



Unique **SEAFLEX**

A Unique Maritime Group Company



Continuous Support Overview -  
SeaSerpent™ for Cables



SeaSerpent in use, Egypt

# Seaflex SeaSerpent™ - Continuous Support for Cables

## Perfected and Patented

SeaSerpent is the safest, most effective and most flexible cable installation buoyancy system in the market, and has become the industry's system of choice for installing cables in shallow water. Efficiently replacing outmoded multiple floats to support a submarine cable during installation in shallow water, the patented SeaSerpent buoyancy system is a continuous inflatable tube directly attached to the cable at 1 to 1.2 metre spacing intervals to suit the cable weight.

## Unrivalled Support and Control

SeaSerpent support and control of the cable cannot be matched. Its key advantage is the operational flexibility it allows the installer; the easy launching procedure is followed by a progressive and controlled sinking sequence which can be started, slowed, or reversed by simple surface control, without subsea intervention.

The form stiffness developed by the SeaSerpent inflation pressure greatly decreases cable kinking tendencies, eliminates catenary sagging between floats and thereby removes the requirement to keep constant tension on the cable. This is a particular advantage when the cable contains sensitive fibre-optic elements.

## Optimised for your Operation

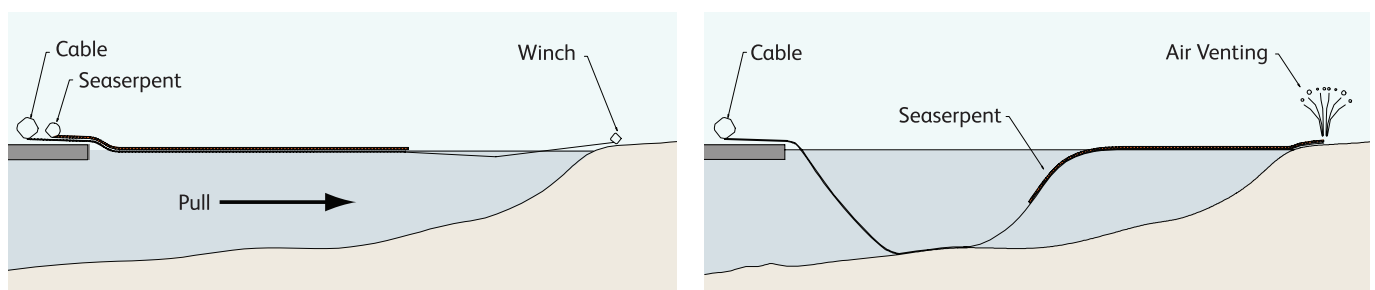
Unlike traditional solid floats, with the SeaSerpent it is easy to park the cable on the seabed during adverse tide or weather conditions and to re-float it when required. SeaSerpent even allows you to easily lift and reposition a cable to hit a trench, impossible with traditional methods. Sections of cable can also be easily towed to installation sites several kilometres from the launch point.

SeaSerpent is generally supplied in 'lay flat' form tightly wound on a braked deployment drum mounted above the cable where it exits the cable engine; the SeaSerpent tube is inflated as it unspools and is attached to the cable just before the launch point. This allows rapid and near continuous deployment. A powered drum can then be used to recover the SeaSerpent. For one-off applications, SeaSerpent can also be supplied on a simple timber drum if so required.

The SeaSerpent integrated system is not subject to the high attrition rate of traditional individual cable floats and saves a huge amount of deck space and manpower at the launch point. With only 1.5 square metres of deck space required to deck load a remarkable 1 kilometre of buoyancy, SeaSerpent reduces transport, storage, handling and replacement costs alongside its operational advantages of speed and control.

## Customised SeaSerpents and Handling Systems

Most cable types and weights can be immediately addressed from stock using the standard SeaSerpent range, catering to up to 130 kilograms per metre in weight. However, in the unlikely event that your cable can't be covered by our standard range we will manufacture a SeaSerpent to suit your specific buoyancy requirement. SeaSerpent handling systems are available for hire, and customised launch and recovery systems can be built by us to a client's fabrication drawings.



The Controlled Way to Install Cables in Shallow Water

## On the Job Support

To assist our customers with the smooth operation of the SeaSerpent, we are able to supply supervisory expertise from our own technicians - who have experience of working with the system on projects right around the world. Many of our SeaSerpent customers are now taking advantage of this service, to benefit from the efficiencies and the further cost-savings which result from having Seaflex expertise onboard their vessels.

# Key Features and Benefits at a Glance

## For Your Peace of Mind

- Tested and proven to greater than 3:1 over maximum working pressure.
- Supports cable fully and gently, with reduced risk of kinking.
- No stress point loads.
- 50 % reserve buoyancy factor at maximum working depth.
- Low capital cost.

## For Your Ease of Operation

- Surface control of the sinking process.
- Can be towed at up to 5 knots.
- Lift capacities from 15-130 kg/m.
- Compact and therefore cost-effective to ship, store and deploy.
- No need for excessive cable tension.
- Eliminates loss of individual floats.
- Systems can be supplied with Seaflex technicians, or we can train your people to use it efficiently themselves.
- Delivered ready for immediate use with universally compliant documentation: SeaSerpent specific log book containing certification, service records and operating manual.



### SEAFLEX SEASERPENT Dimensions

TYPE	LAY Flat Width	INFLATED O.D mm	BUOYANCY Kg/m	WEIGHT Kg/50m Section	100m DRUM Diameter & Width
2650-6-20	213	137	15	32	770 x 450
2650-5-16	258	164	22	37	770 x 450
2650-4-13	324	205	33	43	770 x 450
2650-3-10	434	275	60	54	770 x 550
2650-2-7	655	430	132	76	770 x 800

Drums for 200m lengths have a diameter of 1100mm

# SeaSerpent Punctures

One of the ‘frequently asked questions’ about SeaSerpent is “ What happens if we get a leak, do we lose the whole cable?” The answer is ‘ No’ - and here’s the reason why.

Imagine a 50kg SeaSerpent, with a 25kg/m cable attached, is floating on the surface with a positive pressure inside the tube of 0.2 bar. In this state it is quite firm to the touch and if any part of it was pushed underwater, it would maintain inflation (and thus its buoyancy) down to a depth of 2m. Lets say the total water depth is 14m.

Now take a sharp knife and slash a big hole in the SeaSerpent. The pressure immediately drops around the hole as air escapes, the buoyancy disappears and it starts to sink towards the seabed.

As the leak passes the 2m depth, the tube collapses and no more air can escape.

Although no more air is escaping, there is now a length of cable with no support which will sink to the seabed and continue to drag down more and more cable each side of it until the pressure rise inside the SeaSerpent caused by the decreasing volume is sufficient to support the cable down to a certain depth. The actual depth at which this happens is the same % age of the overall depth of water as the reserve factor of buoyancy.

This is because the reserve factor of 50% means one metre of 50kg/m SeaSerpent will support 2m of 25kg/m cable. So if the water is 14m deep only half this depth of SeaSerpent will be required to support the cable to the seabed i.e. a depth of 7m.

So if the SeaSerpent is ruptured for any reason, all is not lost although a fair length of cable may be on the seabed and the SeaSerpent remaining on the surface will have increased pressure to equal that of its lowest point of inflation, in this case 0.7bar.

To recover the situation, the damaged SeaSerpent section must be repaired, sealed or replaced, after which the portion of cable on the seabed can easily be raised by putting more air into the SeaSerpent.

This will progressively lift the cable off the seabed and back to the surface.

While on the subject of problems - there is another point that should be mentioned - namely, the ties.

It is absolutely essential that these are strong enough and secured so that they cannot come undone. Any decent knot ensures the latter but the strength required can be under estimated if the bursting stress of the tube is not allowed for.

It is not enough to say the cable weighs 20kg/m, so a tie every metre only needs to accept this load. In the sinking situation above, the last two or three ties are supporting 7m of cable which should be allowed for, as well as the load created by the internal pressure in the tube. As a rule of thumb, a safety factor of at least 6:1 should be used. 8mm, 10mm or 12mm polypropylene rope is usually favoured.

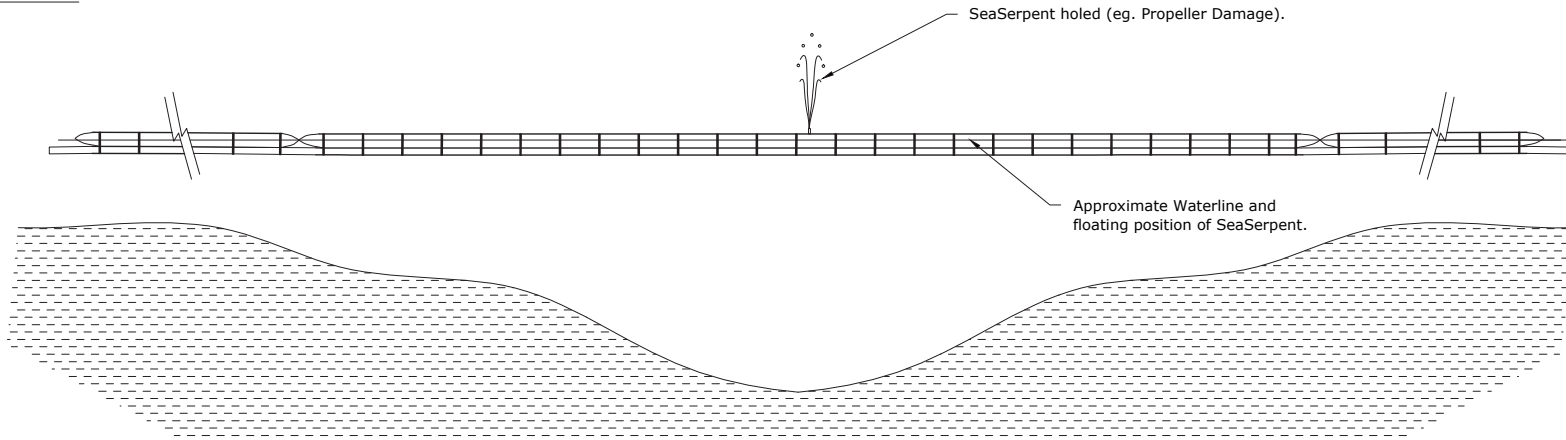
Having said all this, to date we have no reports of a SeaSerpent that has suffered a rupture failure and only one case where inadequate ties caused a problem. Provided propellers are kept away from the tube, it is a very robust and tolerant piece of equipment and gives very few problems in service.

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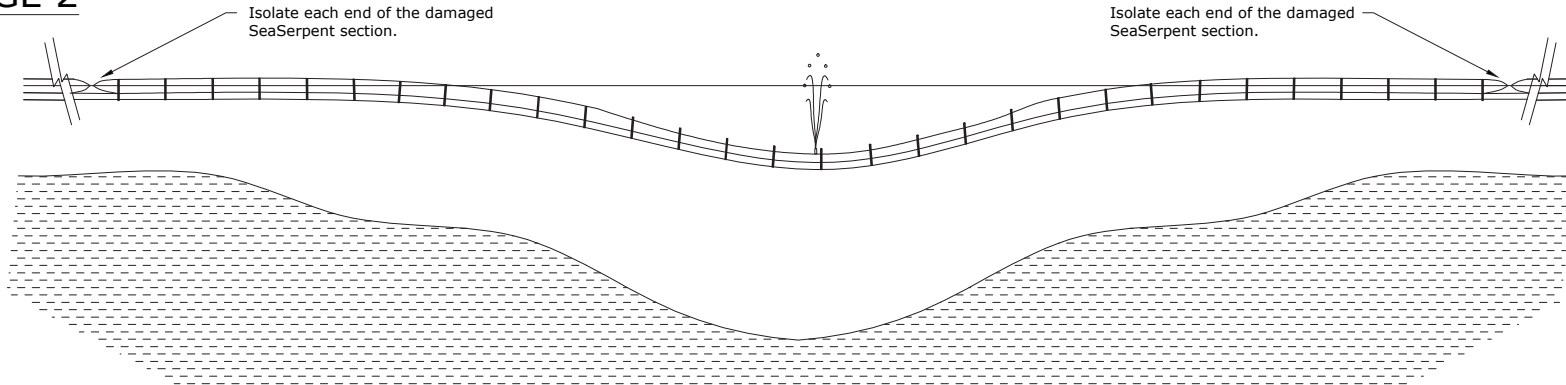
Other Information Sheets:

- SeaSerpent Practical
  - SeaSerpent Technical
  - SeaSerpent Limitations
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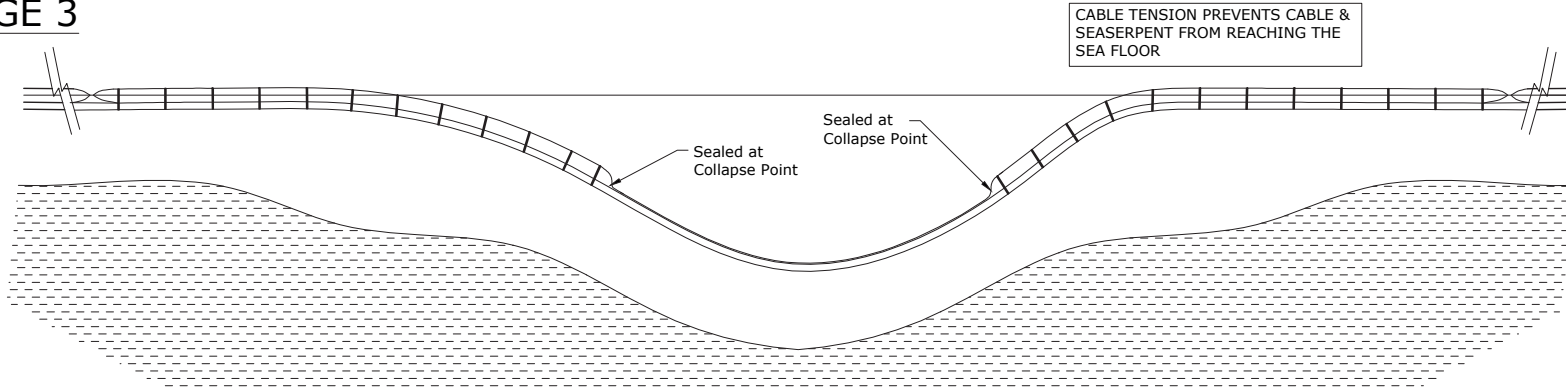
# STAGE 1



# STAGE 2



# STAGE 3

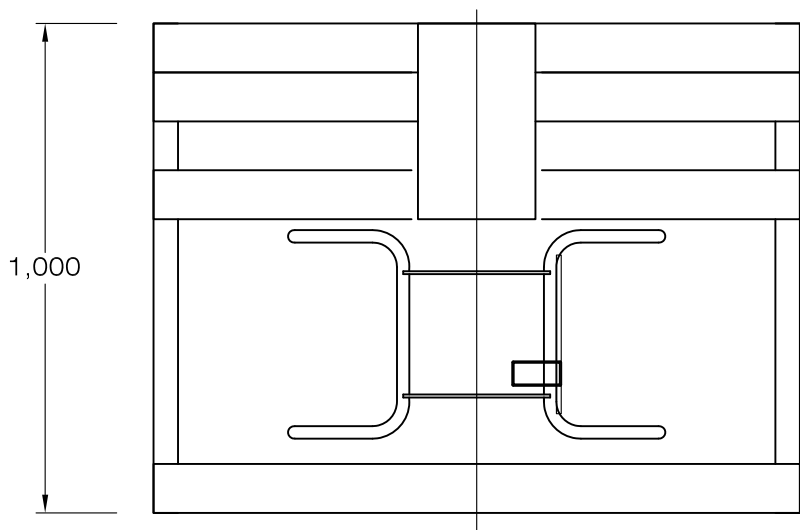
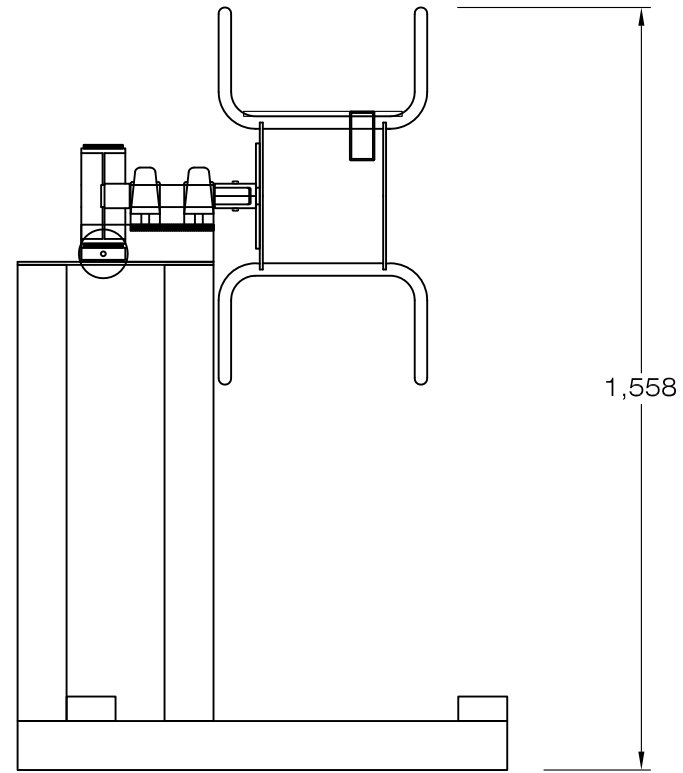
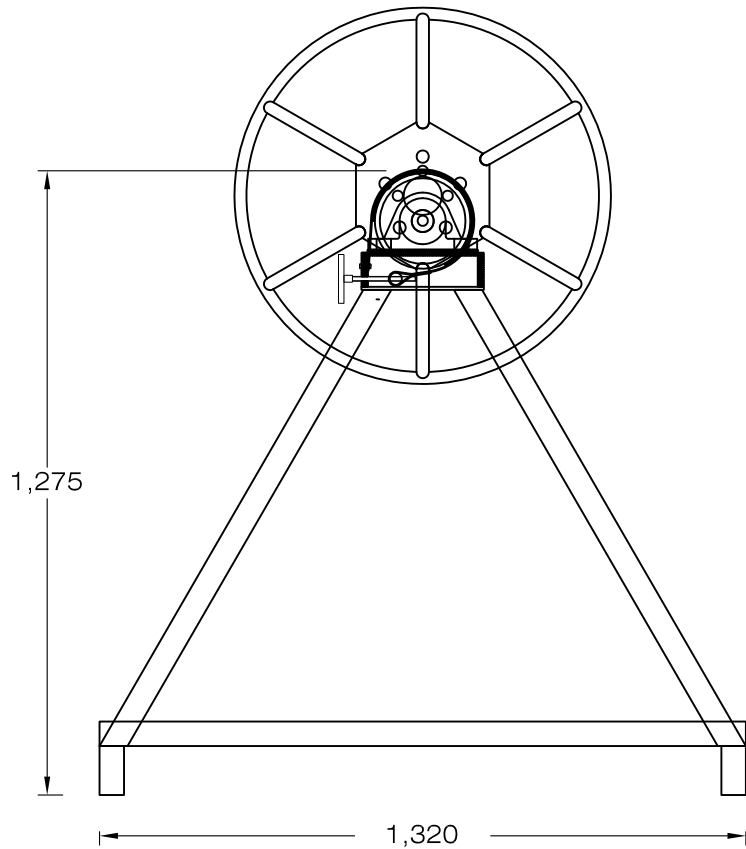


01	26.03.14	Initial Issue	GJP	GSB
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TITLE SEASERPENT PUNCTURE DETAIL			
SCALE N.T.S @ A3	DATE 26.03.2014	DRAWN GJP	CHECKED GSB
DRAWING No. SSPD - SERP - SD			REVISION 01



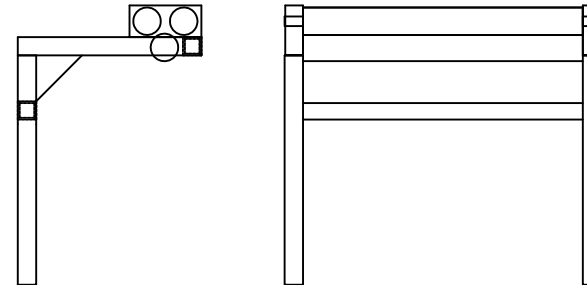
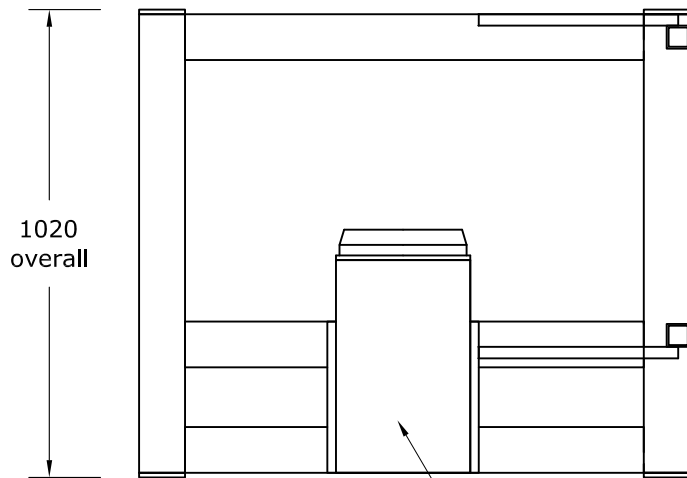
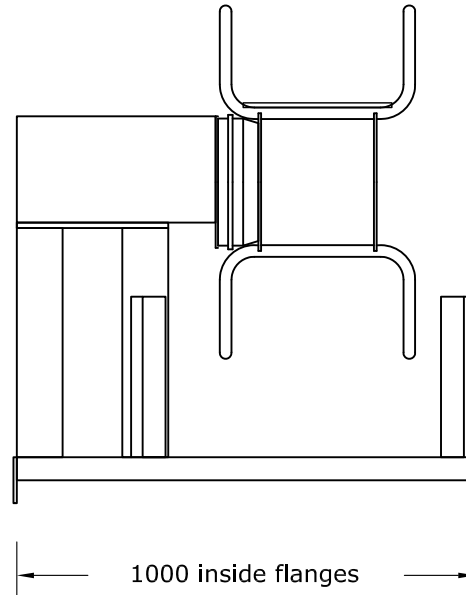
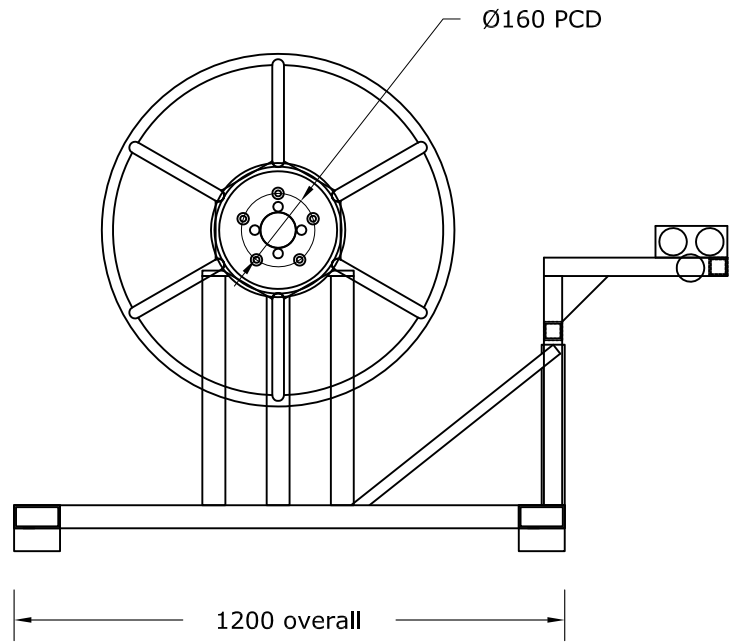
NOT TO BE USED FOR MANUFACTURE  
DIMENSIONS MAY VARY

01	03.08.12	Drawing Amended and Renumbered from 03020711614	GJP	GSB
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TITLE COMPACT DEPLOYMENT PEDESTAL			
SCALE N.T.S @ A3	DATE 23.08.2012	DRAWN GJP	CHECKED GSB
DRAWING No. CDP - SERP - SS			REVISION 01



Hydraulic motor, about 15rpm with plenty of torque (app 20+kg/m)

01	23.08.12	Drawing Amended and Renumbered from 0499032ML6	GJP	GSB
Rev	Date	Description	Drawn	Checked



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JULIA SEASERPENT COMPACT RECOVERY PEDESAL			
SCALE N.T.S @ A3	DATE 23.08.2012	DRAWN GJP	CHECKED GSB
DRAWING NO. CRP - SERP - RR			REVISION 01





# Case Study: Channel Island Electricity Grid Project

## Submarine Cable Shore Landings

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OPERATOR: CHANNEL ISLAND ELECTRICITY GRID

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CLIENT: VDS CABLE BV

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LOCATION: GUERNSEY - JERSEY - FRANCE

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WATER DEPTH: 0 - 35 MSW

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### Project Overview

VDS Cable bv, a Dutch Submarine Cable Installation Contractor, was awarded the contract for the installation of 2 HVAC power cables and 2 (bundled) fibre optic cables by the Channel Island Electricity Grid. The submarine cables were installed between the Channel Islands Guernsey and Jersey, then on to mainland France.

The power cables were manufactured by ABB High Voltage Cables of Norway; the fibre optic cables were manufactured by Ericsson of Sweden. The VDS Cable Installation Vessel 'SEA SPIDER' was used for the installation and burial of the cables.

Due to large currents and tidal ranges, combined with restricted vessel access for the shore approaches, Seaflex was contracted by VDS Cable to supply their patented cable flotation system - SeaSerpent.

### Seaflex Involvement

Seaflex Ltd. supplied 2000m of SeaSerpent cable flotation system Type 2350/2/10 giving a linear buoyancy of 106kg/m.

The SeaSerpent was supplied in 100m (16 off) and 50m (8 off) sections delivered on steel transport, deployment, recovery (TDR) drums. To complement the flotation system two pedestal deployment and recovery systems (DRS) were also supplied.

One manual brake DRS was stationed on the CLV SEA SPIDER for controlled deployment and one hydraulic DRS was stationed with the beach party.

For the start up of the project at Havelet Bay, Guernsey, Seaflex personnel were present to set up and initiate the first shore approach. During this first approach the cable was deployed at 260m per hour, 600m of SeaSerpent in total, cable towed to shore and laid in position within one tide. During the project the SeaSerpent spread was successfully used for a total of four HVAC and four F/O landings.



1. Early morning SeaSerpent equipment load-out on to CLV SEA SPIDER off Cowes, Isle of Wight.



2. SeaSerpent being attached to the HVAC cable showing Seaflex manual brake RDS.



3. The HVAC cable and SeaSerpent being deployed at Havelet Bay.



4. Small work boats are used to tow and position the cable.

# Case Study: Al Khalij Cable Shore Approach Project

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OPERATOR:	ELF PETROLEUM QATAR
CLIENT:	HAMSTO SUBMARINE CABLE CONTRACTORS
LOCATION:	HALUL ISLAND, GULF OF ARABIA
WATER DEPTH:	0-60 MSW

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## Project Overview

As part of the Al Khalij oilfield offshore Qatar, Elf Petroleum Qatar (EPQ) required the installation of a submarine power cable between Halul Island and the DP1 platform, as well as DP1 platform to the wellhead platform.

Through EPQ's main contractor, NPCC, HAMSTO was awarded the contract for the loading, transport and installation of the submarine cables. All cable operations were undertaken from the DP cable lay vessel 'HAM602'. The cables were manufactured by ABB Norsk Kabel AS, Tongsberg, Norway.

## Seaflex Involvement

Seaflex Ltd. supplied the patented cable flotation system, SeaSerpent, for the vessel to beach cable pull-in operation. The SeaSerpent flexible buoyancy, complete with deployment/recovery system, was delivered to the vessel ready for immediate use.

The complete system was seafastened in position before the vessel loaded the cable in Norway.

Once on location the SeaSerpent was successfully used to float the cable from the HAM602 in to the shallow water with the assistance of the lay vessel's MOB boat. Once at the landfall site the pulling wire was attached to the cable and pull-in operations commenced.

On completion of the pull-in, positioning and controlled lay-down was executed using SeaSerpent. The cable was positioned above the trench, running parallel to the pipeline, and by venting of the buoyancy from the shore end a controlled S-lay was performed.

## Seaflex Equipment

### Type 2650/6/15 SeaSerpent

Length:	500m (2 section of 250m)
Linear Buoyancy:	11kg per metre (cable @ 6.5kg/m)
Total Buoyancy:	5,500kg

### DRS System

Seaflex Ltd. designed and fabricated the DRS (Deployment, Recovery and Storage) System in-house to the project requirements of the client. Steel drums with manual brake solution was provided to take a minimum deck footprint.



SeaSerpent in action.

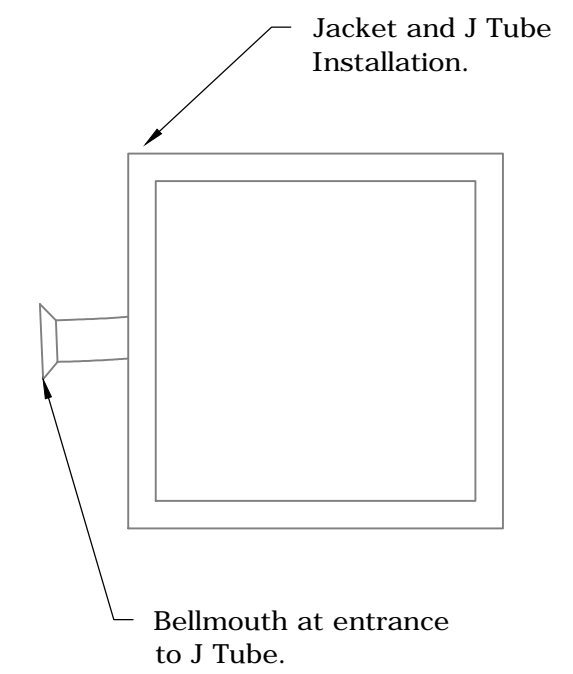
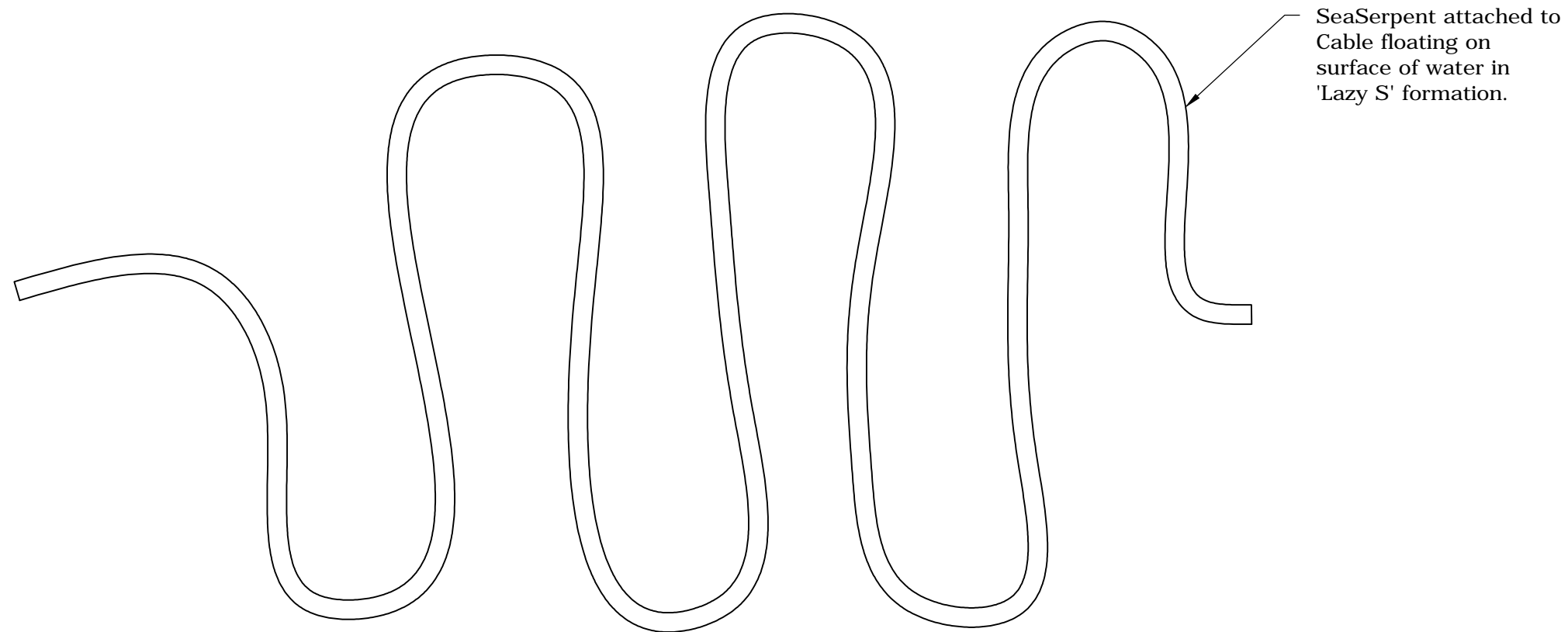


SeaSerpent DRS system positioned on deck at aft overboarding station.



Halul Island, Qatar, Gulf of Arabia.

STAGE 1 - Floating the SeaSerpent and Cable into Position



01	13.05.15	Initial Issue	GJP	GSB	GSB
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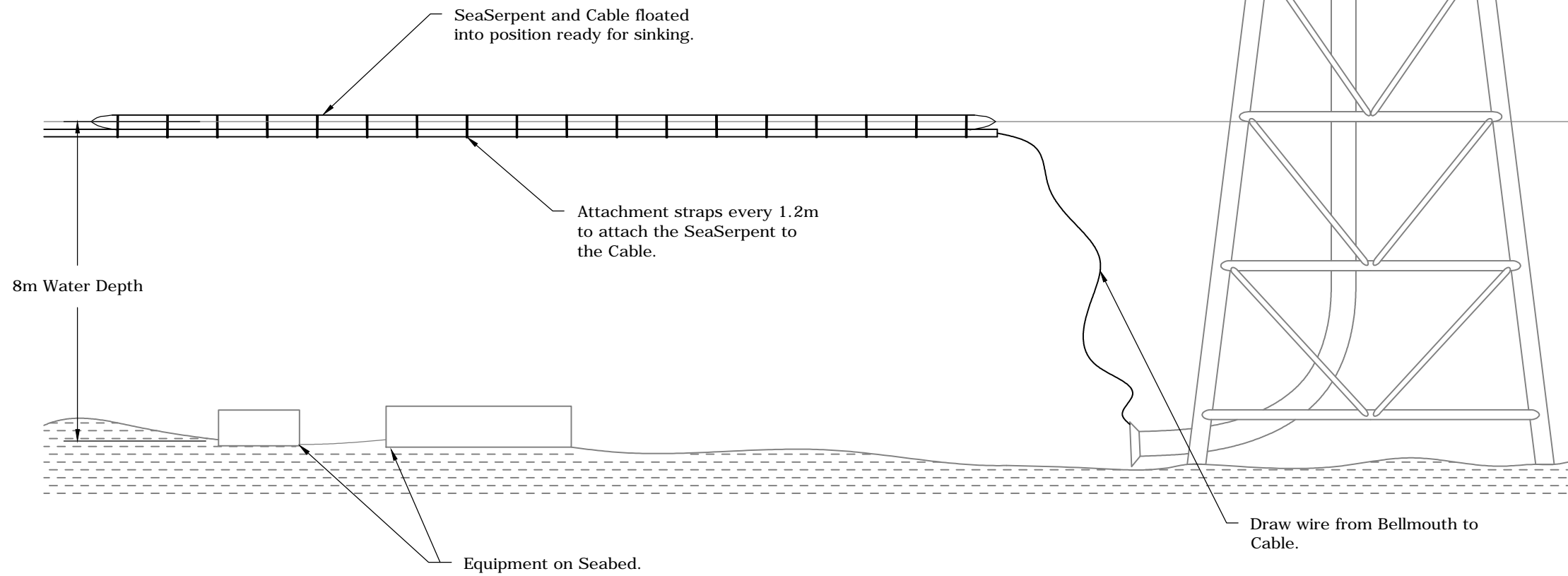
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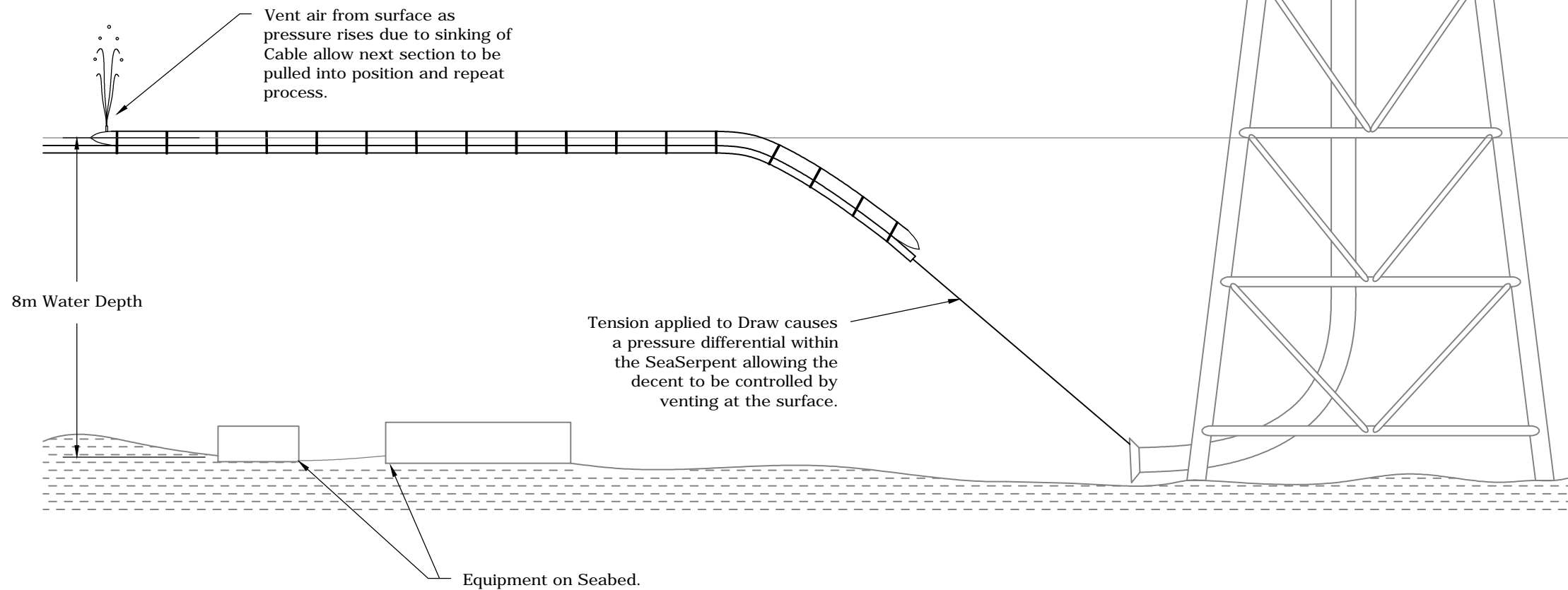
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<b>DRAWING TITLE</b>	<b>SCALE</b>
<b>J-Tube Installation Layout</b>	<b>N.T.S @ A3</b>
<b>PROJECT NUMBER</b>	<b>DRAWN</b>
	<b>GJP</b>
<b>PIPEI - SEAS - 001</b>	<b>REVISION</b>
	<b>01</b>

**STAGE 1 - Floating the SeaSerpent and Cable into Position**



**STAGE 2 - Tension Added to Cable from Draw Wire**



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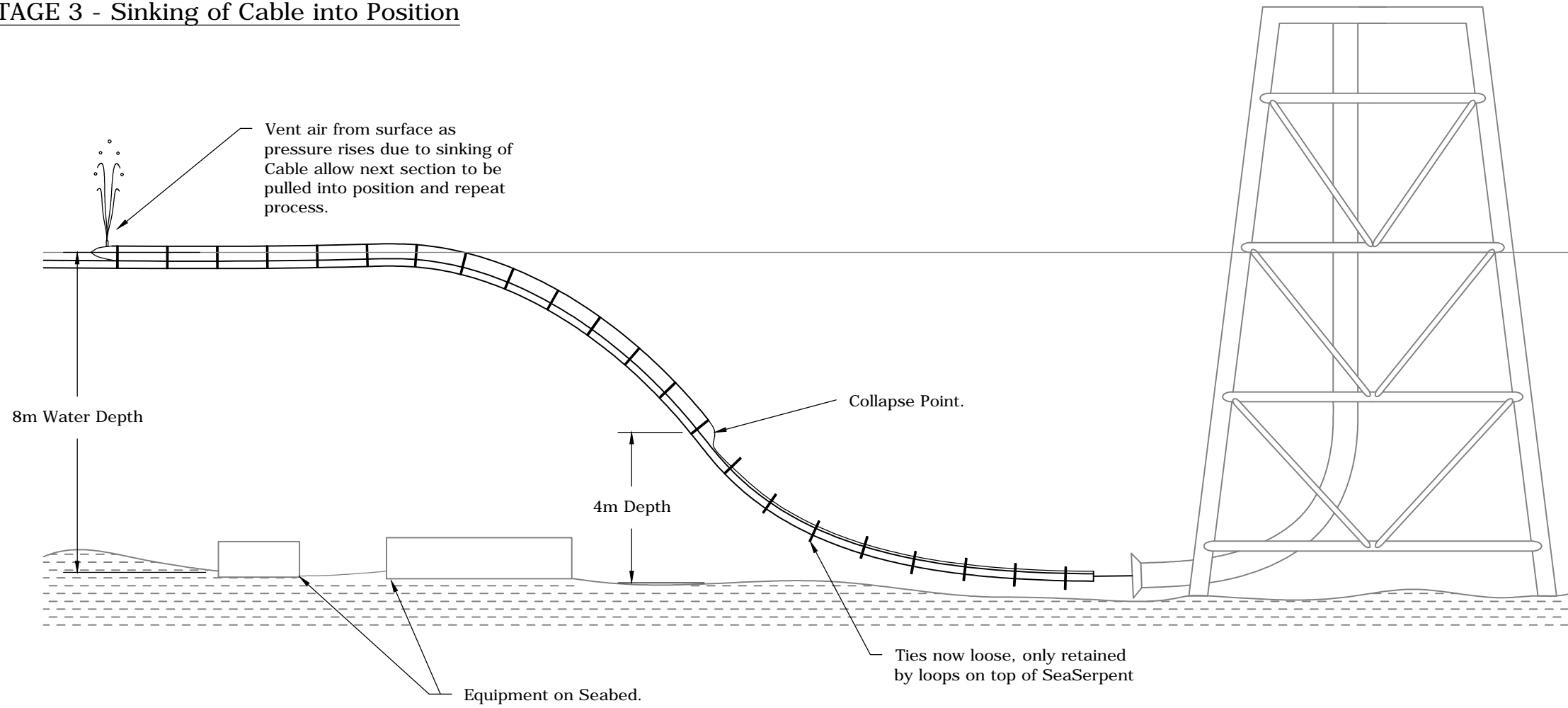
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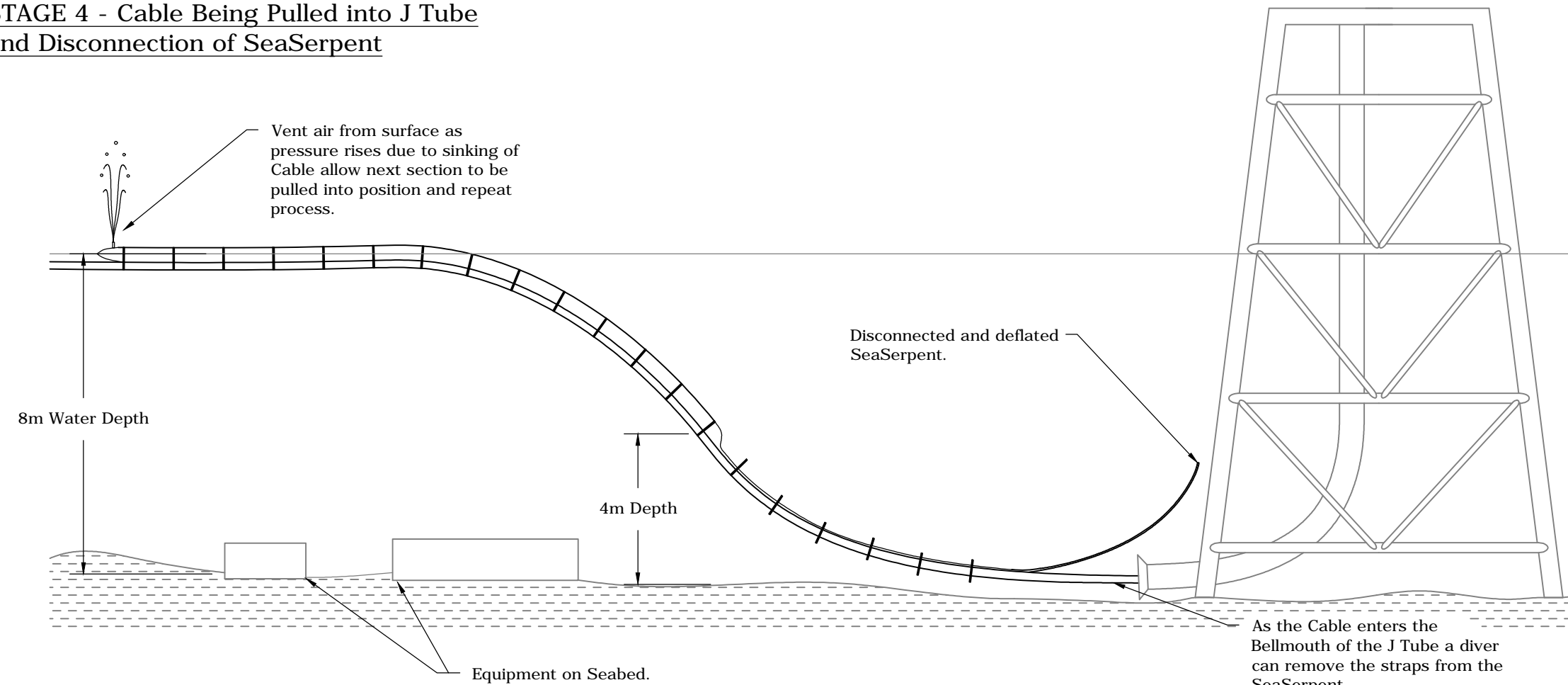
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<b>DRAWING TITLE</b>	<b>SCALE</b>
J-Tube Installation - Stage 1 & 2	N.T.S @ A3
<b>PROJECT NUMBER</b>	<b>DRAWN</b>
PIPEI - SEAS - 002	GJP
	<b>REVISION</b>
	01

**STAGE 3 - Sinking of Cable into Position**



**STAGE 4 - Cable Being Pulled into J Tube and Disconnection of SeaSerpent**



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<b>DRAWING TITLE</b> J-Tube Installation- Stage 2 & 3	<b>SCALE</b> N.T.S @ A3
<b>PROJECT NUMBER</b> PIPEI - SEAS - 003	<b>DRAWN</b> GJP
	<b>REVISION</b> 01

# Our Credentials

Seaflex manufactured our very first range of lift bags for rental and sale to service the diving industry in 1987, in sizes up to 500kg.

Over 25 years later, our biggest Air Lift Bag is 100 times larger than that at an industry-leading 50,000 kg and we employ around 30 skilled staff at our custom-built 30,000 square foot manufacturing facility in Cowes on the Isle of Wight.

In 2011 Seaflex was acquired by the Unique Maritime Group, a global provider of integrated support services for the offshore sector. Unique Maritime Group's expanding network of companies are specialists in ROV, diving, survey, NDT and engineering services. With the benefit of UMG's global footprint and support structure, Seaflex is these days even better placed than ever to meet the needs of its customers - no matter where in the world they are working, nor how challenging or urgent their requirement may be.

As you would expect of a company working in an industry where the concepts of quality and safety are paramount, all our work is carried out within a system which complies with the ISO 9001-2008 Quality Management Standard for full traceability - and we now have also gained ISO 14001 Environmental accreditation and ISO 18001 Health and Safety accreditation for our manufacturing operation. We have also had independent verification of the compliance of our WaterLoad™ bags with LEEA 051 guidelines and of our Buoyancy bags with the requirements of IMCA D-016. ABS have also issued us with full Product Design Assessment (PDA) certification for our main products.

But any company can talk about the vast amounts of testing, certification and accreditation which have been carried on their products - fewer companies can substantiate such claims. Seaflex is one of those which can back up their claims - however, our credibility does not come from bits of paper: it comes from our customers, from the work we have been doing with them for over 25 years, and from the fact that they keep coming back to us time and time again.



# Our Philosophy - Whenever, Wherever

We have a simple philosophy here at Seaflex: we will do everything within our power to deliver what our customers need from us, whenever they need it and wherever they need it.

That simple philosophy is born of several different levels of understanding:

- An expert understanding of how to design, manufacture, prove, deliver and support best-in-class bags for ballast or buoyancy.
- An in-depth understanding of the regulatory environments in which we and our clients operate - both onshore and offshore.
- The desire to understand our clients' businesses, and to work with them to achieve the best possible technical and financial outcome for them.

We are not complacent: we are only where we are due to our ability to keep our band of loyal customers happy, whilst adding to them by demonstrating to others the value which we can bring to their businesses. If we let that slip then we are nowhere. And that is why we keep investing in our business: to better serve your business.

Hence the brand new factory capable of producing 3,500 tons of lift and water load testing capacity each and every month. And hence us holding and managing the largest global rental fleet of buoyancy and ballast bags.

As you continue to invest in us, we'll continue to invest in you. We are always happy to hear from customers new and old alike as to how we may better serve you. We will travel the world to meet with you at your convenience, and the doors of our factory are always open and the kettle is always on for visits from those who would like to see what we do, and how we do it, for themselves.



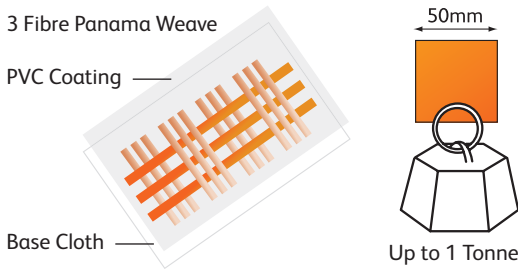


# Seaflex - Technology, Service and Support

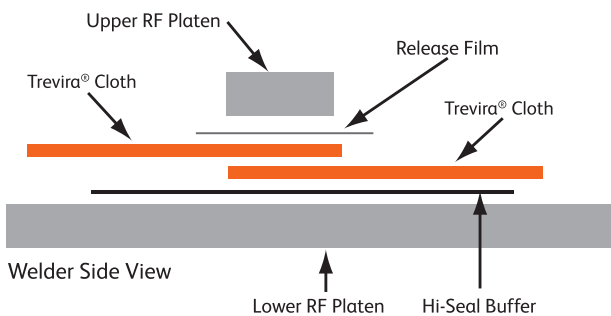
## Manufacturing Technology

All Seaflex products are designed and manufactured in the UK.

Our bag canopies are constructed from High Tensile Trevira® Polyester base cloth (either 2 /2 or 3 /3 fibre panama pattern weave) coated with heavy duty UV stabilised PVC coating or, for special applications, polyurethane. Trevira is incredibly strong; a 50 mm wide 3/3 strip has a break load of approximately 1 tonne.



The panels for our bags are precision cut on our 15 metre long, 3 metre wide advanced automated table for perfect repeatability. Once inspected and approved panels are assembled by skilled personnel to using Radio Frequency welding to strict quality control standards.



## Certification

All our work is carried out within a system which complies with the ISO 9001-2009 Quality Management Standard as audited by Lloyds Register Quality Assurance for full traceability - and we have now gained ISO 14001 and ISO 18001 accreditation.



## Service

Whether for hire or sale, all Seaflex products are sent out fully tested and inspected against their build criteria. And we do also offer on-site support to our clients in the use of our products - this most often happens within the more complex buoyancy applications for our products.

In the event that your Seaflex product should suffer minor damage in service, we can supply an approved, boxed field service kit comprising of patches, a professional quality heat gun and instruction manual to make good minor leaks prior to product refurbishment.

We can also advise on the viability of carrying out more extensive repairs, which would typically be undertaken either at our factory or at one of our approved service centres.

## Support

Our support philosophy is “Wherever, Whenever”. This underlines the Seaflex commitment to not just sending out tested, proven products in proper shipping crates and with the most comprehensive documentation package in the business - but to assisting our customers in every way possible throughout their time using our products, whether the job is a hire project or an equipment sale.

We offer worldwide support to our customers via either email or phone from head office in the UK and via our ever-growing network of offices and partners around the world.

Put your trust in Seaflex. We won't let you down.



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