Fit HDPE Jacket

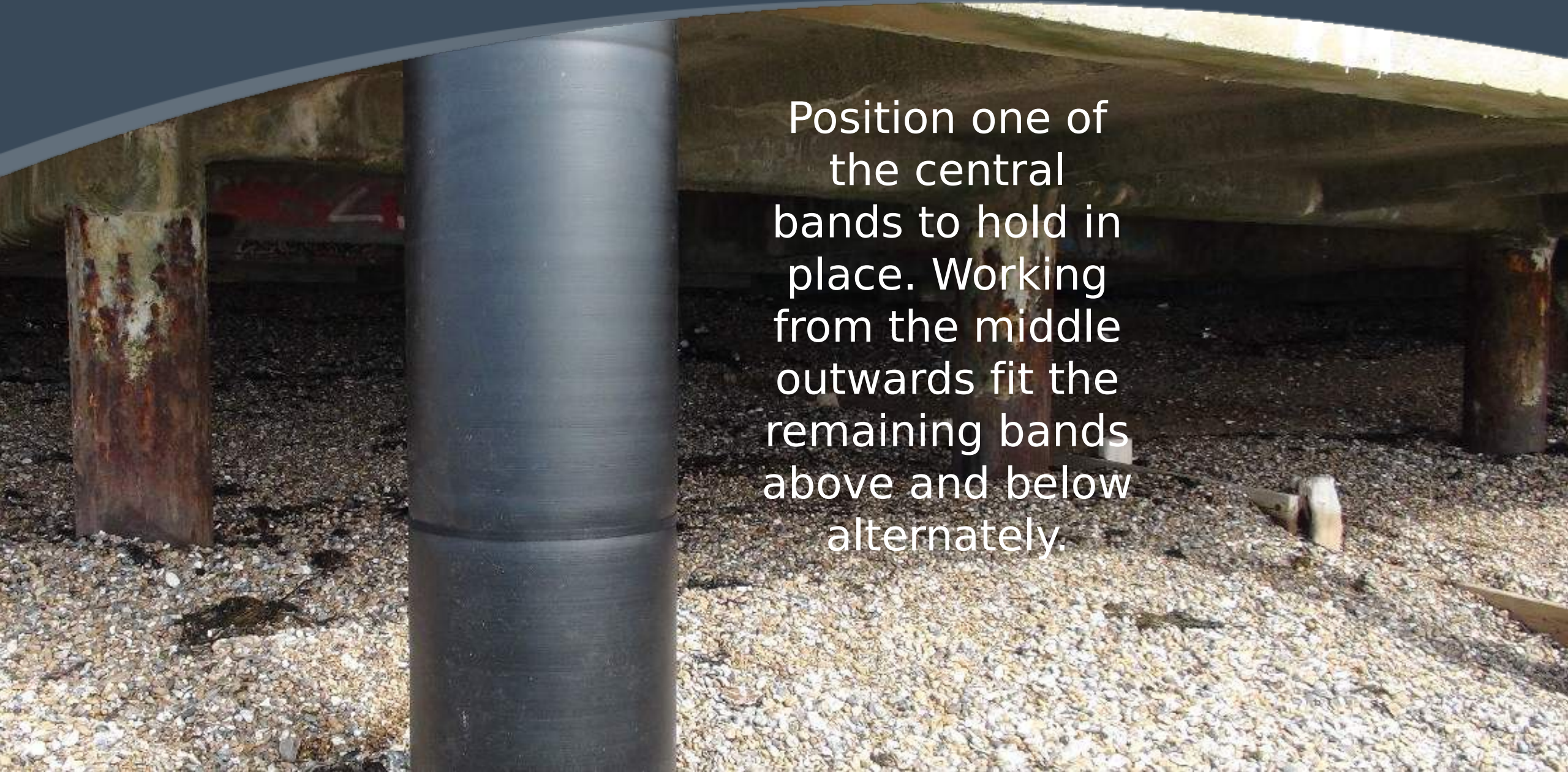


Offer up the 2mm HDPE outer armour. Edging strip already fitted and on the outer edge. The smaller (rounded) part of the Edging Strip profile should be

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.

Stage 2 - Apply primer (where required) and start wrapping tape following 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.

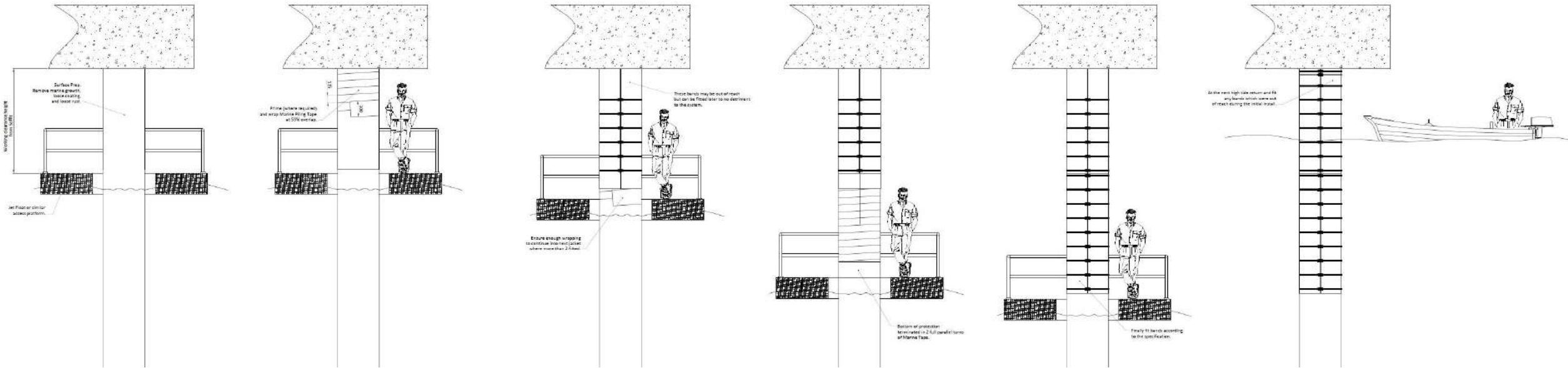
Stage 3 - If a single jacket project then finish tape at the correct level with a double parallel wrap. If overlapping jackets then ensure more than one full width of wrapped tape extends past the bottom of the first jacket. Fit as many bands as working height allows. Out of reach bands can be fitted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

Falling Tide →



Jet Float Installation



HCL Pile Wrap
System on
Ø711mm Pile.

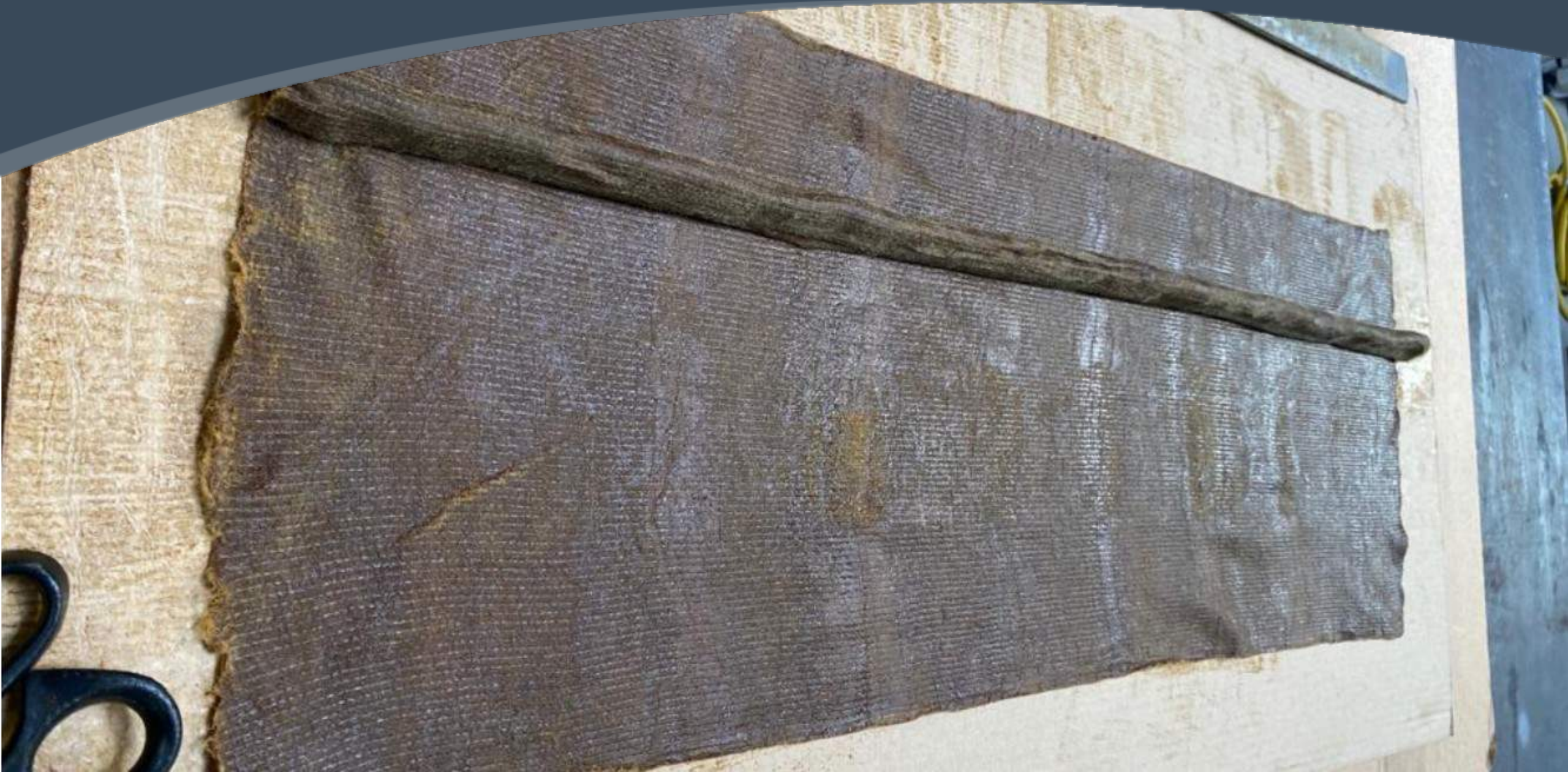
The image shows a close-up, low-angle view of a curved metal structure, likely a ceiling or a large pipe. The inner surface is a dark, textured material, possibly a soffit or insulation. The outer edge is a lighter, metallic material with visible welds and some rust or discoloration. The lighting is dramatic, highlighting the curvature and the texture of the materials.

How to deal with the Soffit.

Roll a bead of tape into a sausage



Place 'sausage' into tape



Form $\frac{1}{4}$ of tape width over 'sausage'



Seal in 'sausage' by pushing and amalgamating tap 



Fit tape arrangement to soffit



And if necessary seal with GRP Resin bandage



Soffit Solution



Bitumen Soffit Seal



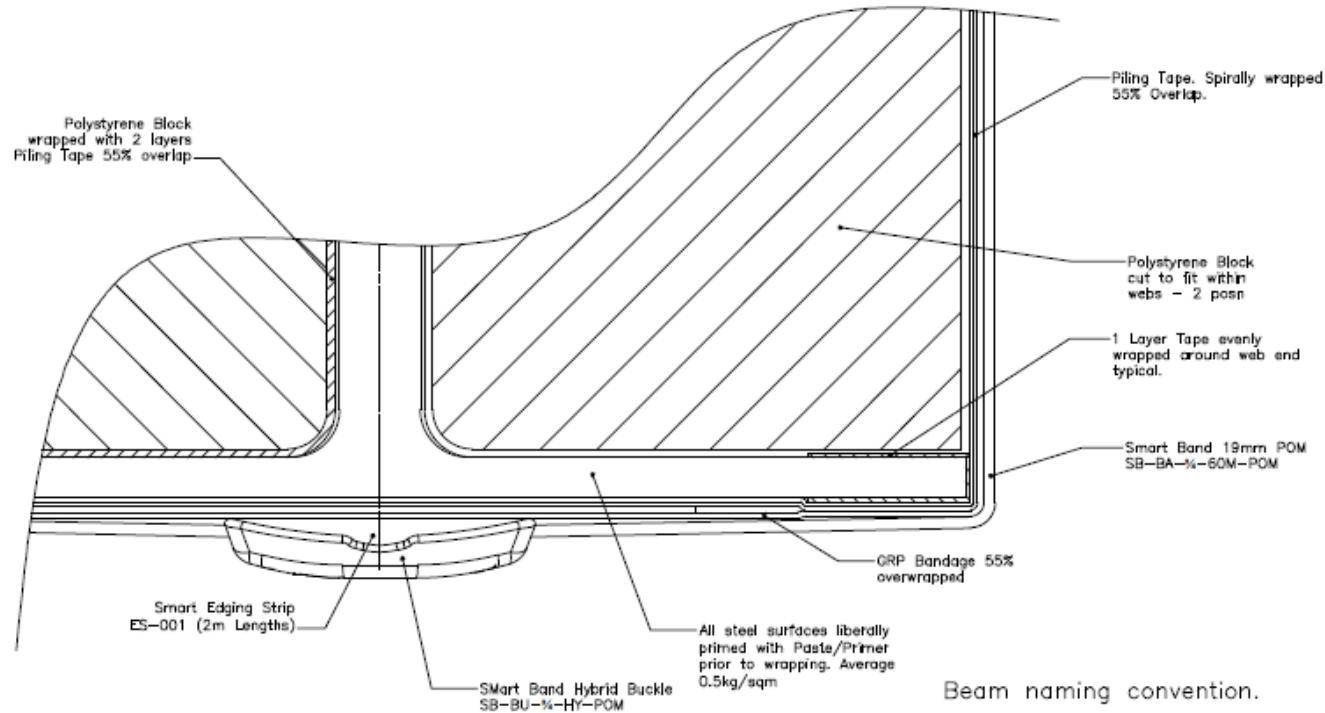
Flexibility for Earthing Connections



H Beam Solution

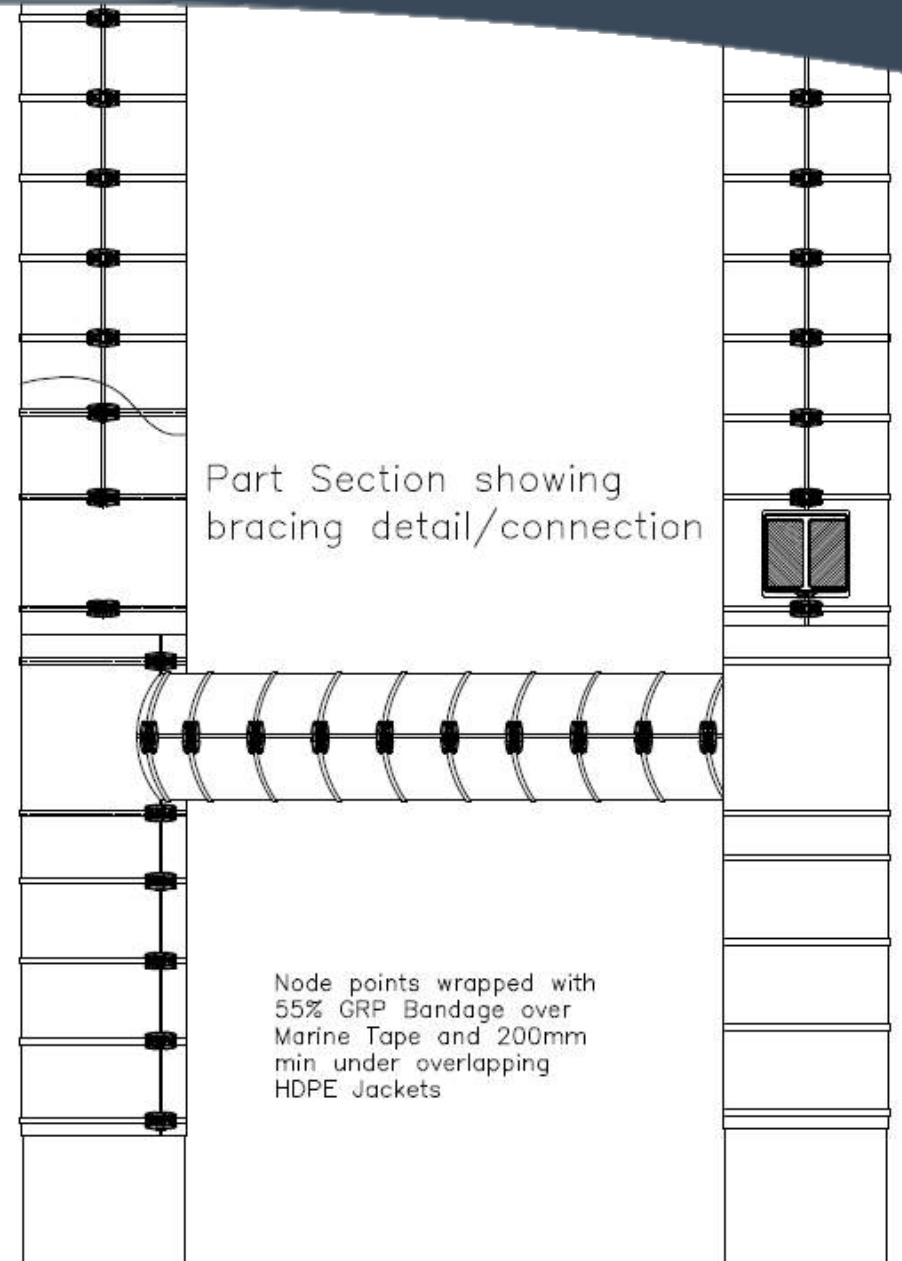


Enlarged View of Wrapping Components on H Beam



Beam naming convention.

Part Section showing bracing detail/connection

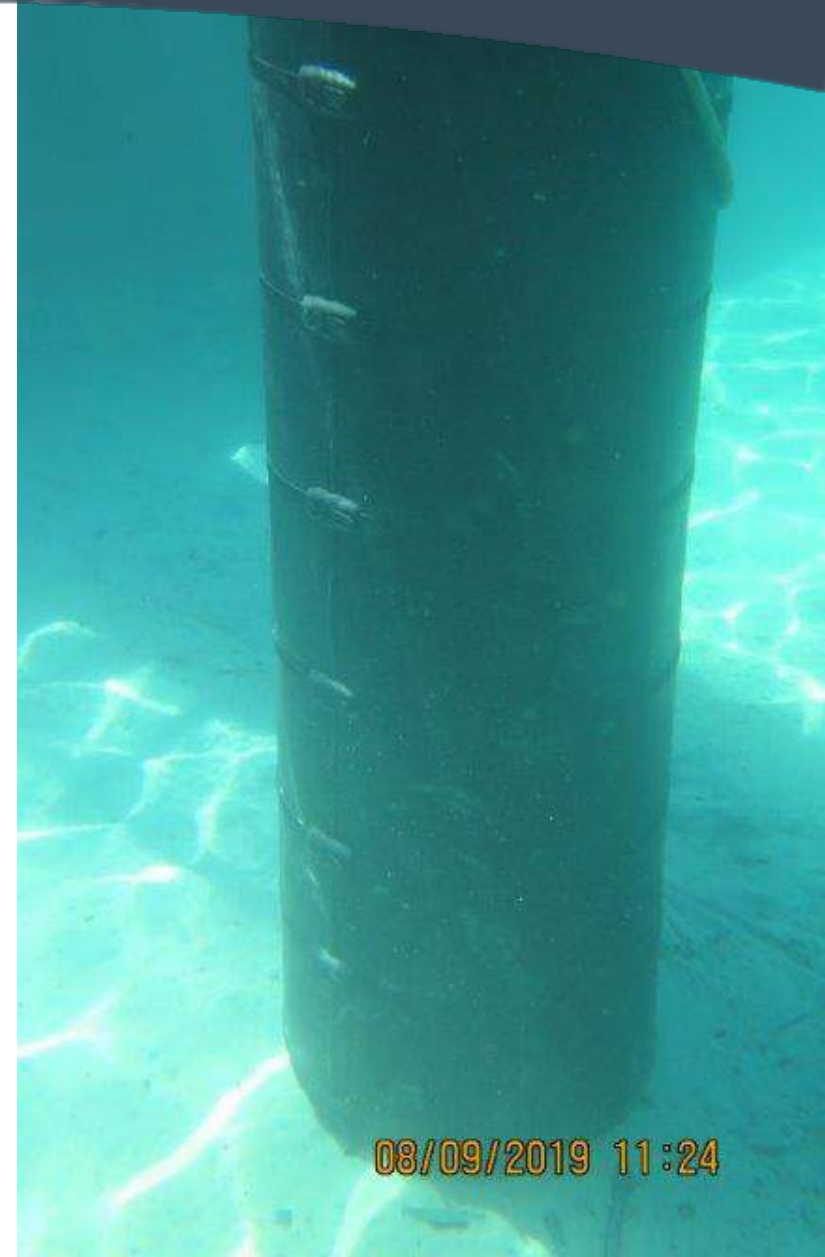


Node points wrapped with 55% GRP Bandage over Marine Tape and 200mm min under overlapping HDPE Jackets

Finished Installation



Installed Series
100 System on
Ø600mm Pile



08/09/2019 11:24

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 and ITR to ensure a quality installation.

HCL
BLINDING SOLUTIONS

Combined ITP/ITR for HCL Pile Protection System.

Client Logo Here	Project Name Here	HCL
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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.
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Page1



HEL

CLAMPING SOLUTIONS

So how to monitor future corrosion levels?



360° Inspection System - 10% coverage.

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**

**Shorty
Jacket.
0.6m**

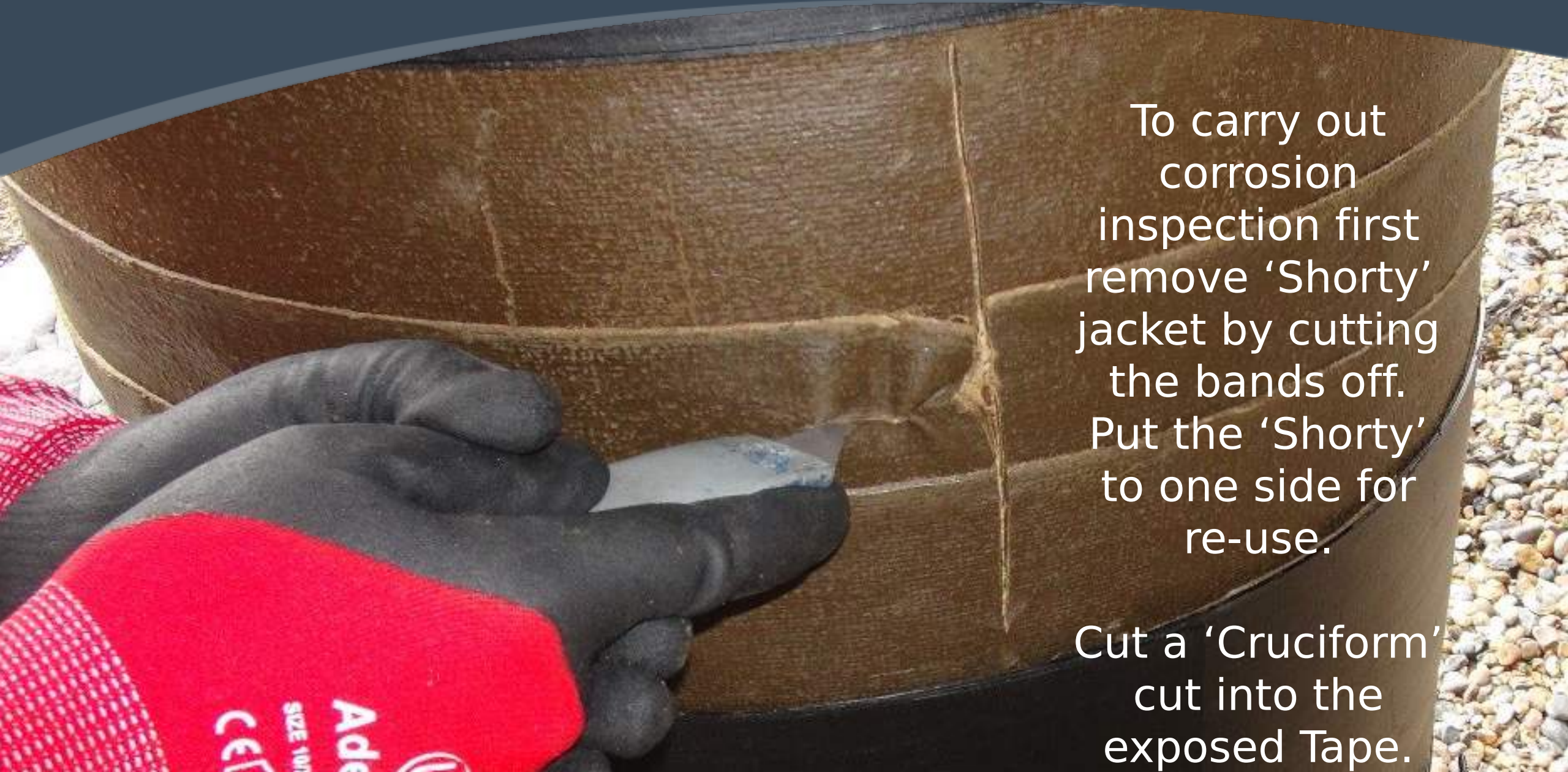


PWS – 360° Inspection



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.

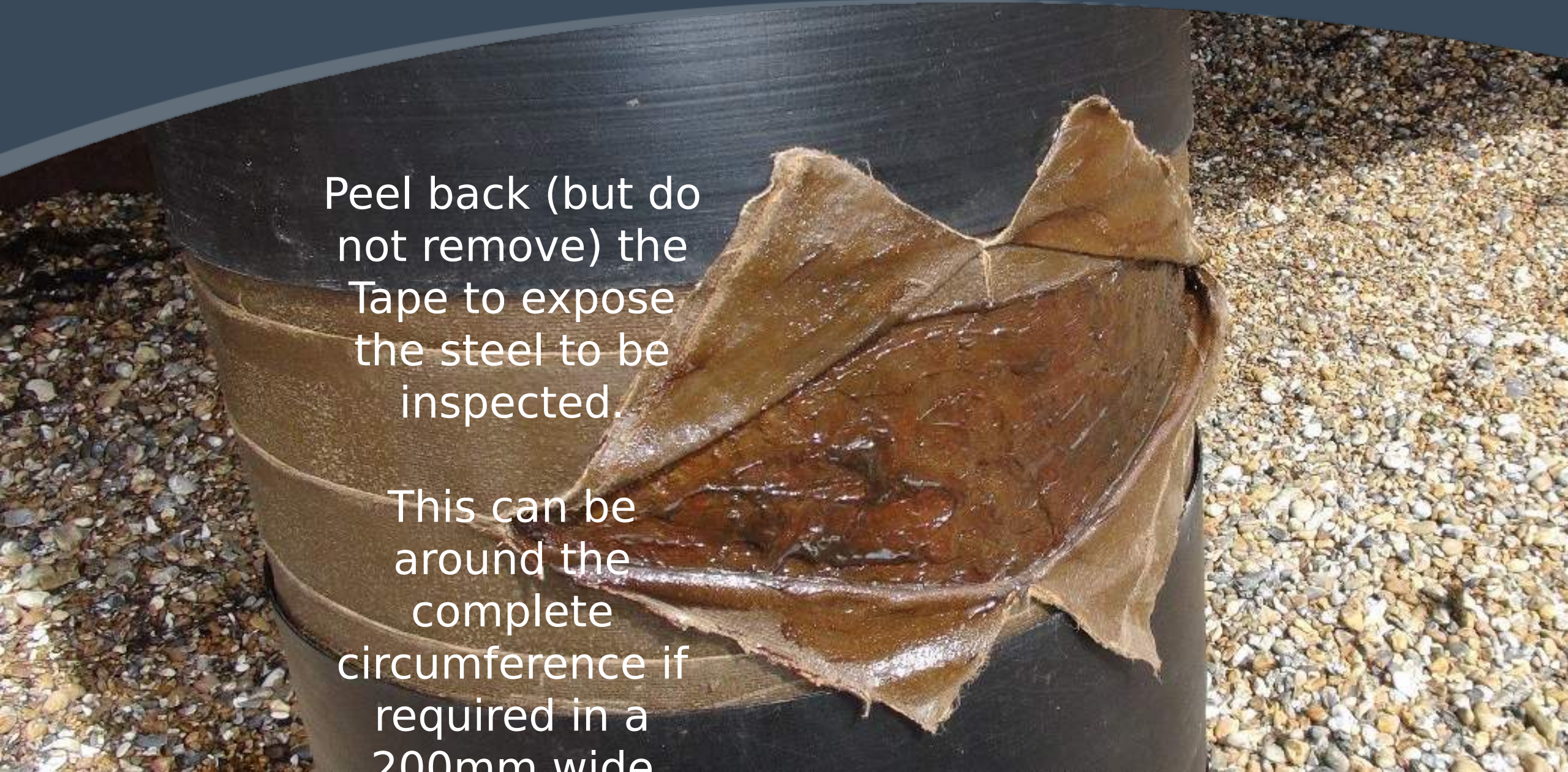


PWS – 360° Inspection



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



Re-fix with 5 new Smart Bands



PWS – 360° Inspection

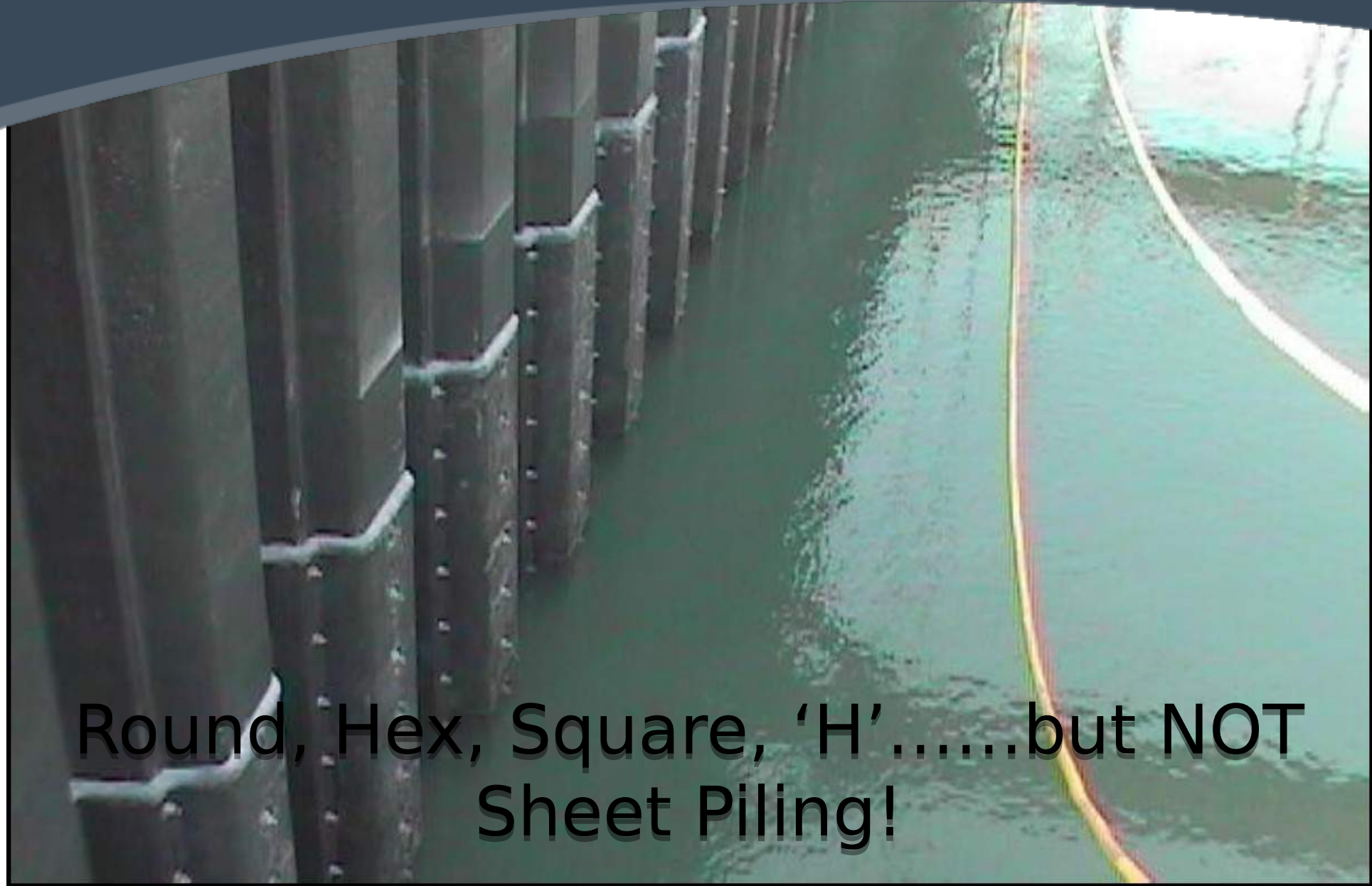


'Shorty'

Installed 'Shorty' jacket.

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

....but not here!



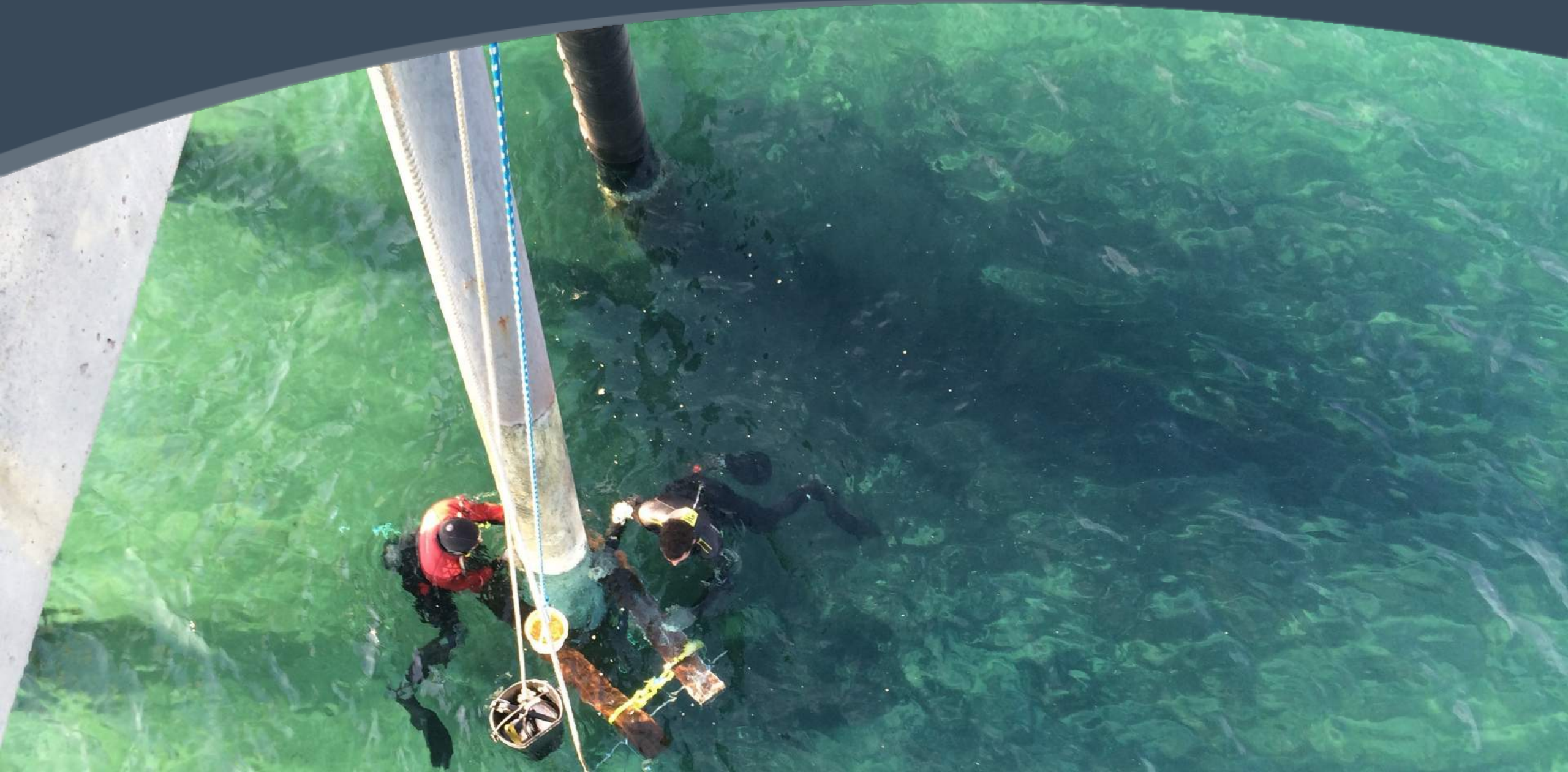
Round, Hex, Square, 'H'.....but NOT
Sheet Piling!

Pile Wrap System Projects

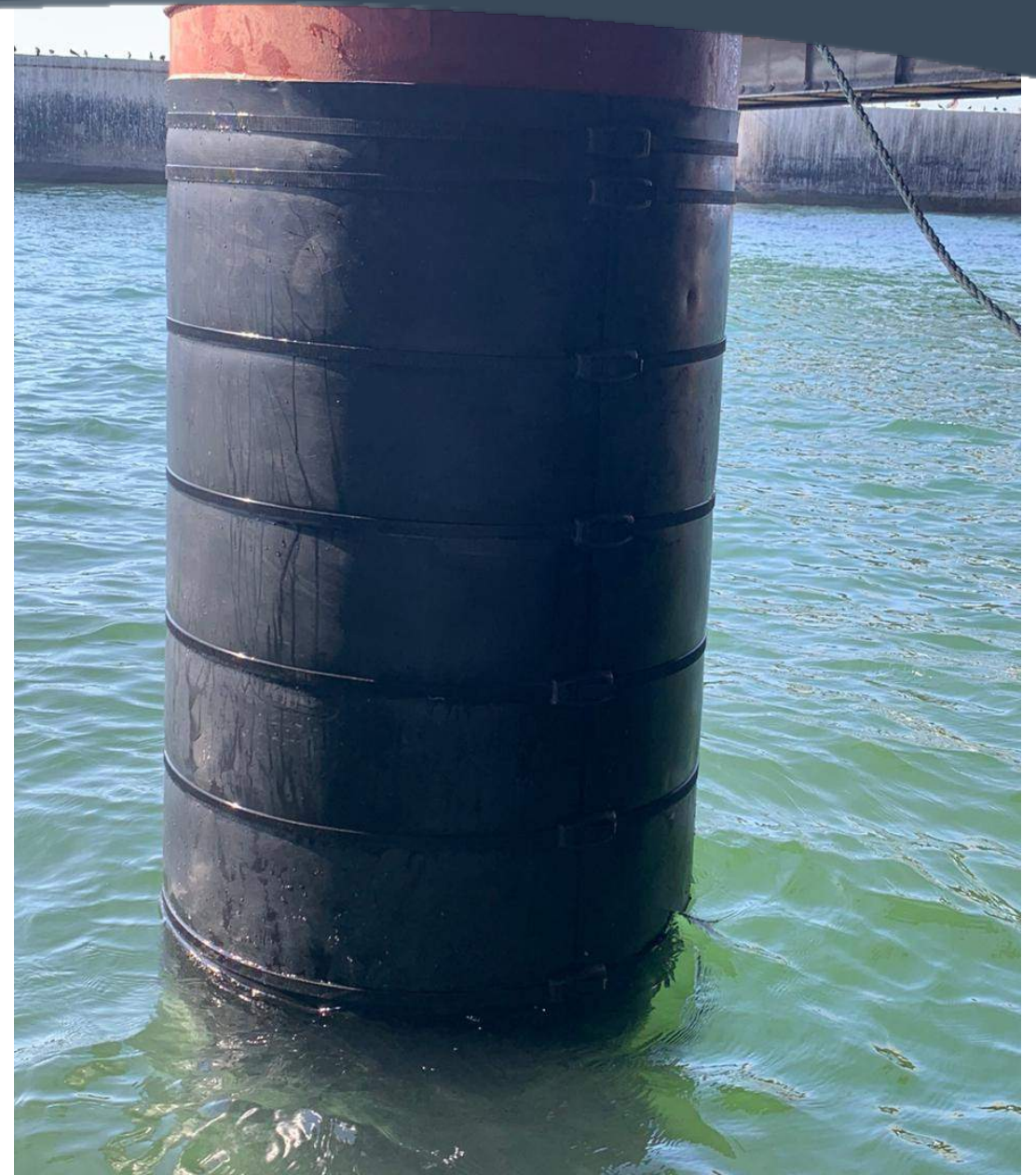
Shell Jetty #4 - Rotterdam



South America



South America - St. Angamos



South America



China



Malaysia



Malaysia



Singapore



Thailand



South Korea



Seoul



UK South Coast.



Cornwall, UK



27/10/20 F
11C
X
HCL - LONDON
HCL, HCL SHANGHAI
HCL, HCL SINGAPORE
HCL, HCL BANGKOK
HCL, HCL JAKARTA

Cornwall, UK.



Cornwall, UK.



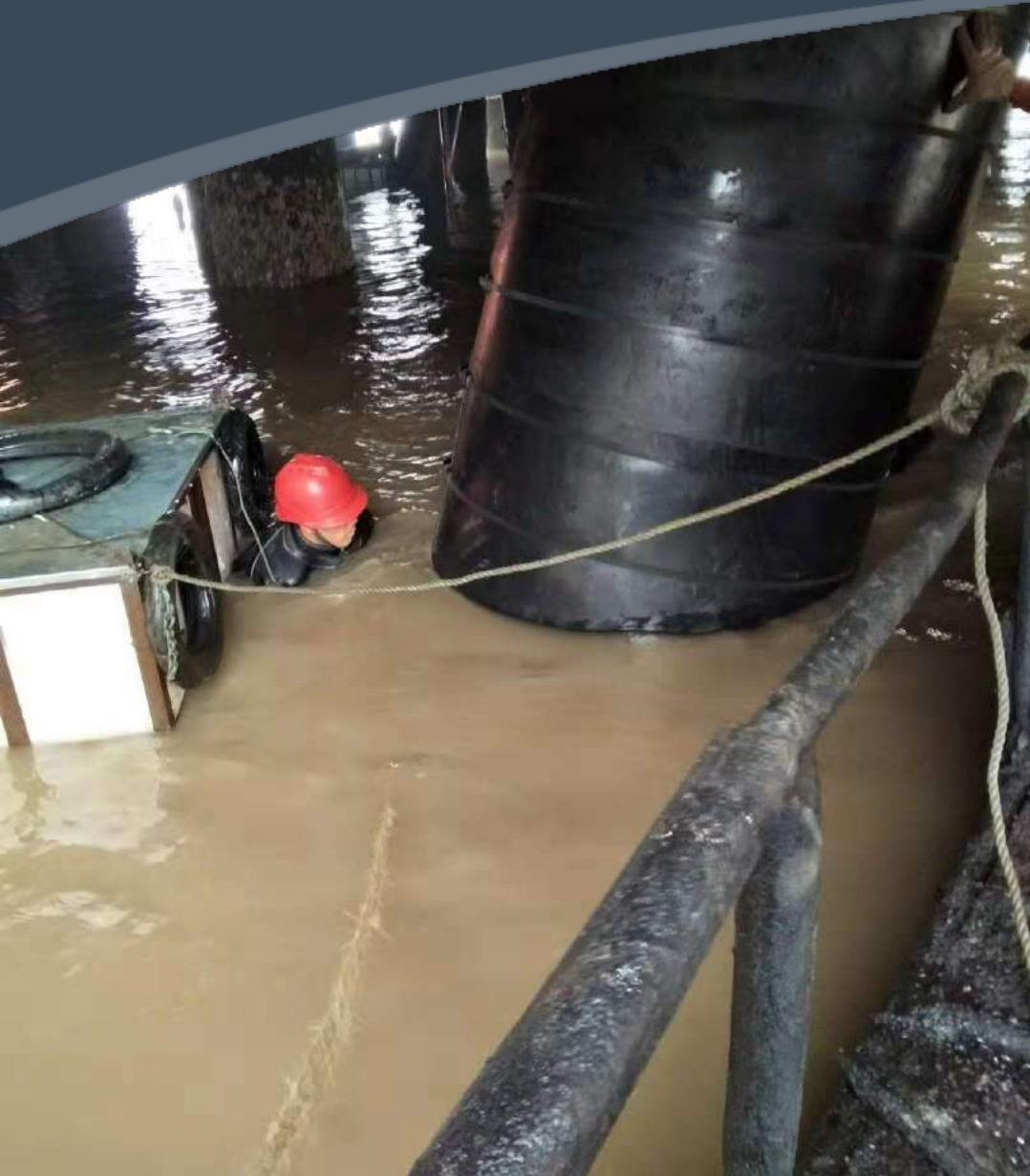
China – Ningbo.



China



China



Thailand



Jordan - Aqaba



11/09/2019 11:43



08/09/2019 11:23

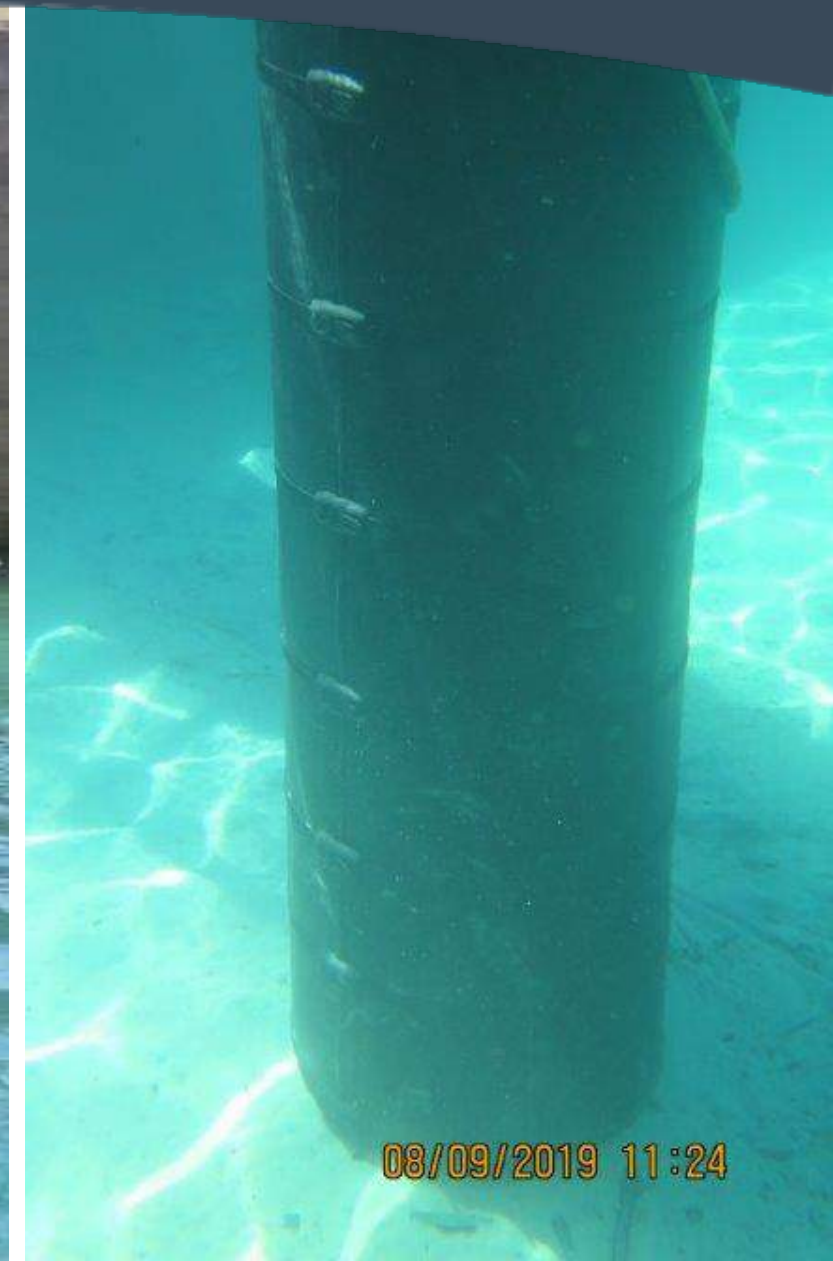
Thailand



Jordan



09/09/2019 14:10



08/09/2019 11:24

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



bp



First clean the Pile



bp



Saddles are clamped into place



bp



Routing and clamping of cables



Indonesia Coal Jetty - ICCP Clamps



© 2020 AfriGIS (Pty) Ltd.
© 2020 Google
Image © 2020 Maxar Technologies

Google Earth

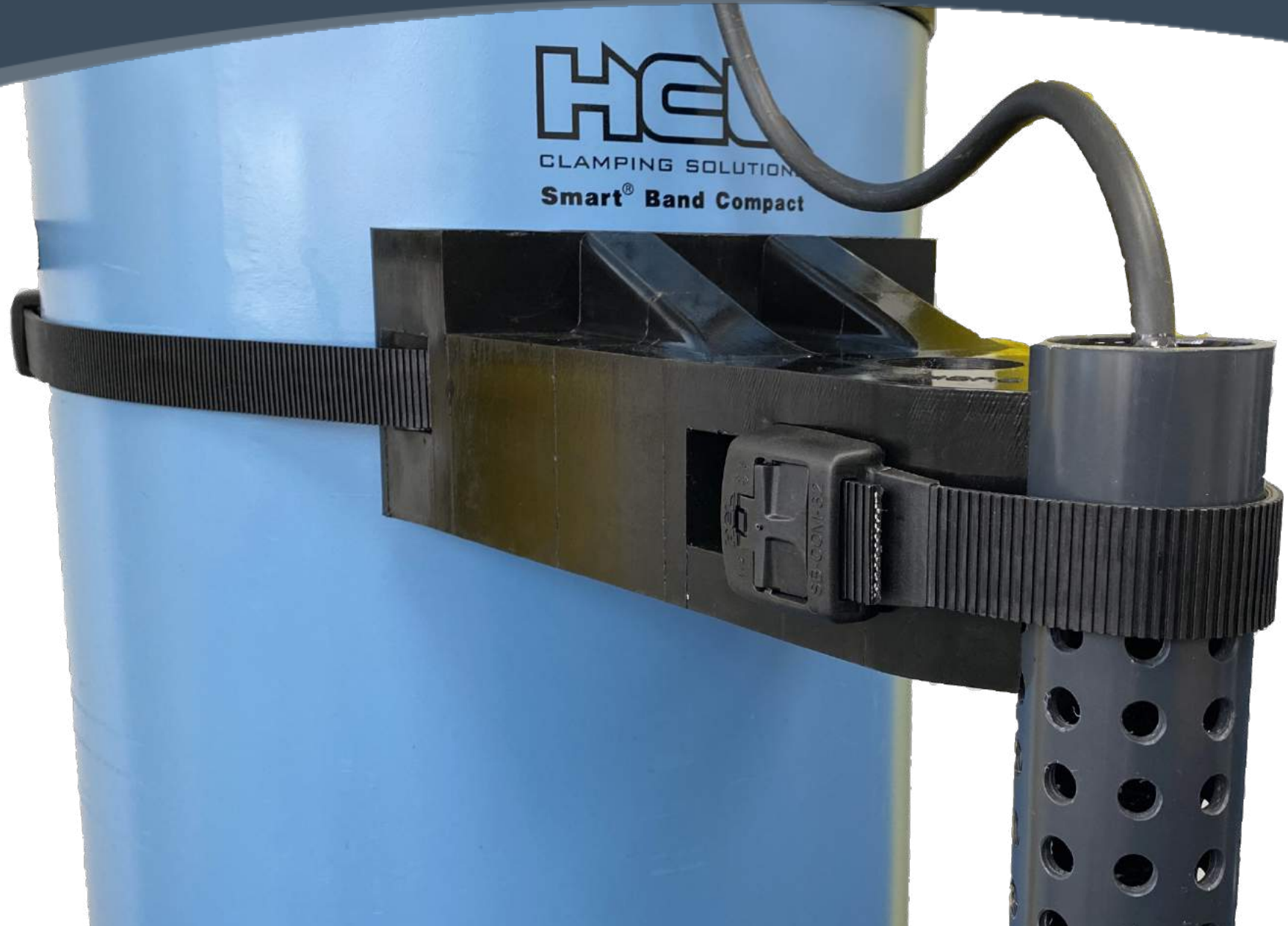
Imagery Date: 6/14/2019 4°07'19.91" N 98°15'33.66" E elev 0 m eye alt 2.14 km

2002

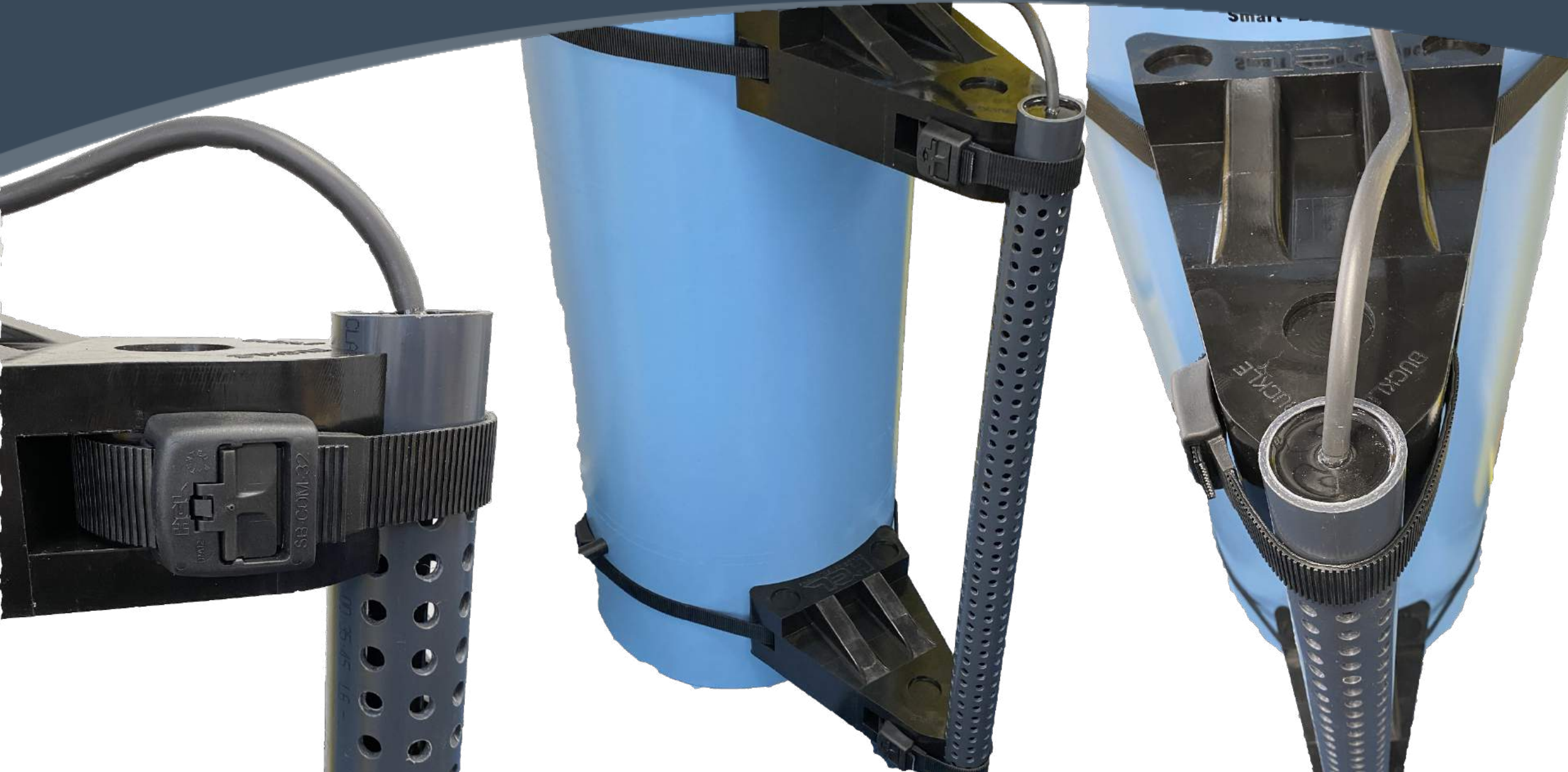
Totally non-metallic clamping!



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



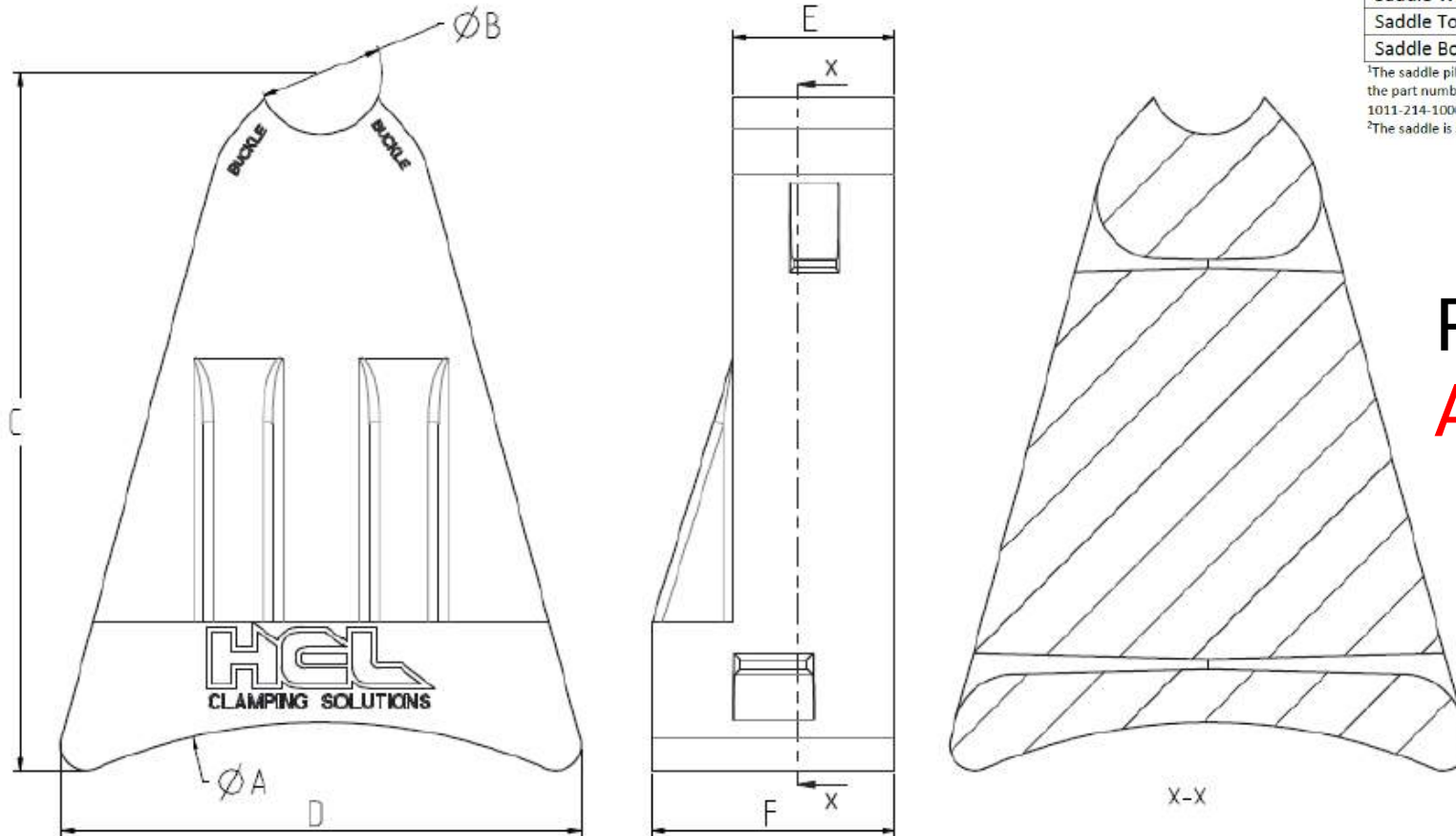
SADDLE: SDL-1011-344-A-B, Material Polyurethane
Part No. SDL-1011-344-A-B



Part Code Convention



Outline Dimensions (General Tolerance $\pm 2\%$)



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)

¹The 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

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

Part # SDL-1011-344-
A-B

Compact banding strength



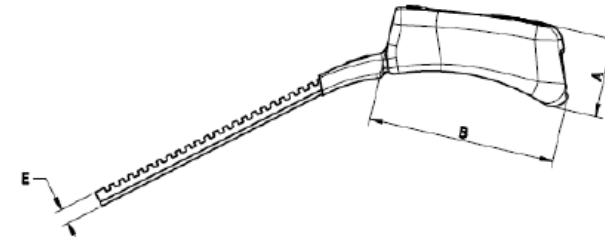
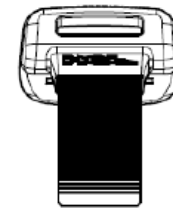
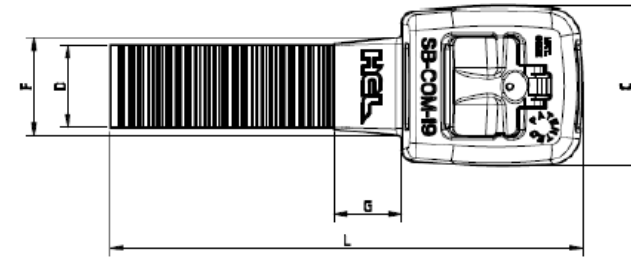
Smart[®] Band Compact 19mm, Material PA12GF
Part No. SB-COM-19-PA12GF



Banding part codes



Outline Dimensions (General Tolerance $\pm 1\%$)



“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 PA12GF¹

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	

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

²The 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.

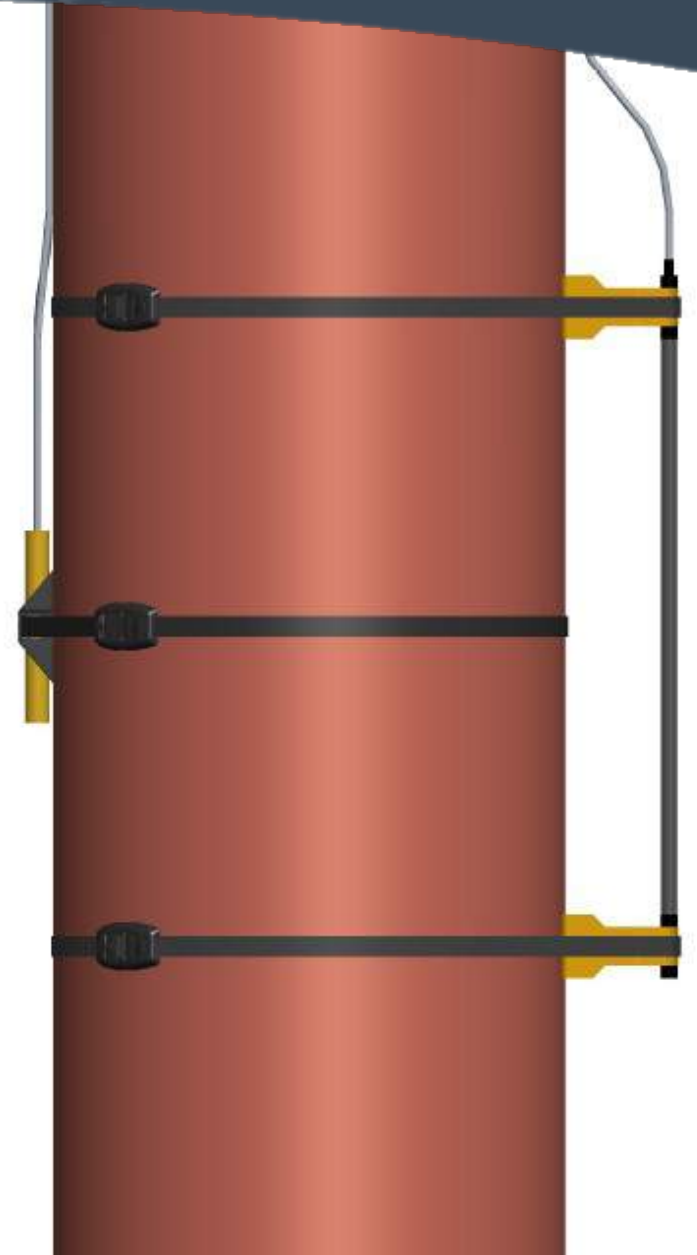
Anode splice box mounting too



System Benefits



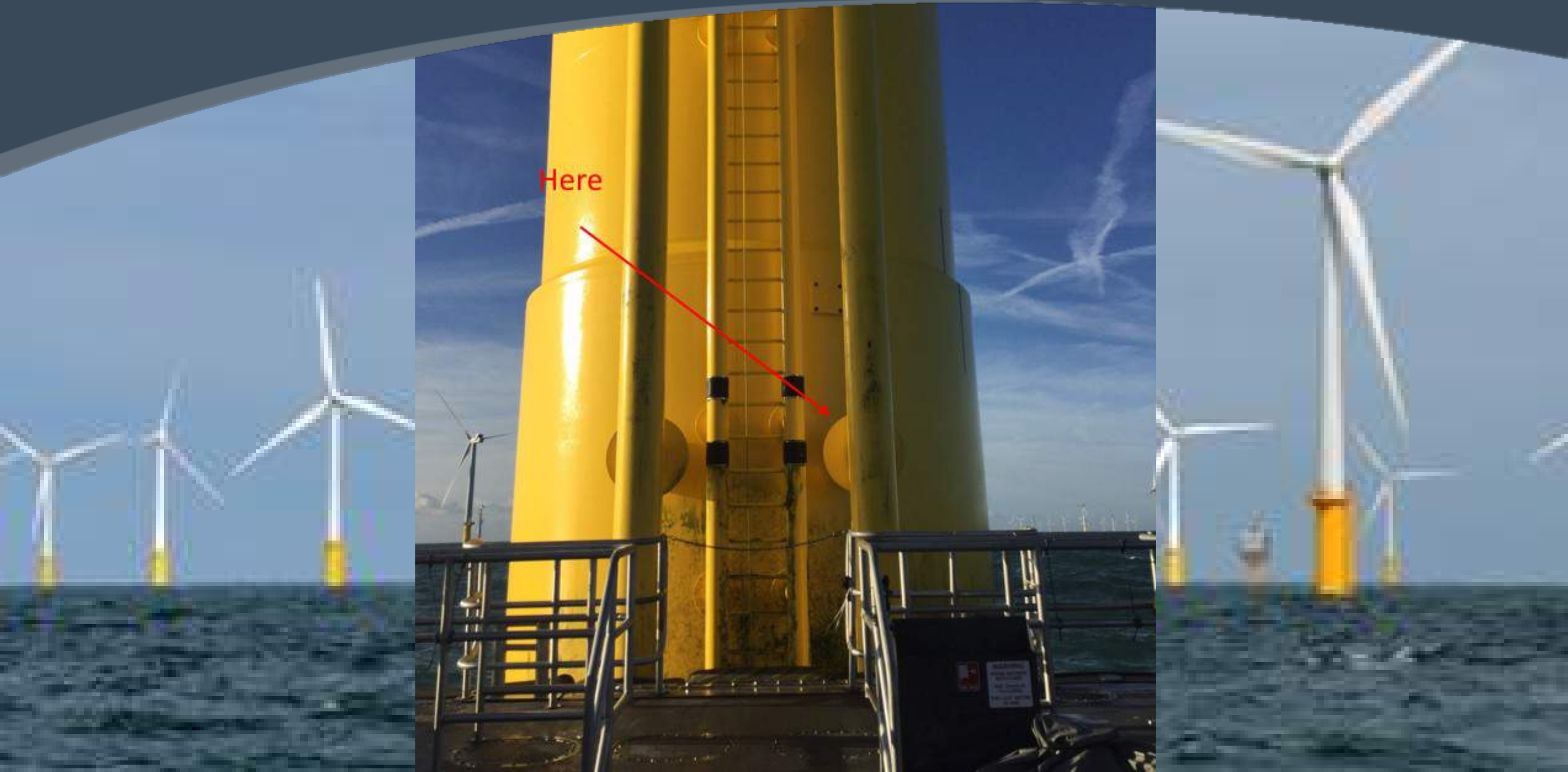
- No penetration of existing coating.
- No requirement for skilled Divers.
- No Power Plant required.
- Will fit any irregular Pile.
- Lightweight & easy to Mobilise.
- No welding required.



Other Marine Corrosion Related Applications

Headng Here





















PETRONAS



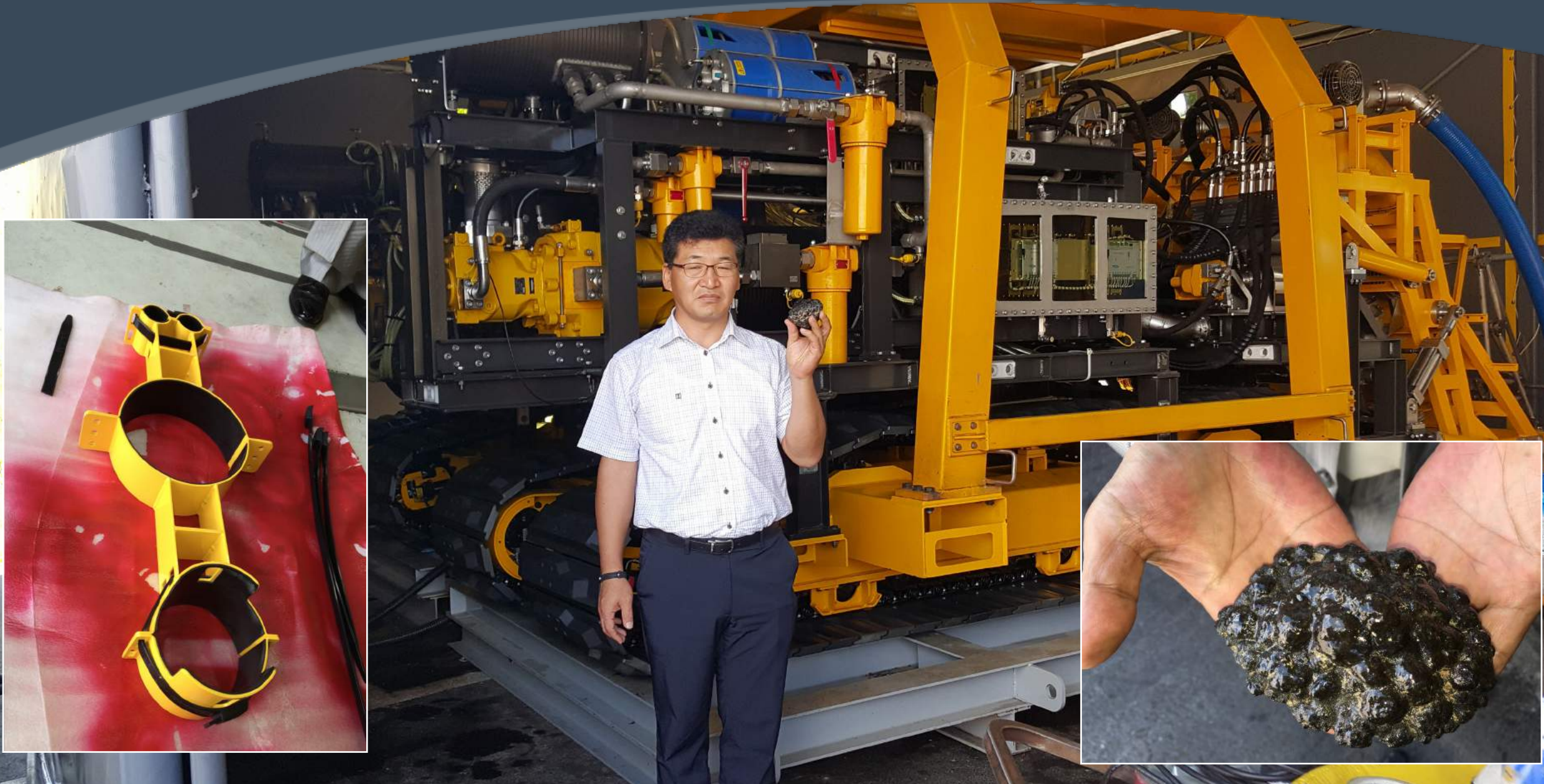




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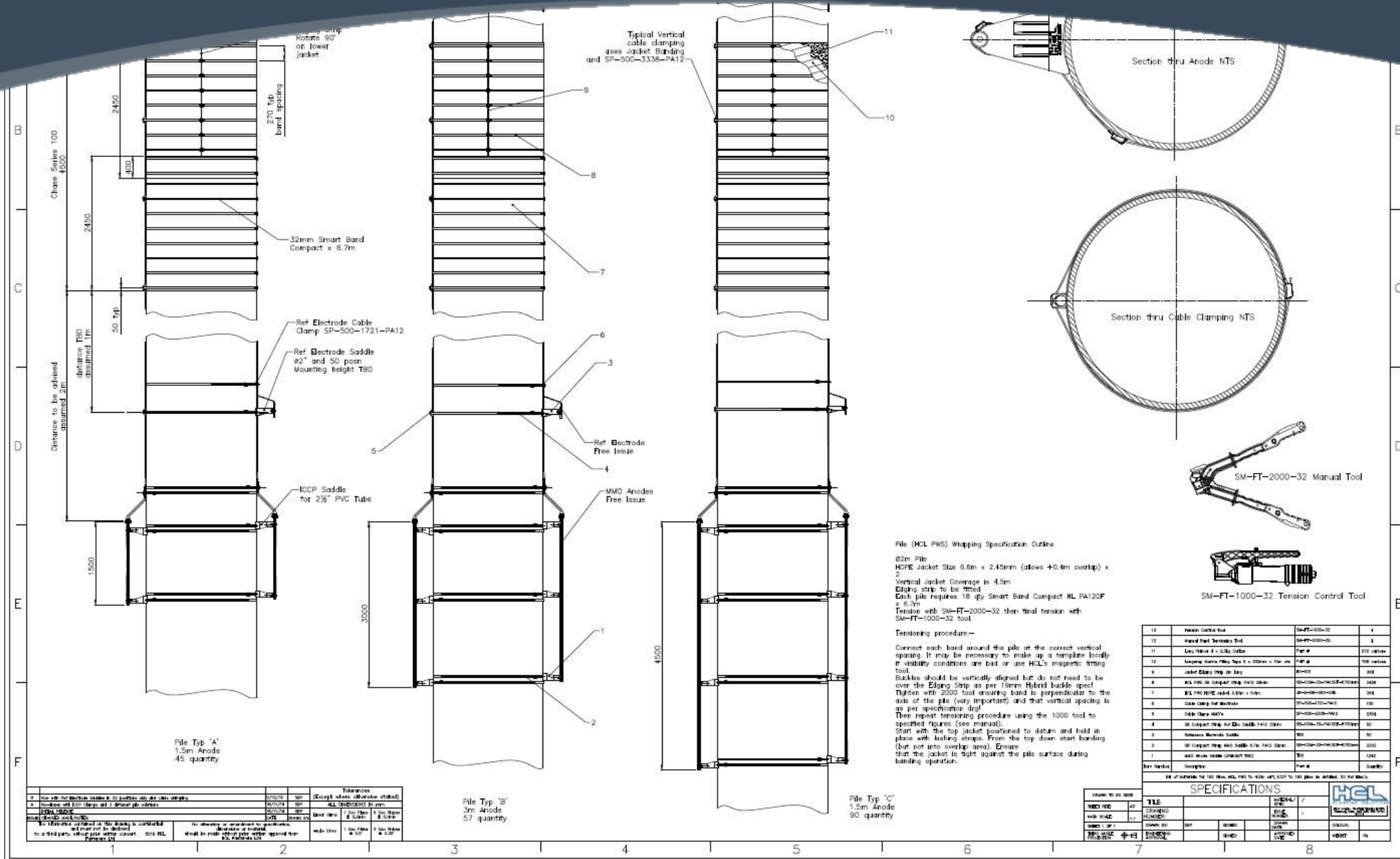






Support!

System drawings, RAMS



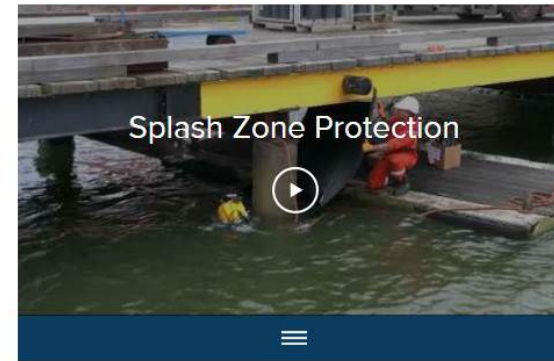
On-site training



International Support.



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



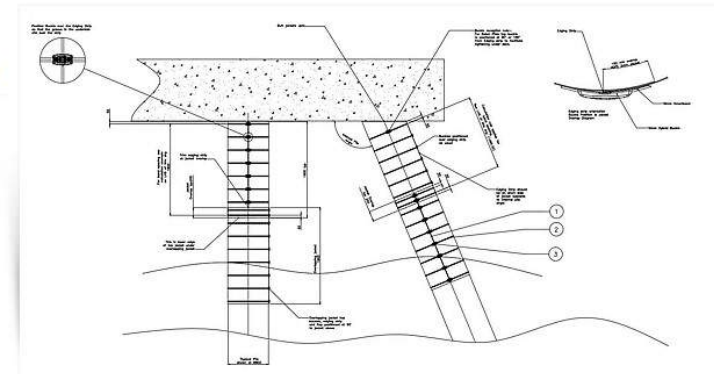
Approved Installers

HCL works with many approved Diving Installation companies around the world - Click on the helmet below to find out more



Consultancy and Design

With over 20 years experience gained first hand in the Marine Pile Protection business HCL is happy to offer a full consultancy service from initial site visit and client meeting to full specification drawings and method statements for your project.





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Banded Pile Protection System – Case History

This list excludes certain confidential projects.

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	MARINEGARD 100 (HCL PWS Style)	610mm		
2012	PCS	Australia	Main Roads dept. – WA – Road Bridge	SPLASHpro M1 (HCL PWS Style)	610mm		
2012	PCS	Thailand	Freemansle Port – North bank Jetty	MARINEGARD 60 / Pile Mesh	407mm		
2012	PCS	Thailand	Thai Oil Refinery	MARINEGARD 60 / Pile Mesh	1100-1700mm		4
2012	Central Products	Singapore	BLCP Power Station	MARINEGARD 100 (HCL PWS Style)	250x250mm		
2013	Central Products	Singapore	Clarke Quay	MARINEGARD 100 (HCL PWS Style)	610mm	H	
2014	PCS	Australia	Samsung LNG	SPLASHpro M1	700mm		
2014	PCS	Thailand	Port Kembla Coal Terminal	SPLASHpro M1 (HCL PWS Style)	506mm		
2014	PCS	Thailand	BLCP Power Station	MARINEGARD 100 (HCL PWS Style)	630mm		4
2014	Barrier	USA	Khao Bo Ya LPG Terminal	MARINEGARD 100 (HCL PWS Style)	633mm		14
2014	Central Products	Singapore	NYC DOT – FDR Bridge	MARINEGARD 100 (HCL PWS Style)	600-1000mm		
2015	PCS	Singapore	Senoko Energy Pile Ltd (SEPL)	MARINEGARD 100 (HCL PWS Style)	700-1200mm		
2015	PCS	Australia	Busselton Jetty	Pile-Gard (HCL PWS Style)	700-1200mm		
2015	Barrier	USA	Freemansle Port – Rous Head	SPLASHpro M1 (HCL PWS Style)			
2016	Barrier	USA	NYC DOT – East Promenade	MARINEGARD 60 / Pile Mesh	406-711mm		
2016	Central Products	Singapore	NYC DOT – Harlem Bridge	MARINEGARD 100 (HCL PWS Style)	450mm		16000
2016	Central Products	Malaysia	Pengerang	Pile-Gard (HCL PWS Style)	383mm		72
2016	Central Products	USA	Malibu Beach Front Property	SPLASHpro M1 (HCL PWS Style)			
2017	DMContr	S. Korea	Hyundai Oil Bank	SPLASHpro M1 (HCL PWS Style)	508-610mm		
2018	MPPS	UK	Worthing Pier	SPLASHpro M1 (HCL PWS Style)	750-1200mm		30
2018	Songduk	Dominican Republic	Busan Jetty	HCL PWS	914mm		16
2018	R dam port	Korea	B. Smit Jetty	HCL PWS	506		7
2018	Sintemar	Holland	El Zacatal	HCL PWS	600mm		85
2018	Sintemar	Mexico	Lenova ECA	HCL PWS	916mm, 1219mm		
2018	AIWC	Indonesia	Confidential	HCL PWS			+100
2018	MPPS	Dominican Republic	Confidential	HCL PWS	600mm		
2018	Triumph	China	Ningbo	HCL PWS	1219mm		
2018	Guardian Weeks	Thailand	IRPC Jetty	HCL PWS	1300mm		
2019	Chase	Bahamas	Inagua	HCL PWS	1018mm		100
2019	Chase	Malaysia	Tanjung Bin Cola Jetty	Chase HCL PWS	1219mm and 916mm		78
2019	Guardian	Jordan	Acaba	Guardian HCL PWS	1200mm		150 and 84 jackets
2019	PankMesh	Thailand	IRPC Jetty	HCL PWS	800mm		
2019	Chase	Thailand	PTT Gc	HCL PWS	1m to 2.4m piles		
2019	Chase	Taiwan	Shell Jetty #4	HCL PWS	0.914m		41
2020	Chase	Holland	Shell Jetty #4	HCL PWS	600mm, 915mm, 915mm		424
				Chase Series 100	1m, 1.6m		

PWS Case History List.

Questions?

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Thank You.

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