



HCL

CLAMPING SOLUTIONS





HCL

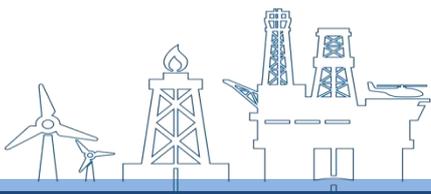
CLAMPING SOLUTIONS

Presentación Productos HCL Smart®

Steven Pearce. *IEng, MIMechE*

Export Sales Manager

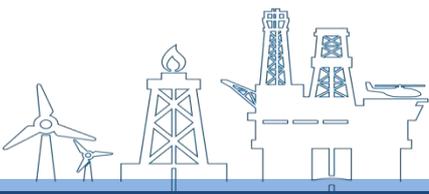


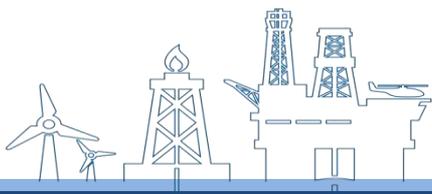


Base en UK



Manufactura Automatizada





Clientes alrededor del mundo



saipem



Schlumberger



Weatherford

subsea 7



Transocean



Technip



Seadrill

NOII



ExxonMobil





Clientes alrededor del mundo





Smart® Products



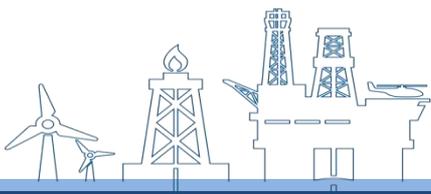
Compuesto Premium sistemas de hebilla y banda basados en polímeros diseñados específicamente para soluciones de sujeción submarina.





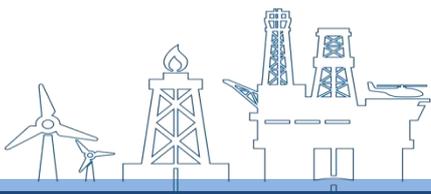
Smart® Tie





Sensor Adjunto





Sensor Adjunto

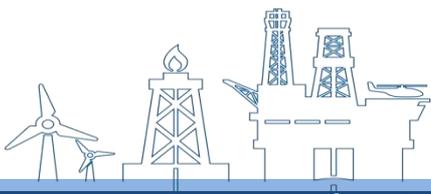
- Velocidad para adaptarse
- Sensores multiples – solo 1 banda.
- EX seguro.



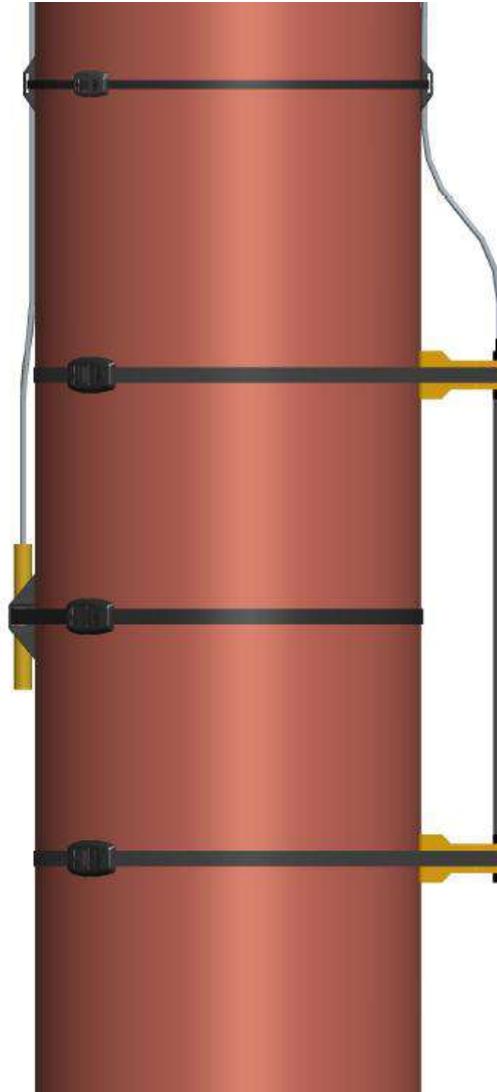


Smart® Band Hybrid





- Sin penetración de recubrimiento existente
- No require buzos de alto nivel
- No require Planta de Poder
- Se ajustará a cualquier pilote irregular
- Ligero & fácil de Movilizar
- No requiere soldadura



Corrosion Marina

Instalación ICCP

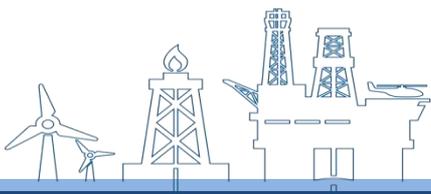




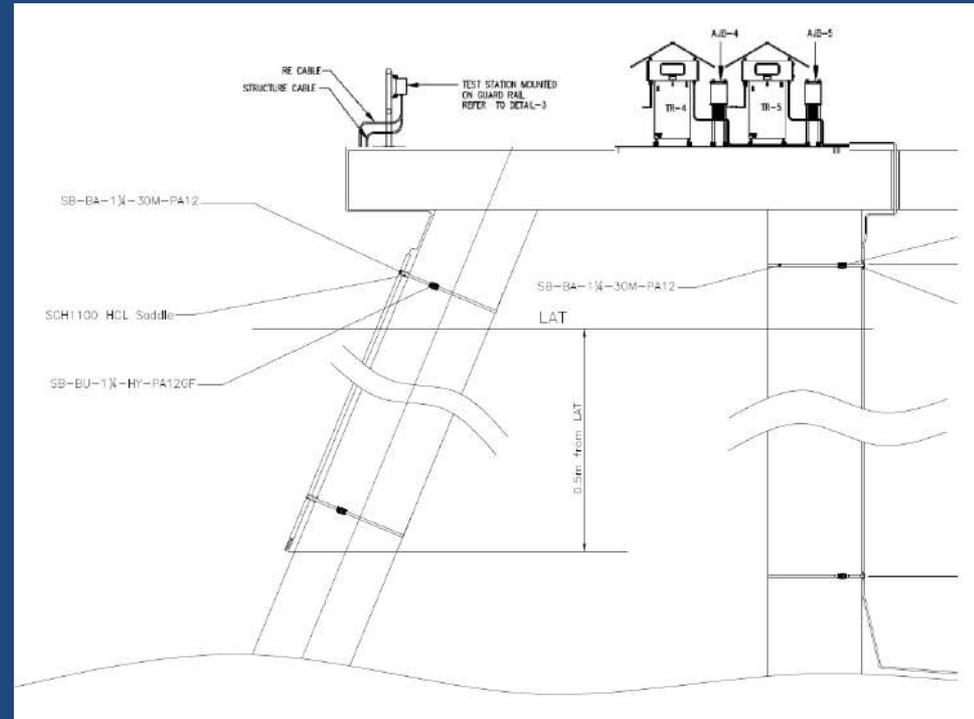
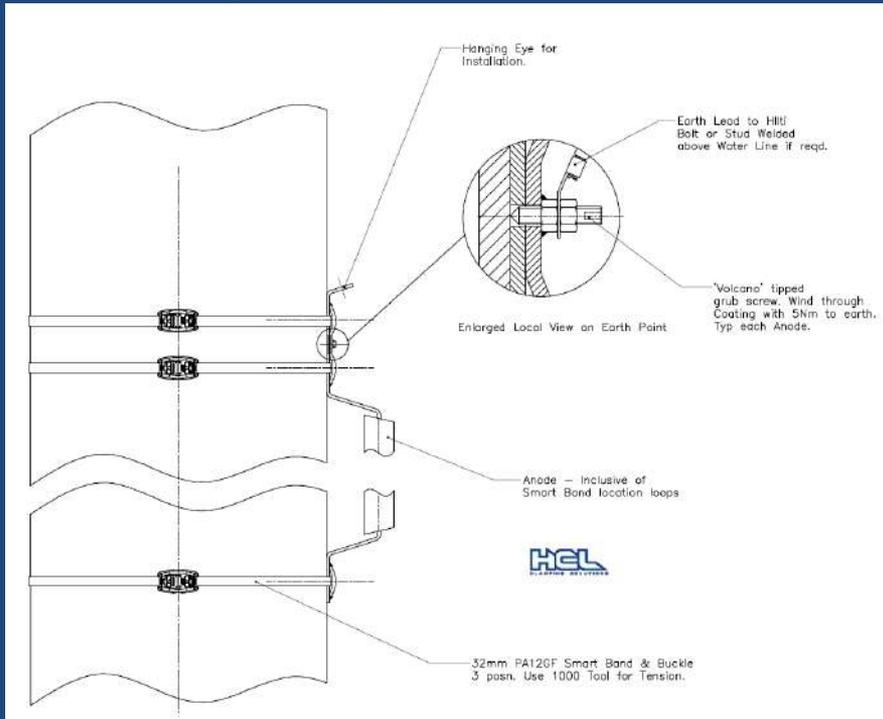
Corrosion Marina

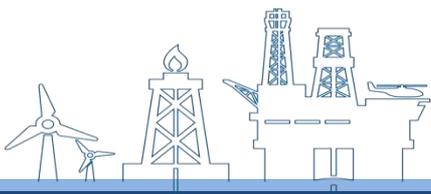
Instalaciones de Sacrificio



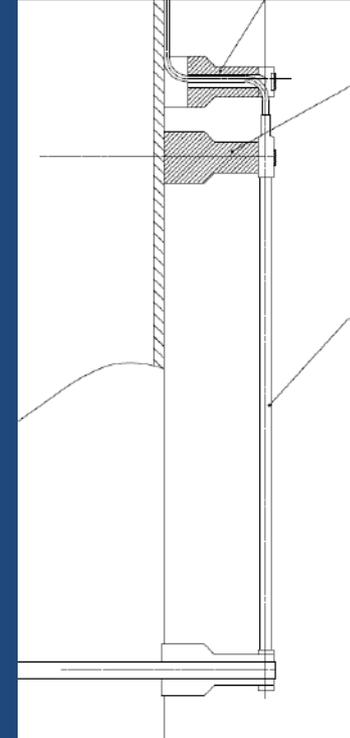
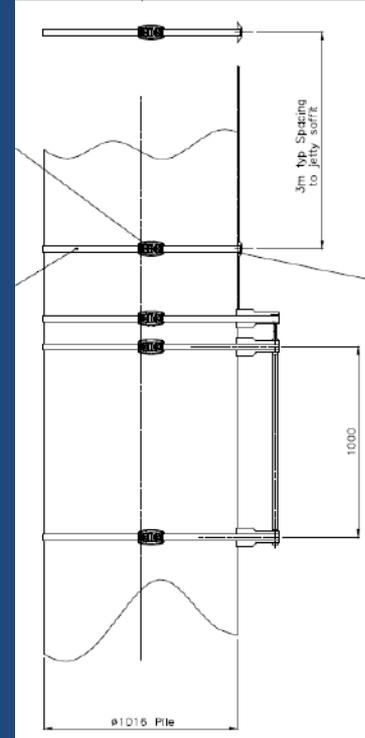
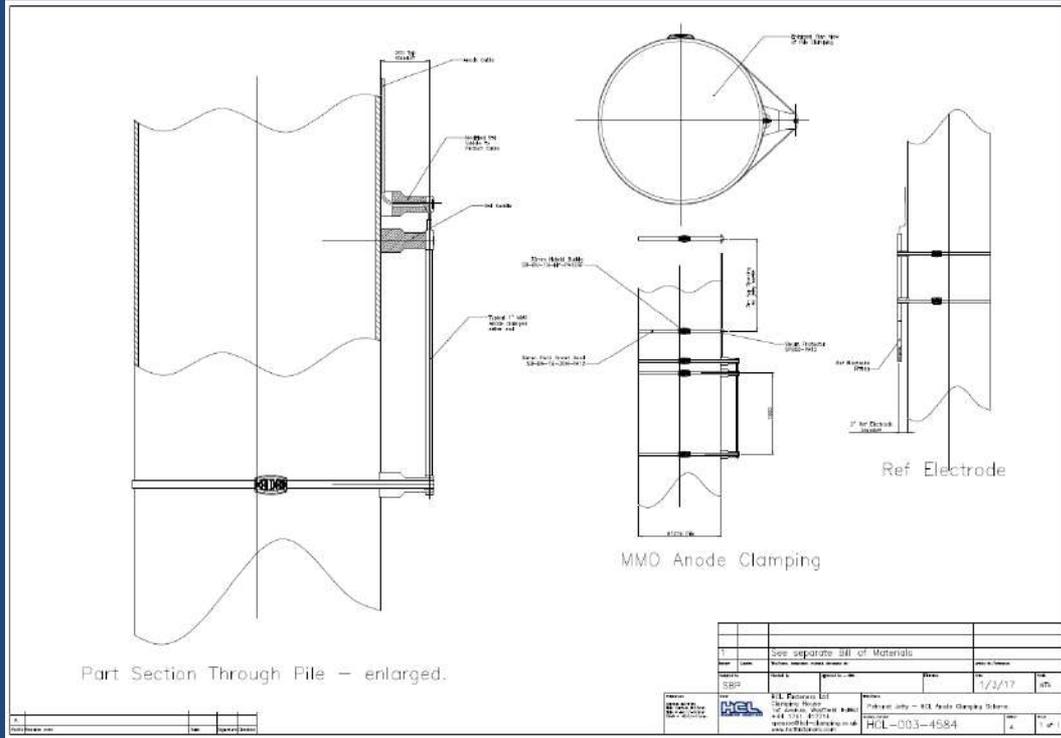


Diseño & Ingeniería

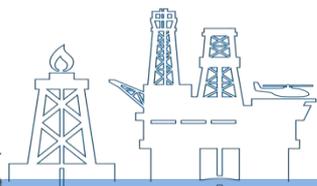


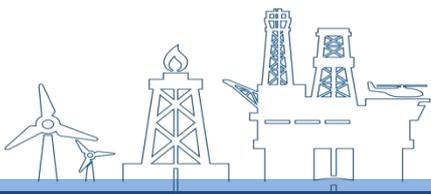


Diseño & Ingeniería



Corrosion Marina





- Funda siempre se ajusta al Pilote
- Instalación fácil c/cero visibilidad
- 100% no-metalico
- Tension constant del arco
- Sin contracción/estiramiento de la funda
- Herramientas de instalación de bajo costo
- Evita puntos calientes de corrosion en grietas



Corrosion Marina

Accesorio funda
Protectora usando
Smart® Band





Especificaciones montaje Series 100.



Método
completo
disponible en
HCL.



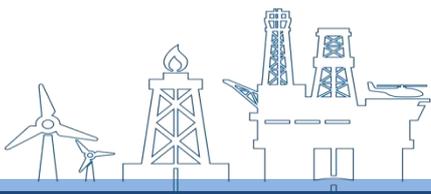


Historia de casos Series 100.

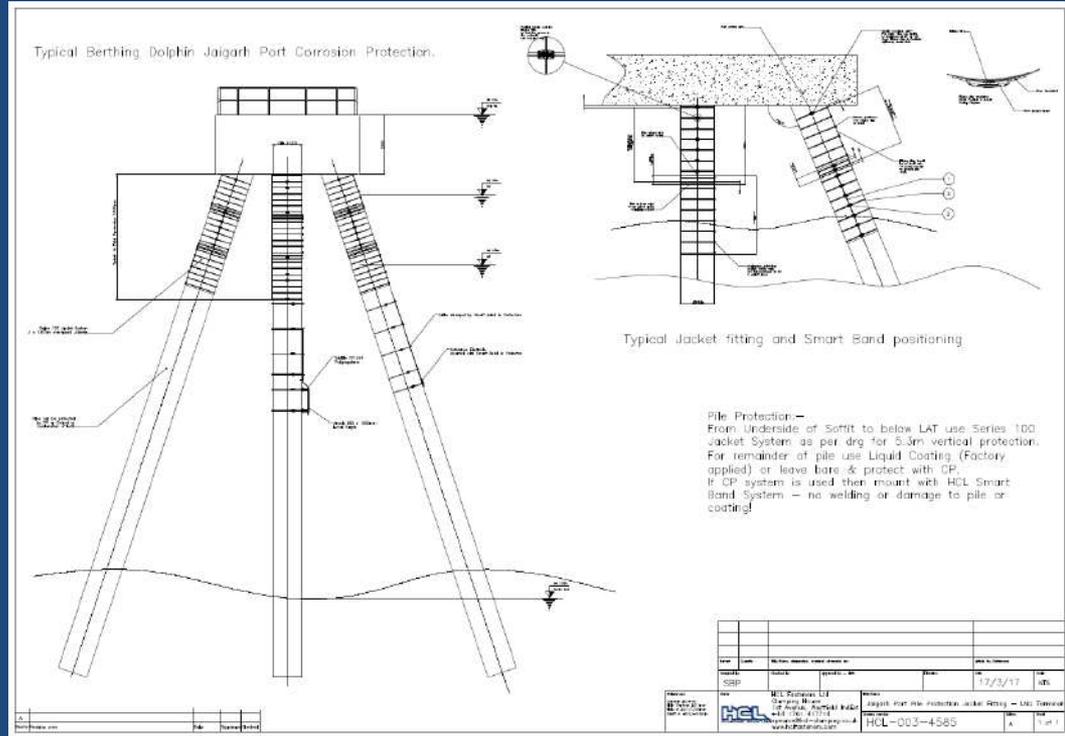
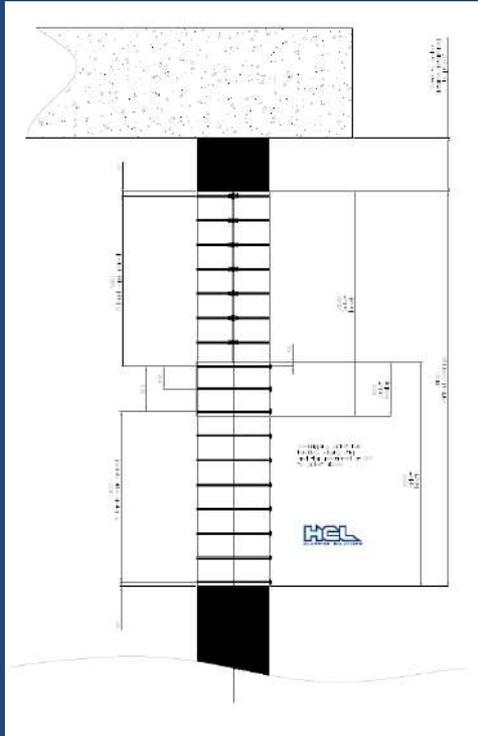


Proyecto:-
Puerto
Brisbane,
Australia.





Diseño & Ingeniería





Smart® Band Compacta



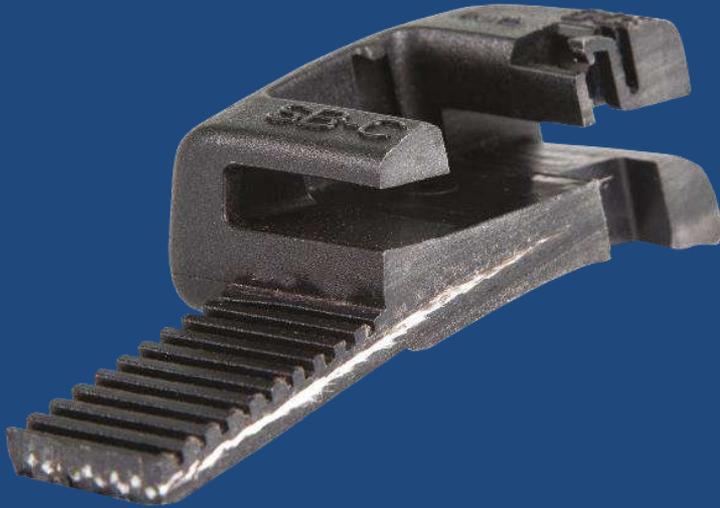


Smart® Band Compacto (centro) comparación.





Smart® Band Compacto





Correa compensadora Smart® Band

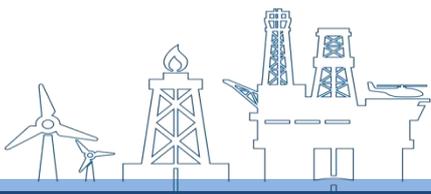
Desarrollo conjunto con proveedor extranjero líder.





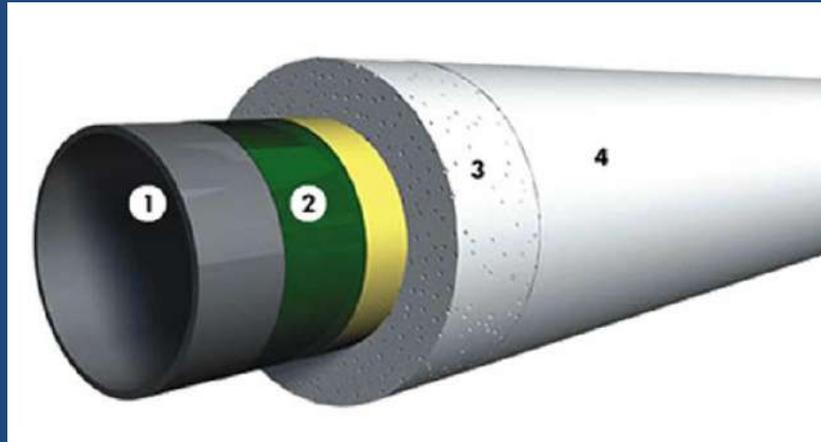
Correa compensadora Smart[®] Band

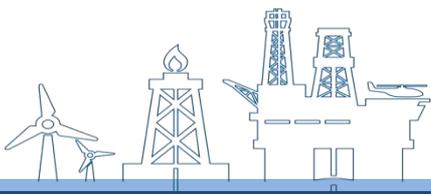




Correa compensadora Smart® Band

- Aguas Ultra Profundas
- 5 LSPP (Syntatic polypropylene) & C25 Silicon
- Compensa hasta 10% de contracción hidrostática.



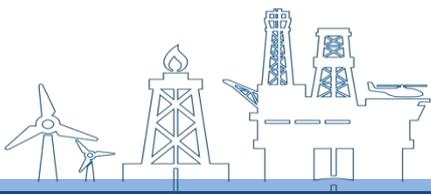


Correa compensadora Smart® Band

Proyecto Kaombo.

- Inicial $\text{Ø}660.1\text{mm}$, Final $\text{Ø}648.5\text{mm}$



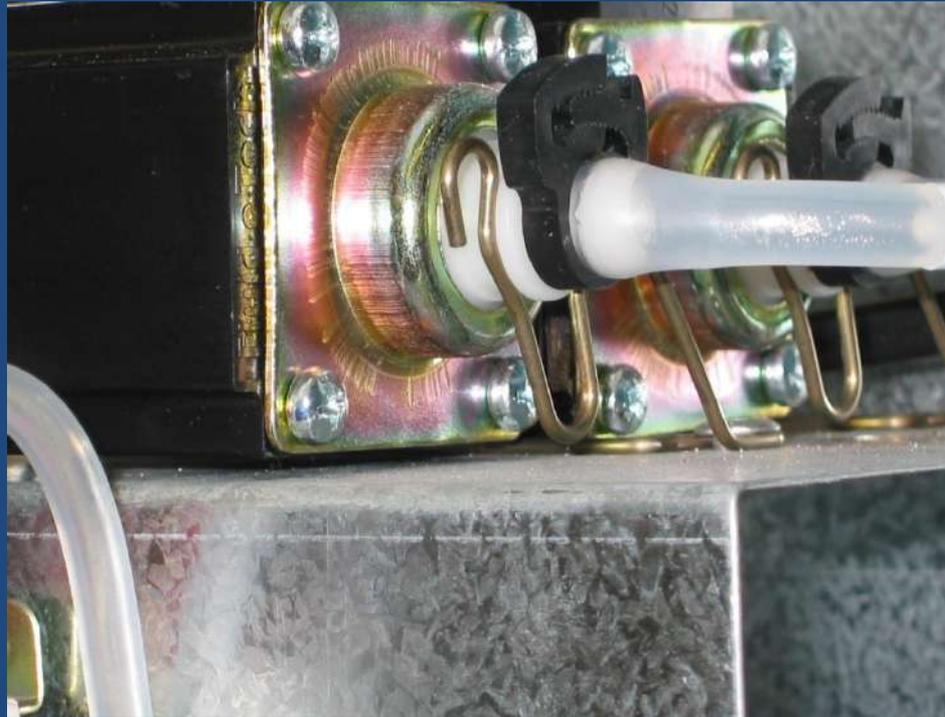


Abrazaderas





Abrazaderas





Protectores Smart®





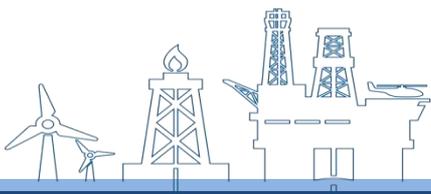
Tirante y Protectores Smart®



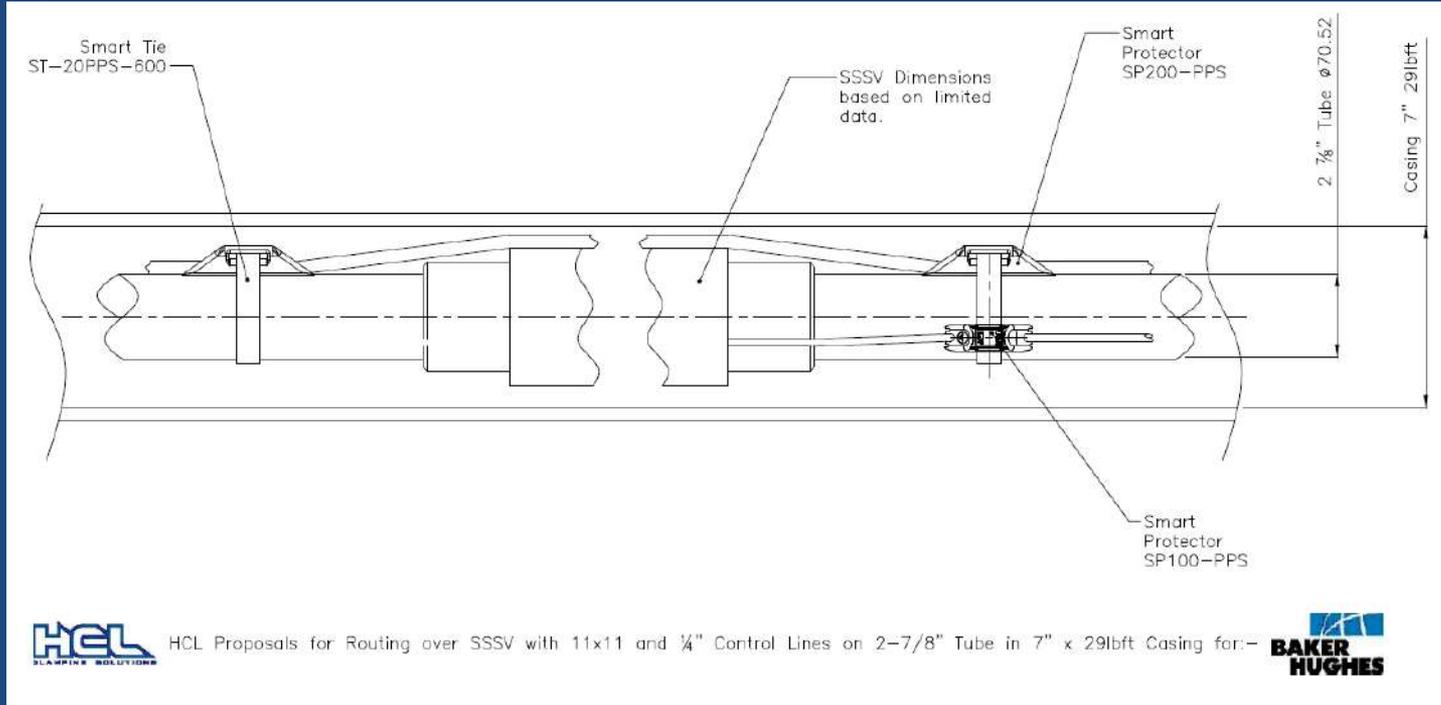


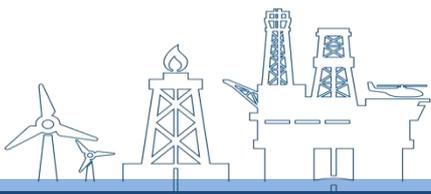
Hoyos Subterráneos



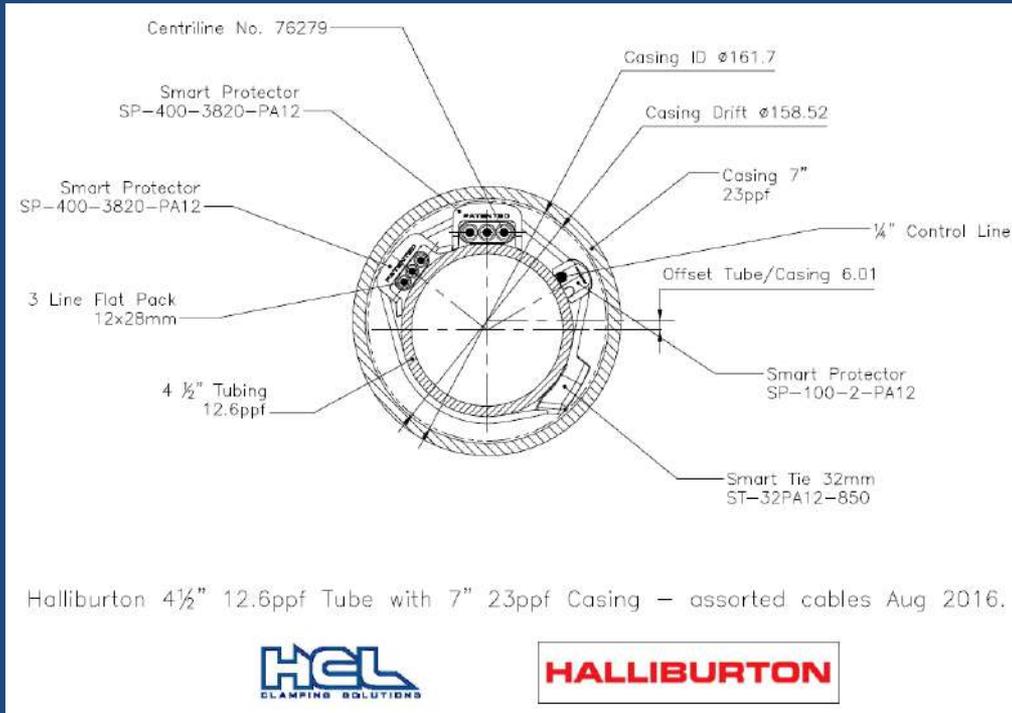


Servicios Técnicos





Servicios Técnicos



Herramientas de Instalación





SM-FT-1000 Herramienta Instalación



1000 series herramienta manual.

Control de llave de Torque





SM-FT-2000 Herramienta Instalación



2000 series
herramienta manual



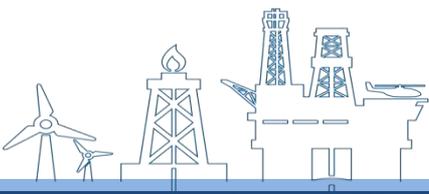


SM-FT-3000 Herramienta Instalación



3000 series - herramienta
montaje neumática





2000 Herramienta en Oman



3000 Herramienta en Colombia





Beneficio Productos HCL

- No Corrosivo
- Alta Resistencia
- Alta Retención
- Larga Vida
- Resistancia a la Compresión Hidrostática
- Seguros
- Rápido para ajustar
- Económico
- Tiempos de entrega cortos



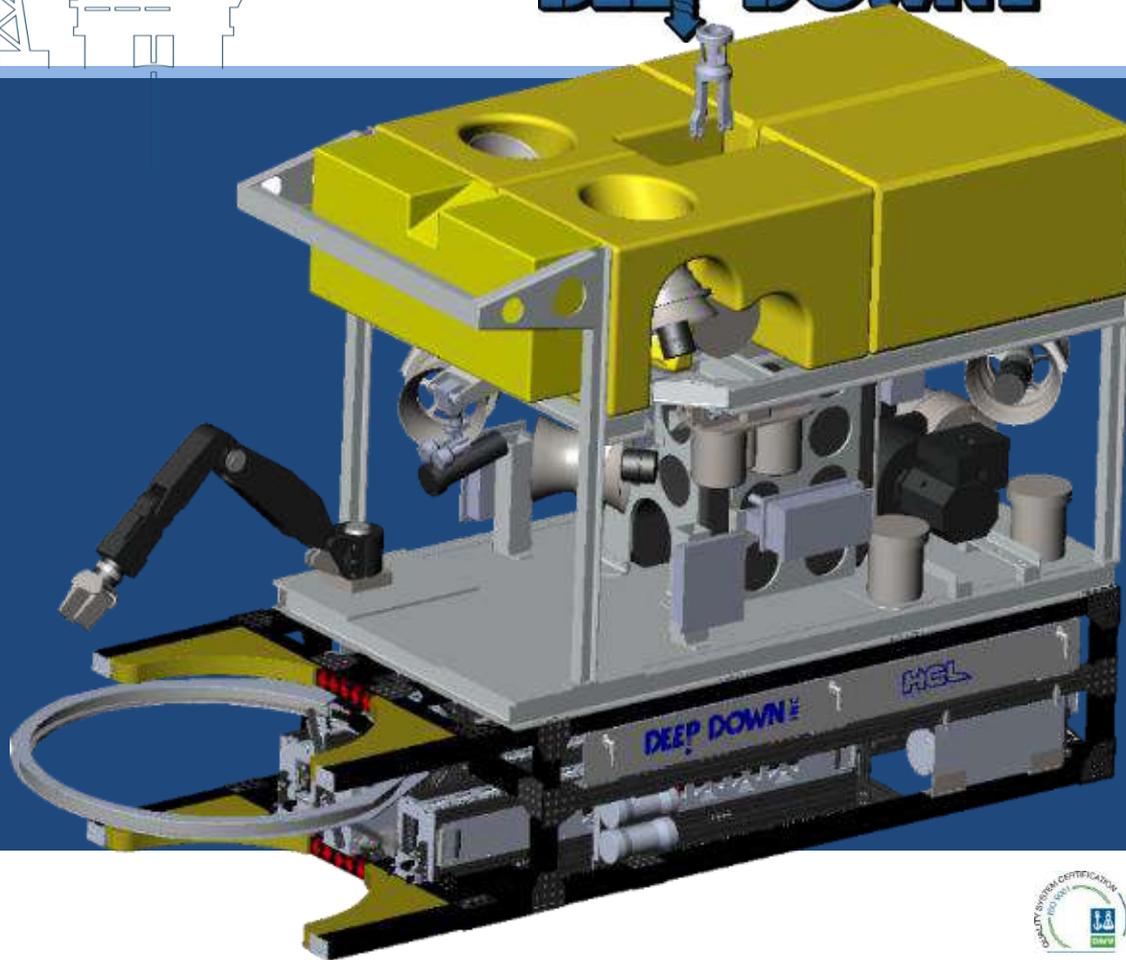
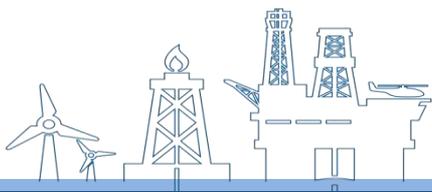


Costa afuera, Submarino y Marino

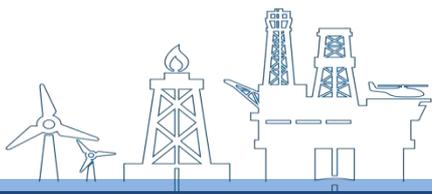


DEEP DOWN[®]

Asociaciones



HCL
CLAMPING SOLUTIONS

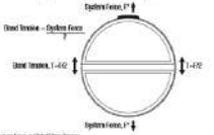


Datos Técnicos

5] Tensile Strength

5.1] System Tensile Tests – Introduction

System tensile testing of Smart™ Tie and Smart™ Band is carried out in vertical or horizontal. It involves testing the strength of the tie or band under static or dynamic loads. The test results are used to determine the tensile strength of the system. The test results are used to determine the tensile strength of the system. The test results are used to determine the tensile strength of the system.



1. Ignored case in Vertical Tie System
Note: In the case of vertical tie system, the tensile force is applied across the width of the tie or band.

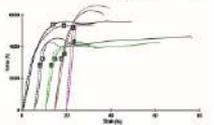
5.1.1] System Tie Diameter and Circumference Table

Tie Diameter	Tie Circumference
100 (3.94)	314 (12.32)
125 (4.92)	393 (15.47)
150 (5.91)	471 (18.62)
175 (6.89)	550 (21.77)
200 (7.87)	628 (24.92)
225 (8.86)	707 (28.07)

5.2] Smart™ Tie System Tensile Tests

5.2.1] Smart™ Tie System (100) System Tensile Test

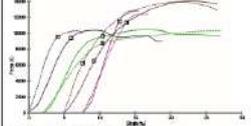
Line No.	Band Size	Material	Tie Diameter	System Tensile Strength	Circumferential Pull (kN)
1	100	FRP	100	4800 (1078.11)	118
2	100	FRP	100	4800 (1078.11)	118
3	100	FRP	100	4800 (1078.11)	118
4	100	FRP	100	4800 (1078.11)	118
5	100	FRP	100	4800 (1078.11)	118
6	100	FRP	100	4800 (1078.11)	118
7	100	FRP	100	4800 (1078.11)	118
8	100	FRP	100	4800 (1078.11)	118
9	100	FRP	100	4800 (1078.11)	118
10	100	FRP	100	4800 (1078.11)	118



Note: Circumferential pull is 1% below the tie.

5.2.2] Smart™ Tie System (125) System Tensile Test

Line No.	Band Size	Material	Tie Diameter	System Tensile Strength	Circumferential Pull (kN)
1	125	FRP	125	5800 (1300.00)	143
2	125	FRP	125	5800 (1300.00)	143
3	125	FRP	125	5800 (1300.00)	143
4	125	FRP	125	5800 (1300.00)	143
5	125	FRP	125	5800 (1300.00)	143
6	125	FRP	125	5800 (1300.00)	143
7	125	FRP	125	5800 (1300.00)	143
8	125	FRP	125	5800 (1300.00)	143
9	125	FRP	125	5800 (1300.00)	143
10	125	FRP	125	5800 (1300.00)	143



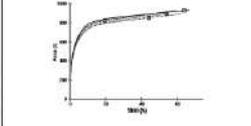
Note: Circumferential pull is 1% below the tie.

5.3] Smart™ Band System Tensile Tests – Standard Buckle

5.3.1] Smart™ Band System (100) Standard – FRP

Note: The figure shows the test results for the standard buckle. The figure shows the test results for the standard buckle.

Line No.	Band Size	Material	Tie Diameter	System Tensile Strength	Circumferential Pull (kN)
1	100	FRP	100	4800 (1078.11)	118
2	100	FRP	100	4800 (1078.11)	118
3	100	FRP	100	4800 (1078.11)	118
4	100	FRP	100	4800 (1078.11)	118
5	100	FRP	100	4800 (1078.11)	118
6	100	FRP	100	4800 (1078.11)	118
7	100	FRP	100	4800 (1078.11)	118
8	100	FRP	100	4800 (1078.11)	118
9	100	FRP	100	4800 (1078.11)	118
10	100	FRP	100	4800 (1078.11)	118

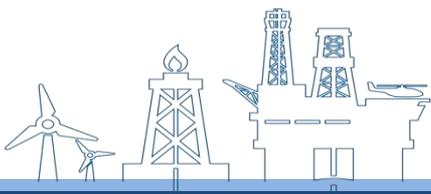


Note: Circumferential pull is 1% below the tie.



Sección 5] Resistencia a la Tracción

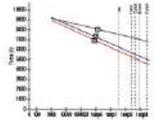




Datos Técnicos

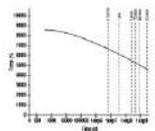
6.1.1] Snap® Band 25mm (1 1/8") High in Air

Note: The Snap® Band 25mm High option is fitted and operated in a manner described in this manual. It is essential to verify that machine, the following machine is suitable for using the 1011 1000 and the optional large width. To verify machine check manual with a certified technician. It may not be suitable for use with the Snap. The table showing machine type, length and area of the above machine and the details of the product.



6.1.2] Snap® Band 25mm (1 1/8") High in Water

Note: The Snap® Band 25mm High option is fitted and operated in a manner described in this manual. It is essential to verify that machine, the following machine is suitable for using the 1011 1000 and the optional large width. To verify machine check manual with a certified technician. It may not be suitable for use with the Snap. The table showing machine type, length and area of the above machine and the details of the product is given.



It should be noted that moisture uptake by the 1012 material accelerates the rate of stress relaxation during the first 60 minutes of loading (this period not shown in the graph).



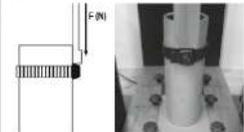
7] Axial Retention

Axial Retention is an important consideration when clamping cables to down-hole pipes. The clamping resistance of the cable must be large enough to cope with two aspects of the installation:

1. The weight of the cable
2. The impact resistance when design and joints are an occurrence. Open end situations need very careful consideration to the force measurement. Force may vary from a high force to a low force and vice versa.

7.1] Banded Axial Retention

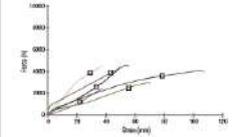
The following jig setup on a tensile testing machine was used to measure the axial retention for Snap® Band and Snap® Band products. The test includes a compression and a axial ring. Test per load 20N, load speed: 0.05mm/min. Snap® Band (S-Series) Field: Serial Number Field: G4 also TREAT40 (10) (see manual)



7.1.1] Snap® 20c 20mm (3/4") Axial Retention

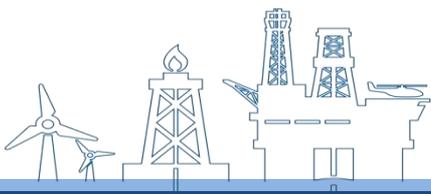
LINE	Product	Material	Size (mm)	Clamp length	Max. Cable Movement (mm)	Min. Movement (mm)
1	20c	FRP	20	100	100	100
2	Snap® 20c	FRP	20	100	100	100
3	Snap® 20c	FRP	20	100	100	100
4	20c	FRP	20	100	100	100
5	20c	FRP	20	100	100	100
6	20c	FRP	20	100	100	100

Note: Axial Retention values with their confidence and actual values of test application.



Sección 6.1.5] Relajación de estrés en agua





Datos Técnicos

8) Hailer Testing

Hailer testing is conducted on equipment that replicates the action of the rollers. Equipment used is 75" for pipe deployment.
A test pipe filled with Smart® products is passed under rollers that have been built to apply a controlled force to the pipe and associated Smart® products.



Roller Type — 4025mm including a 3.17" coating.
Rollers — 4042mm including a 3.17" coating (30.5mm A thickness of 81 mm thick.
A vertical force of up to 1500 Newton is applied through the rollers.
The pipe is guided forward and back under the rollers.

Product	Loading		
	Roller	Roller Pressure	Roller Speed
Smart® 19" Smart® Band	5000	75	1/200
Smart® 32" Smart® Band	5000	75	1/200
Smart® 19" Smart® Protector Band	5000	50	1/200
Smart® 32" Smart® Protector Band	5000	50	1/200

Note: Minimum product is 10mm particles in the hole of the band (last system only) for the rollers.

9) Impact Strength

Impact strength is of particular interest in the use of HCL Smart® products. Whether in a horizontal, vertical or a bonding application there is a good chance that Smart® products will encounter considerable impact at times.
The following data is derived from various tests involving strength of a 10mm weight 1 foot in travel height.

The standard energy equation — Energy (Joules) — is applied where:
m = Mass (kg) g = Gravity 9.81 (m/s²) h = Height (m)

9.1) Smart® Band Impact Strength

The weight is adjusted accordingly to set the correct impact energy but the distance impact starts of the weight is always 100mm (4 inches) in diameter.

Smart® Equipment	Material	Maximum Impact Energy (Joules) Level of injury to a human
Smart® 19" Band	100 T-70	10000 J
Smart® 32" Band	100 T-70	10000 J
Smart® 19" Band	100 T-70	10000 J
Smart® 32" Band	100 T-70	10000 J
Smart® 19" Protector Band	100 T-70	10000 J
Smart® 32" Protector Band	100 T-70	10000 J
Smart® 19" Band	100 T-70	10000 J
Smart® 32" Band	100 T-70	10000 J
Smart® 19" Protector Band	100 T-70	10000 J
Smart® 32" Protector Band	100 T-70	10000 J

The actual maximum strength after repeated maximum energy tests (up to 1000) is 10000 J.



9.2) Smart® Protector Impact Strength

The impact force capability of the SP-100 on 19mm protector was being using the impact rig setup shown below. The maximum height and weight of the assembly however exceeded the sustainable energy load.



The impact testing was conducted using an impactor of a variable weight, dropping it from various heights. Flaps progressively reduce both factors until the Smart® Protector sustains the impact. Note that the test is conducted using 100mm of the protector above the sample. The above data shows and test procedure does not contain an impact such as an ESP cable that would give it more impact strength if it is closer to the cable.

Imp. Height (mm)	Weight (kg)	Impact Energy (J)	Result
1000	100	10000	Failure - Bandrupt
1000	200	20000	Failure - Bandrupt
1000	400	40000	Failure - Bandrupt



Sección 8] Prueba Rodillo/Stinger 19 & 32mm Smart® Band Hibrido Carga en la banda 100T-70 ciclos sin rotura.





Datos Técnicos

11] Half Shell Minimum Bending Radius

Due to a dynamic environment, umbilicals and hoses are often subjected to significant bending. The best Minimum Bend Radius (MBR) is usually a function but to ensure absolute compliance and to get a good rocky back, they are often subjected to a much higher MBR.

Smart® Band has been well proven to stand an MBR of less than one meter for this type of application.

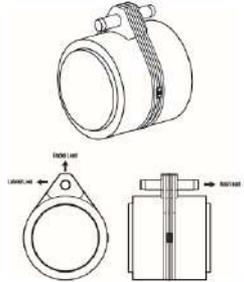


Photo courtesy of LockheedMiddletown
 150mm² Smart® Band P1313F clamped on a 1.625MTR Half Shell Test Machine (Smart® Band is 0.53m)
 Water depth: 0.20m to 1.00m
 Fuel: a synthetic Liquefied West Coast of Angola

11] Piggyback Pipe Lay

11.1] Smart® Band Piggyback Performance

The industry has been unable to define the performance of Smart® Band Straps (1.625MTR) in test systems as used in a Piggyback Stack Pipe Lay application. During the tests a Piggyback Stack arrangement was bonded with rubber seal at several points. The seal was bonded to the inner surface of the saddle was considered suitable for the carrier pipe, for rubber blocks, the system bond strength was measured.



100 Barriers = Smart® Products Technical Back = Half Shell Minimum Bending Radius / Piggyback Pipe Lay / Hydraulic Compression = Page 17

11.1.1] Smart® Lightning Fences

Plasma Cutting Test Type	Air Pressure	Operation Interval
Smart® (1.625MTR) Smart® Band P1313F	100 bar (14.5 psi)	1000 (300) min
Smart® (1.625MTR) Smart® Band P1313F	100 bar (14.5 psi)	1000 (300) min
Smart® (1.625MTR) Smart® Band P1313F	100 bar (14.5 psi)	1000 (300) min

11.1.2] Smart® Hydraulic

Loading Direction	Saddle Type	Pipe Diameter (mm Ø)	Pressure (bar)	Load Point (mm)	Load Point (mm)	Load Point (mm)
Radial	Radial	100 + 1.25(DP + 1)	11.0	100	100	100
Longitudinal	Radial	100 + 1.25(DP + 1)	10.0	100	100	100

Note: It should be noted that these tests were only carried out in the particular arrangements above and that the actual test set up and the test results are subject to change. For further test information please contact HEL.

12] Hydraulic Compression

In deep water applications, hydraulic compression is a factor that needs to be taken into account when objects are dropped. In applications such as drilling, seabed land production and lay-up, the high pressure in deep water has a crushing effect on the material causing the overall diameter to reduce. The elongation of the material results in the ability to take on the reduction in diameter to give results well within the design bearing capacity.

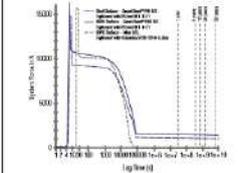
Smart® Band is a factor that is used with hydraulic compression when compared with traditional steel strapping. The benefits of the lower elongation, resistance to higher water pressure from steel and its low compression rate when used.

12.1] Typical Hydraulic Compression Test Simulation

The following graphs give an example of a Smart® Band P1313F around a 150mm diameter ball and an arrangement. The test steel was made from a polyethylene surface to simulate a piggyback stack. The Smart® Band is tightened using a calibrated SMA-47-1330 tool. Over a period of 24 hours the diameter is reduced by 2.7mm to simulate the strain caused by increasing hydraulic compression. The system is then left for 11 days to ensure as any creep that might take place. In this graph, the data has been reinterpreted to give the maximum resistance over many years.

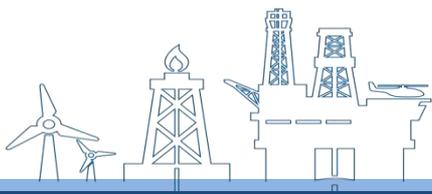
Note: The graph gives a resolution that the diameter and weight measurement each affect. The ball loses a further 0.1g of weight over 11 days.

12.1.1] Retention Force (F) against Log (Time (t))



Sección 11.1] Rendimiento de Piggyback Saddle





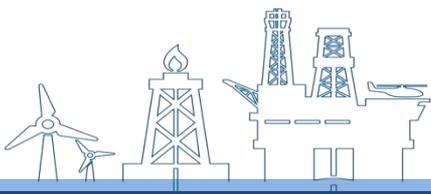
Inspección Geocean 7 Años



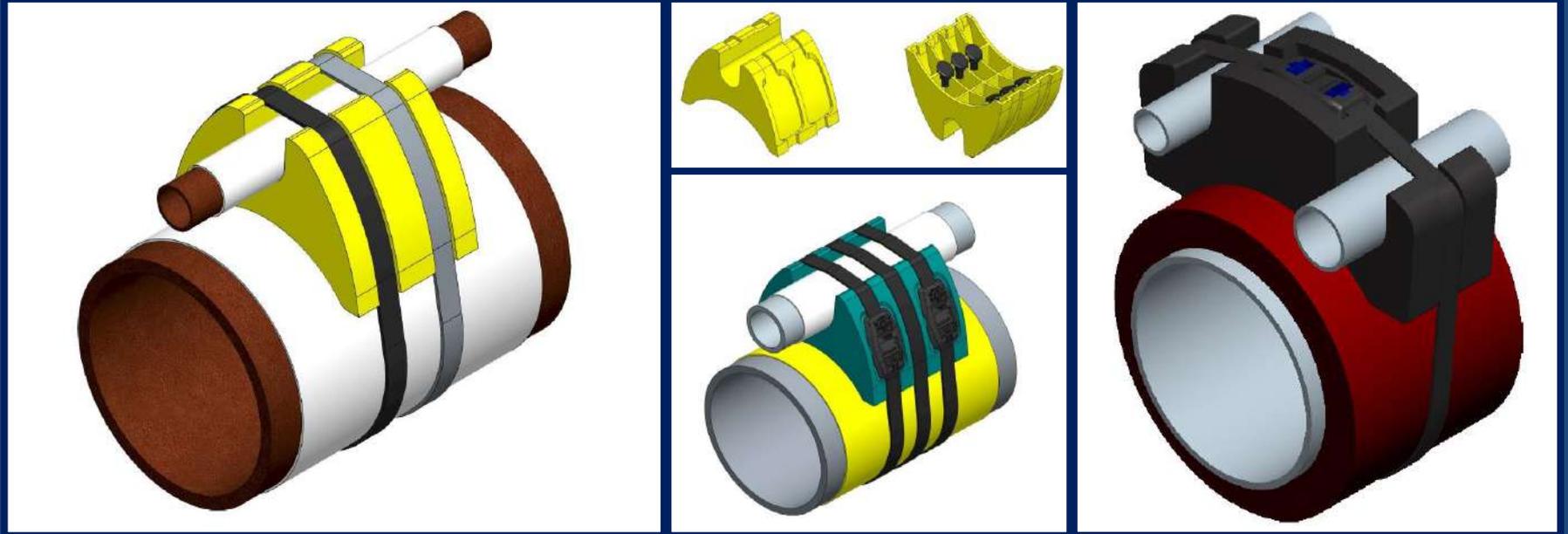
Línea de mar en buenas condiciones.
Abrazaderas línea de mar en buenas condiciones. (Anodo, tuercas abrazaderas)

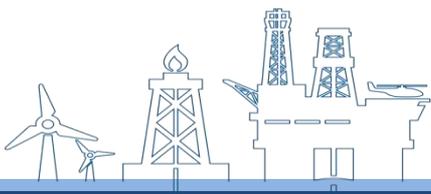
Abrazaderas de manguera (Smart Bands) vistas en agua fresca, están en buenas condiciones.



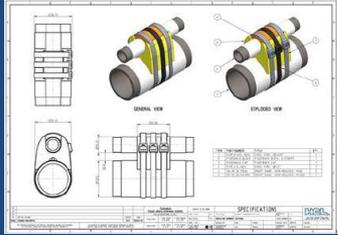


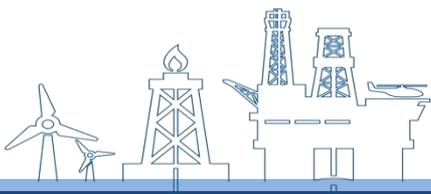
Diseño & Ingeniería



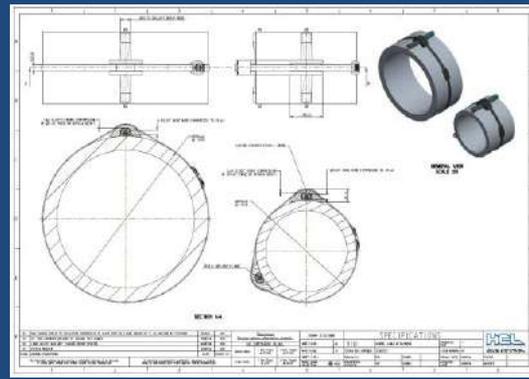
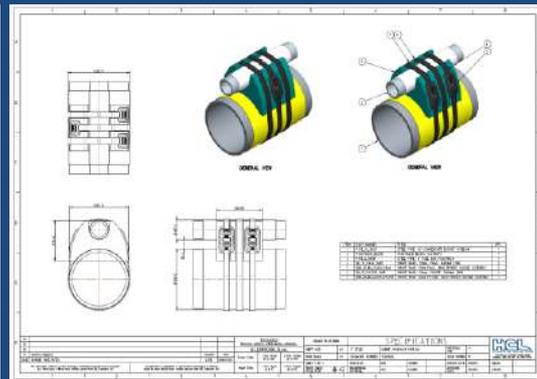
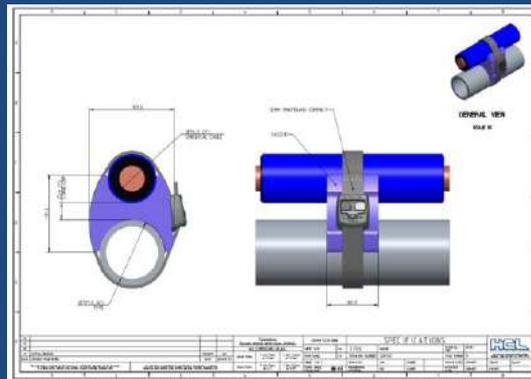
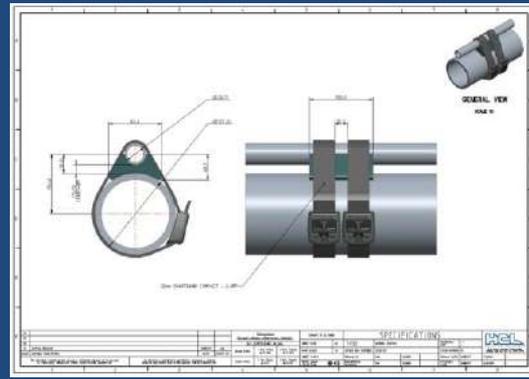
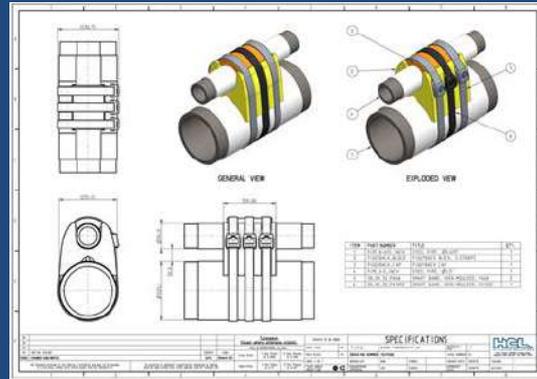
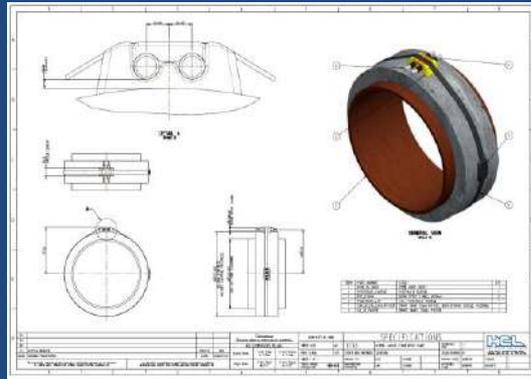


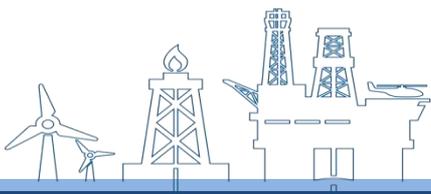
Sillines Smart®





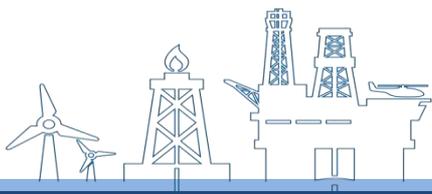
Diseño & Ingeniería





Entrenamiento en Sitio





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Cliff Head (Roc Oil)
Rosa (Total)
Holland LG4 (Total)
Kaombo (Total)
Egina (Total)
Greater Plutonio
Kashagan
Enfield (Woodside Petroleum)
Pyrenees (BHP Billiton)
Tombua Landana (Chevron)
Pazflor (Total)
Girassol (Total)
Bongkot (Perenco)
CLOV (Total)
BARD Wind Farm
Thannet Wind Farm

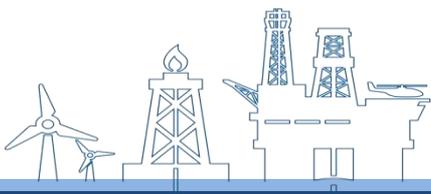
Balder Phase 3 (Exxonmobil)
Vincent (Woodside Petroleum)
West Nile Delta (BP)
Malikai (Shell)
Big Foot (Chevron)
Thunderhawk (Murphy Oil)
Schiehallion (BP)
Clair (BP)
Stones (Shell)





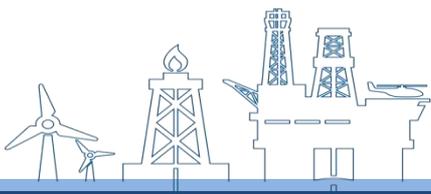
Smart® Band



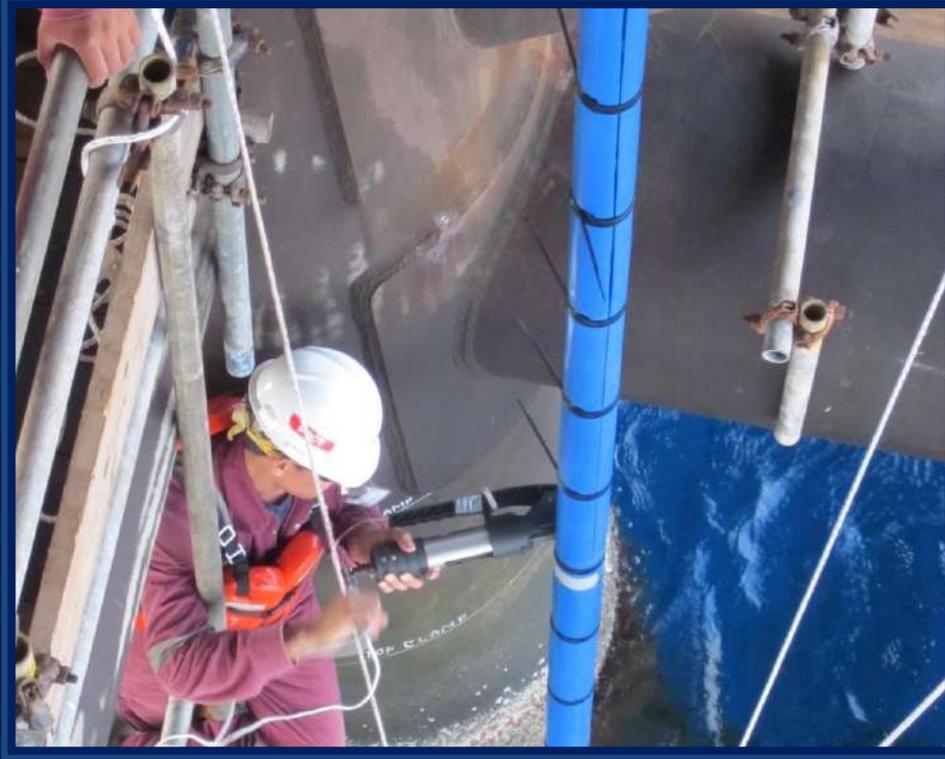


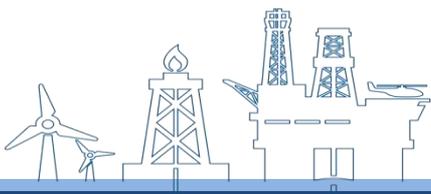
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Proteccion de Cable



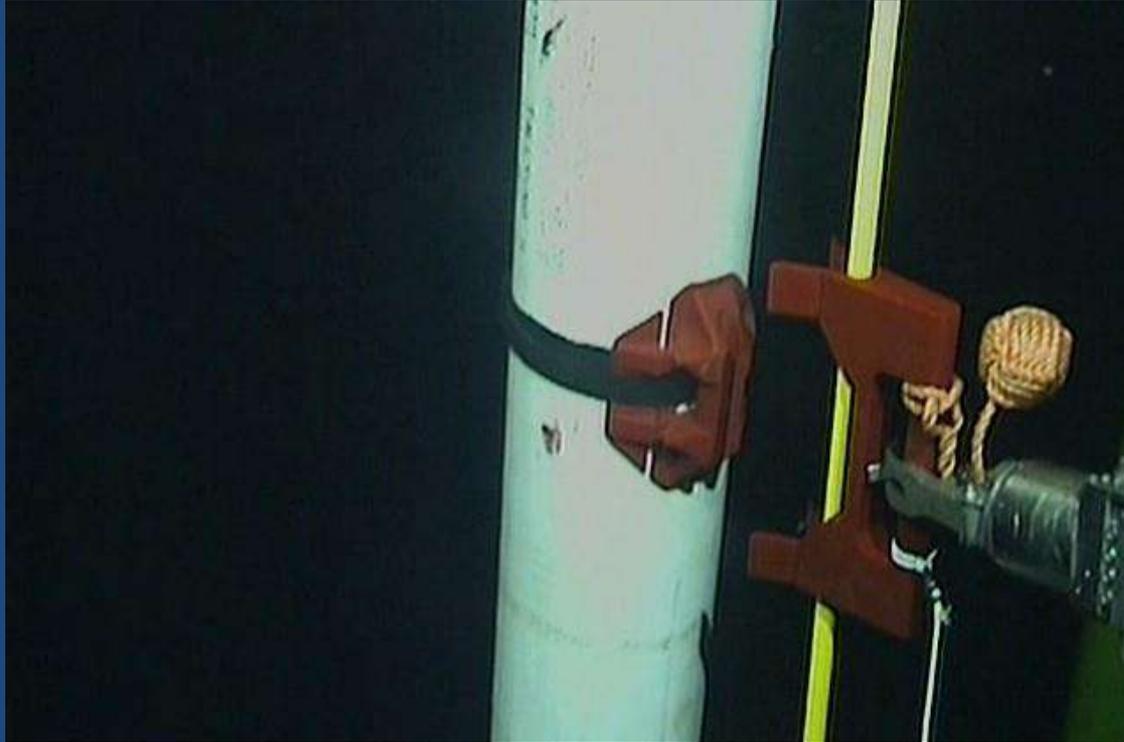


Bongkot





ENGINA





Apache

Cliff Head



HCL
CLAMPING SOLUTIONS



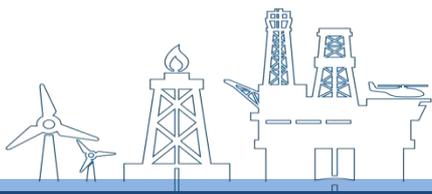


Technip

Vincent

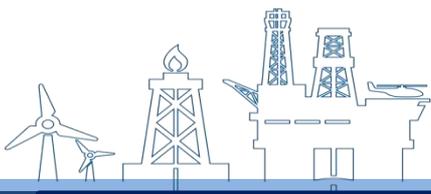


HCL
CLAMPING SOLUTIONS

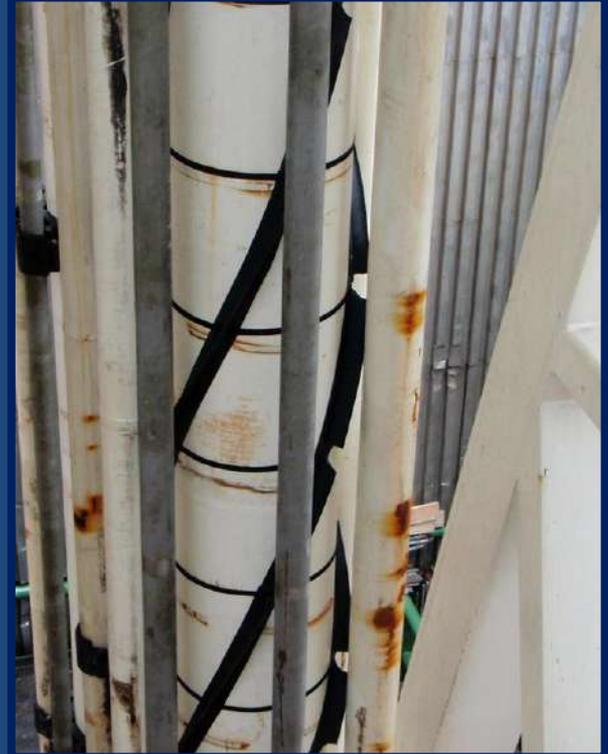


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VIV Strakes





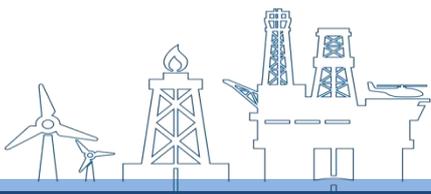
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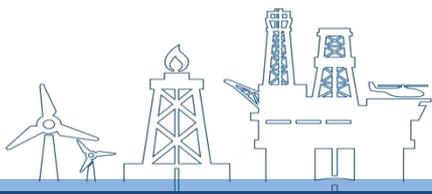
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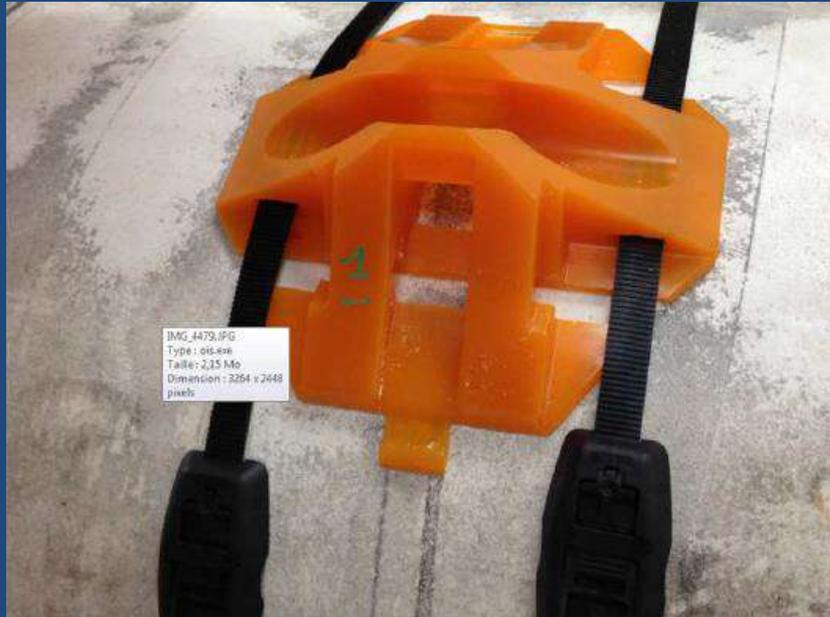


Y mucho más

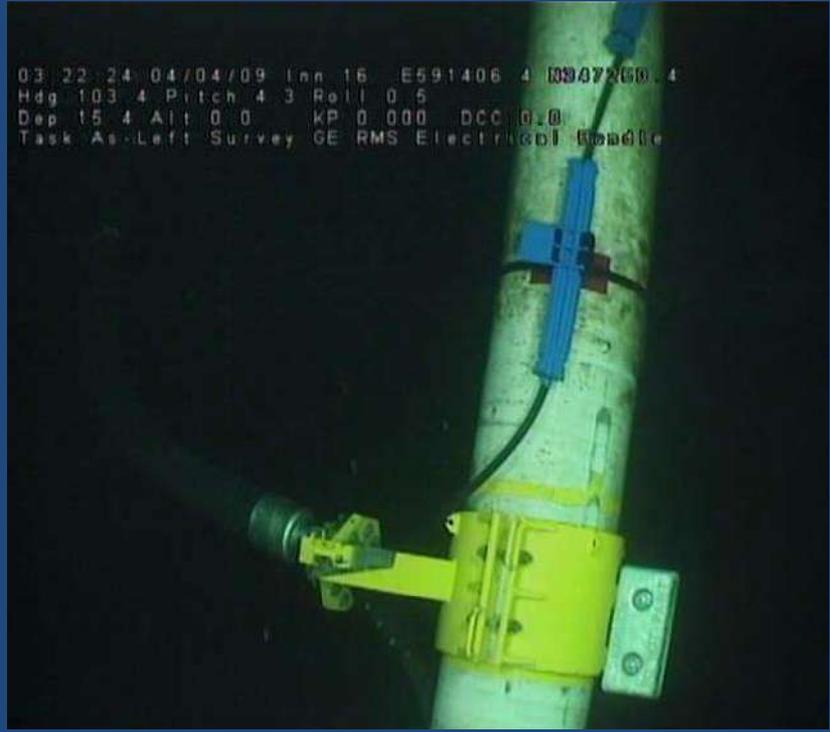




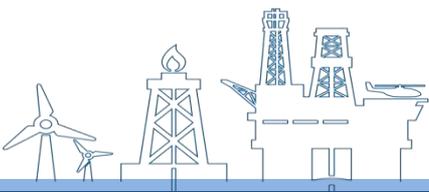
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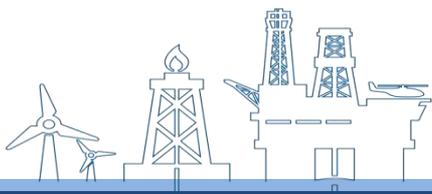


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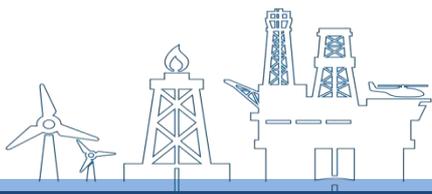
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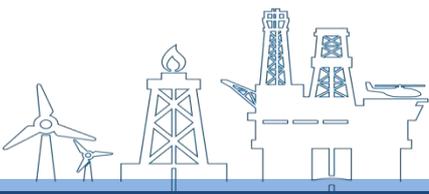




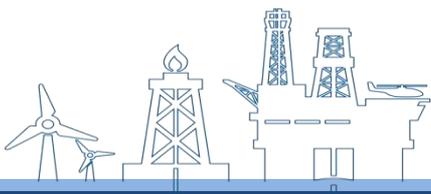
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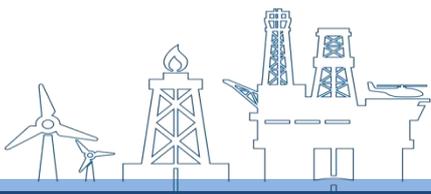


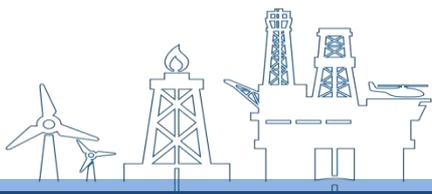


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HCL Fasteners Ltd
+44 (0)761 417714
sales@hclfasteners.co.uk

HCL Fasteners Corp
(281) 217 1145
sales@hcl-clamping.com

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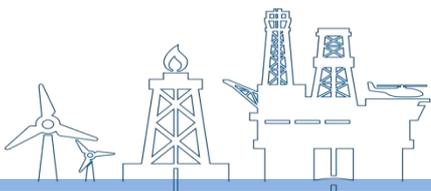




En Resumen

- No-Corrosivo
- Alta Resistencia
- Alta Retención
- Larga Vida
- Compresión Hidrostática
- Seguro
- Fácil de ajustar
- Económico
- Tiempos de entrega cortos
- Pre-ensamblados





Gracias.

Steve Pearce, *IEng, MIMechE.*

Export Sales Manager

 +44 7472643983

spearce@hcl-clamping.co.uk

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